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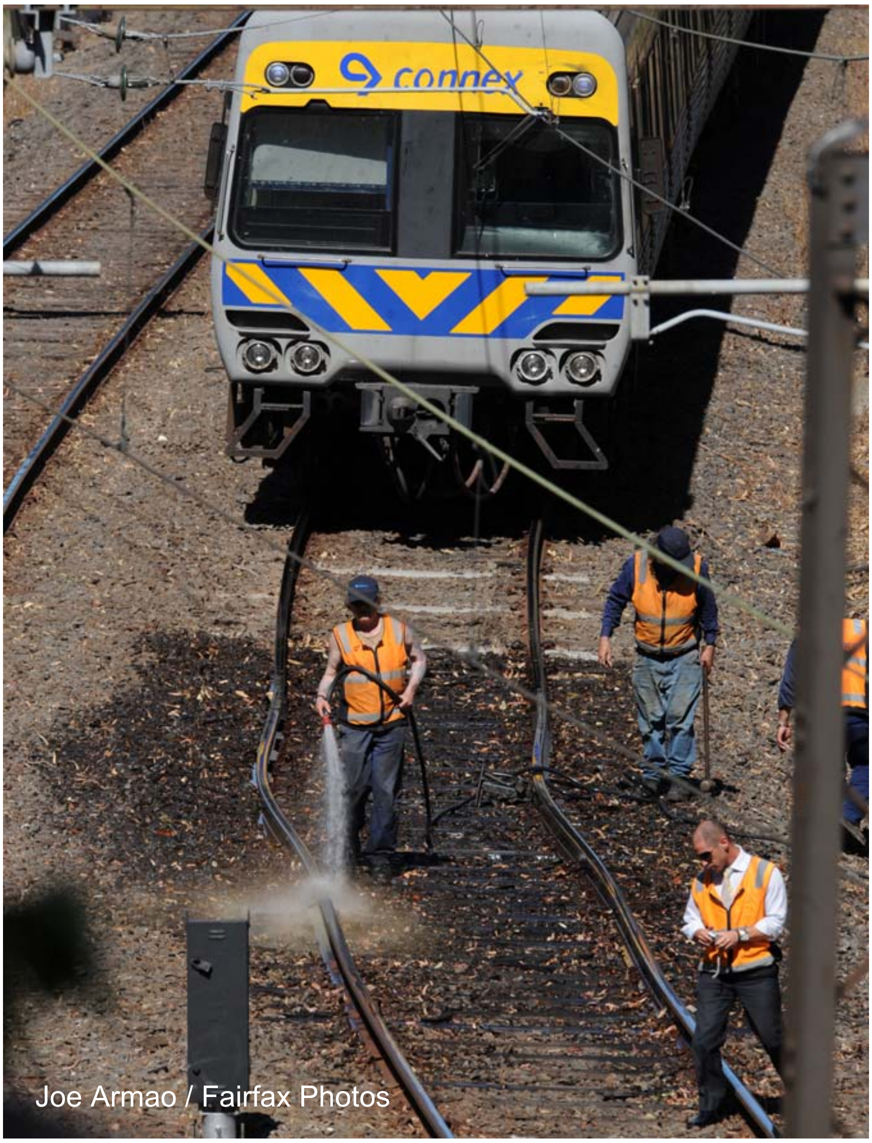

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An Investigation of Extreme Heatwave Events and Their Effects on Building & Infrastructure

Minh Nguyen, Xiaoming Wang and Dong Chen

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Enquiries should be addressed to:

Dr Xiaoming Wang
Urban System Program, CSIRO Sustainable Ecosystems
PO Box 56, Graham Road, Highett, VIC 3190, Australia
Xiaoming.Wang@csiro.au

Dr Minh Nguyen
Urban Water System Engineering Program, CSIRO Land & Water
PO Box 56, Graham Road, Highett, VIC 3190, Australia
Minh.Nguyen@csiro.au

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EXECUTIVE SUMMARY

This report presents a preliminary study of extreme heatwave events using the historical daily maximum temperature data. The study aims at establishing an analysis framework for modelling extreme heatwave events and their effects on the building and infrastructure performance.

- Using the historical data of daily maximum temperature recorded by the Bureau of Meteorology at 548 stations across Australia, conditional probabilistic modelling for two types of extreme heatwave events, hot days and hot spells, have been developed. The average recurrence interval, also known as the return period, of the number of extreme heatwave events for a given threshold temperature were estimated and mapped for Australia. This would provide a basis for assessing vulnerability and identifying adaptation options for buildings and infrastructures on various aspects, such as building thermal performance and energy efficiency, occupants' comfort, productivity and health, fire risk, utility and transport infrastructure serviceability and structural integrity.

- An analysis of the changes in a number of extreme heatwave events over time has been undertaken. It was found that over the last 150 years or so, Melbourne has an increasing number of yearly hot days with maximum temperature of more than 30°C, which was more likely due to the increasing number of hot spells that last 2 days or longer. The trend was also found in some of other locations with different extents.

- A scenario analysis on the effect of consecutive hot days or a longer hot spell on building thermal performance and cooling energy requirement has been conducted by using CSIRO AccuRate software. It was found that the longer a hot spell was, the higher cooling energy for each day was required. For a typical single floor house with 3 bedrooms, the daily cooling energy requirement in a 4-day hot spell event was 32% more than the demand in a single 1-day hot spell. In other words, an *n*-day hot spell therefore has more pronounced effects on building performance than *n* hot days occurring separately, basically due to the effects of thermal mass. It should also be indicated that the longer hot spells also has more significant impacts on occupants' comfort and health.

- Case studies on building and infrastructure under an extreme heatwave have been discussed, including a sensitivity check on the effects of insulation in building envelope on indoor temperature; a consideration of energy loss in electricity transmission and distribution, and an assessment by Monte-Carlo simulation of the thermal load and buckling of railways during the heatwave in Melbourne in Jan 2009. The approaches were outlined and discussed to provide basic approaches for further detailed investigations.

In summary, 'hot spells' are proved to be a more appropriate parameter than the conventional 'hot days' for evaluating the impacts of heatwaves on building and infrastructure performance. The hot spells are defined in different durations, properly

taken into account the time duration effect of extreme heatwave events. The hot spells also would be a more appropriate parameter to consider the deterioration of occupants' comfort and health under heatwave events.

In summary, the study is providing essential components that can be linked to form a consistent analysis/simulation framework for further investigation of heatwave impacts on different types of physical infrastructures. It is envisaged that in the next stage, research focus will be given to each type of infrastructure.

1. INTRODUCTION

1.1 Extreme Heatwave events – Hot days and Hot Spells

Among climatic parameters, temperature is the one that shows the highest likelihood to increase in the projected future climate scenarios (IPCC 2007a, CSIRO 2007). However, while the changes in the temperature have been the focuses in many studies, extreme heatwave events, which are characterised by prolonged high temperature durations, and especially their effects on building and infrastructures, have yet to be given due consideration. It is anticipated that not only the high temperature, but also the prolonged duration of a heatwave event, has its impacts on building and infrastructure performance. This will, in turn, has greater effects on indoor environment, occupants' comfort, productivity, health, and safety.

This study presents an investigation of extreme heatwave events on the basis of historical temperature observations. The study aims at establishing an analysis framework to identify and model extreme heatwave events as well as their effects on the building and infrastructure performance. There are two ways to describe extreme heatwave events, i.e. hot days and hot spells. While the hot day has been widely used in a number of climate change studies (IPCC 2007b, CSIRO 2007, and Hennessy et al. 2008), the hot spell seems having attracted much less attentions. In fact, it would be a more proper parameter to be taken into the consideration of extreme heatwave impacts on buildings and infrastructure.

In this study, the two types of parameters to describe heatwave events are defined as follows:

- A hot day is a day which has the maximum temperature (T_{max}) equal to or higher than a defined threshold temperature. The number of the hot days per year will be the parameter of interest.

- A hot spell is a group of consecutive days in which the maximum temperatures (T_{max}) of all days are equal to or higher than a defined threshold temperature. The number of *n-day* hot spells per year will be the parameter of interest, where n = 1, 2, 3, … is the duration of a hot spell in day(s). Therefore, given a threshold temperature, one n-day hot spell comprises n hot days that occurred successively.

Examples of hot days and hot spells are illustrated in Figures 2.1 and 2.2, respectively, with $T_{max} \geq 40°C$ and $T_{max} \geq 35°C$. The temperature was observed during the period of Jan and Feb 2009 in Melbourne, when the latest heatwave and 'Black Saturday' hit Victoria.

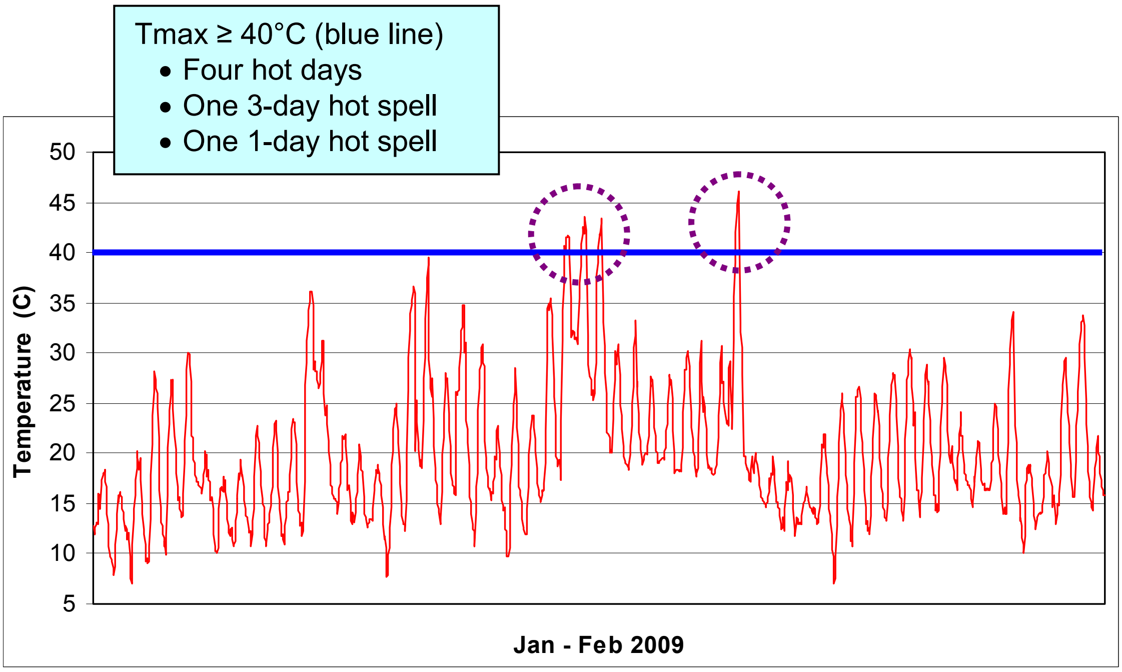


Figure 2.1 – Illustration of hot days and hot spells with Tmax ≥ 40°C

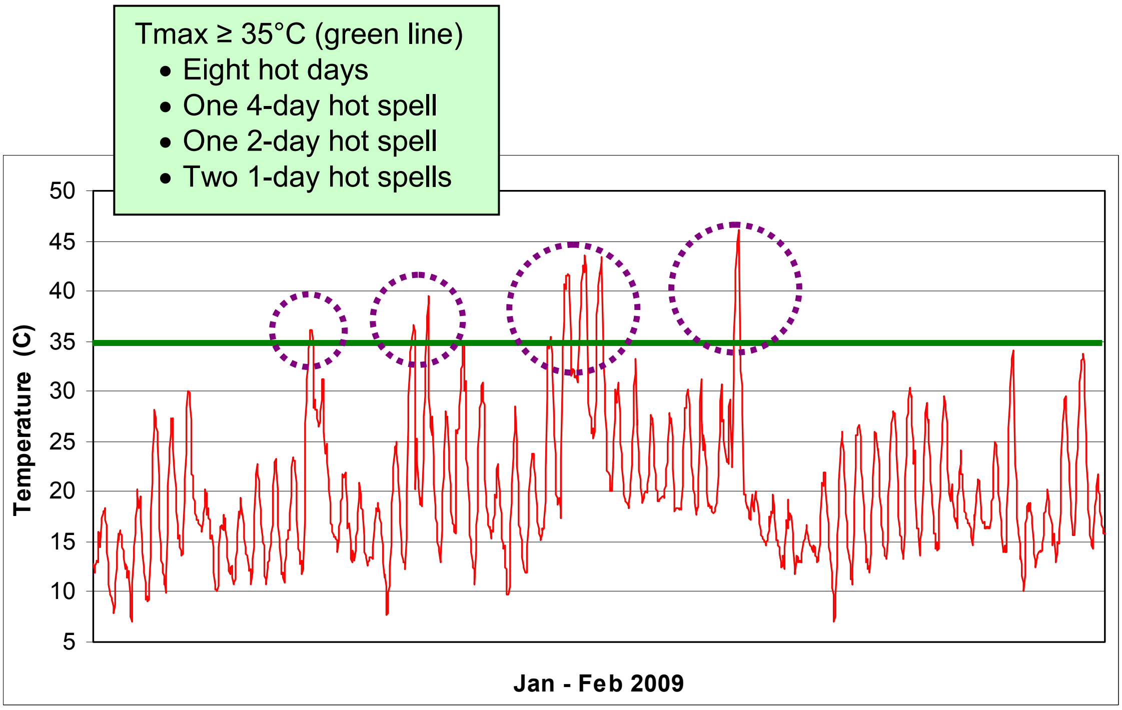


Figure 2.2 – Illustration of hot days and hot spells with Tmax ≥ 35°C

Threshold temperature is also important for building and infrastructure design. The selection of the threshold value may depend on the assessment scenarios to be considered. For example, the threshold temperature can be set at 30°C when considering the effects on building thermal performance and energy requirement for cooling; at 35°C when considering the effects on human comfort, health and safety; and at 40°C when considering fire hazard or utility failures. In this study, 4 thresholds, including 25°C, 30°C, 35°C, and 40°C, will be considered.

1.2 Data Descriptions

Daily maximum temperatures, hereafter denoted as T_{max}, recorded by the Bureau of Meteorology (BOM, 2009a) are used for the investigation. The data are available up to the end of April 2008 at total 1703 stations across Australia. The observation period of temperature, however, varies greatly among the stations, as plotted in Figure 2.1. To assure the statistical validity, 548 stations which have data record for more than 30-years were chosen for the analysis. A list of the stations is given in Appendix A. Their locations are depicted in Figure 2.2.

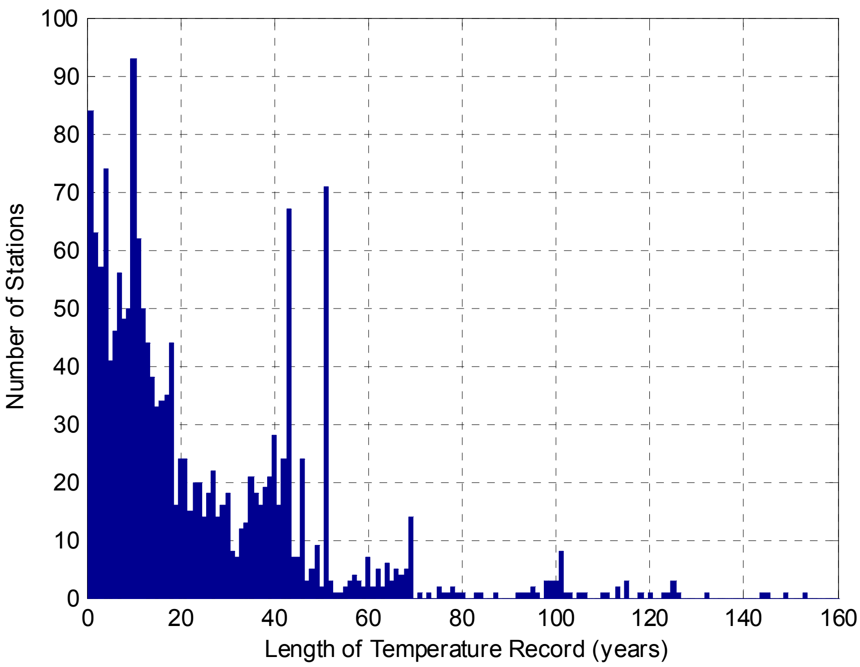


Figure 2.1 – Temperature record length versus number of stations

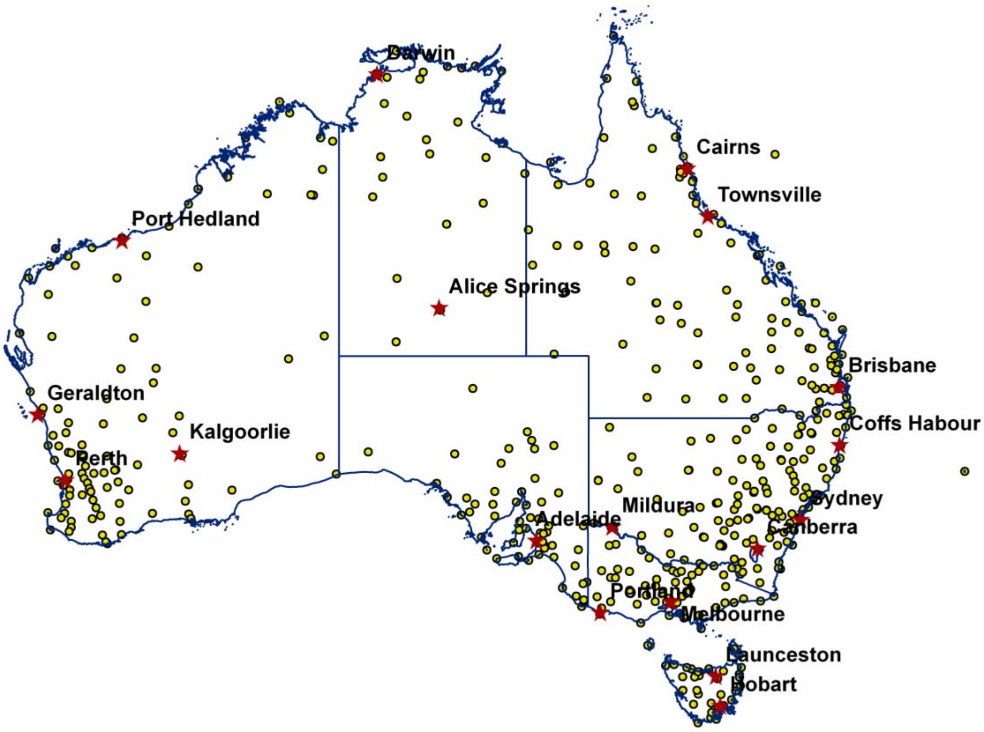


Figure 2.2 – Location of 548 BOM stations having record period more than 30 years

There is an exception for the data at Melbourne Regional Office Station, which will be used frequently to illustrate the modelling and analysis in the main text of this report. The daily maximum temperature data has been updated to April 2009 to include the 3-day hot spell with T_{max} > 40°C in January 2009 and the 'Black Saturday' 7 Feb 2009.

Hourly temperature data of January and February 2009 in Melbourne has been obtained from BOM to be used for climate data input to AccuRate in the parametric studies in Section 5.

2. EXTREME HEATWAVE EVENTS ACROSS AUSTRALIA

2.1 Hot days

This Section aims at evaluating the conditional probability of the yearly number of hot days given a daily maximum temperature threshold.

2.1.1 Data Processing for Number of Hot Days in Each Year

As defined, a hot day is a day which has the maximum temperature equal to or higher than a threshold temperature. It is therefore straightforward to count the number of hot days every year from the maximum temperature data record from each of the stations. As an example, Figure 3.1 shows the number of hot days with threshold temperature of 30°C from 153 years of data recorded at Melbourne Regional Office Station.

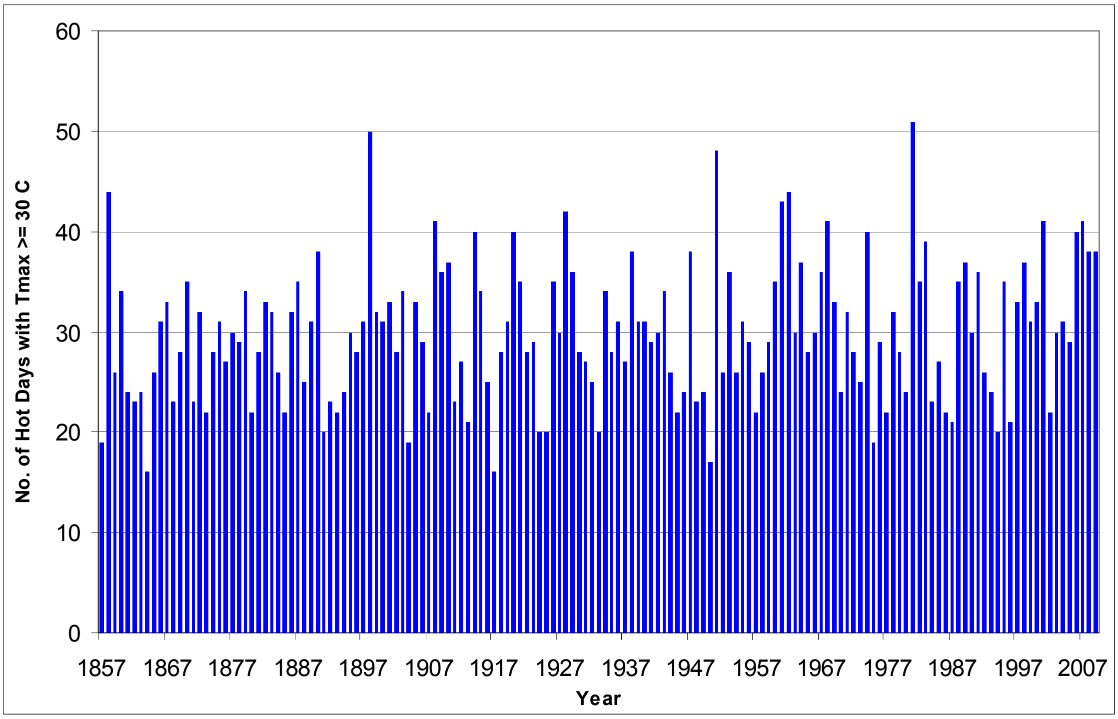


Figure 3.1 – Number of hot days with Tmax ≥ 30°C counted every year at Melbourne Regional Station

2.1.2 Probabilistic Modelling

The yearly number of hot days is a random variable, found to be best fitted with the normal (Gaussian) distribution. The normal cumulative distribution function (*CDF*) is expressed by

$$CDF(n) = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{n} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2} \right) dx \qquad (3.1)$$

where μ and σ are the mean and the standard deviation of the distribution, *n* is the yearly number of hot days.

Figure 3.2 shows some of results describing the probability model in terms of cumulative distribution function (CDF) based on the data from Melbourne Regional Station. The fitting were carried out by considering four different temperature thresholds. The CDFs are therefore the probability of yearly number of hot days exceeding a threshold temperature. The mean and the standard deviation of the fitted normal distributions for the 548 stations each was determined, given in Appendix A.

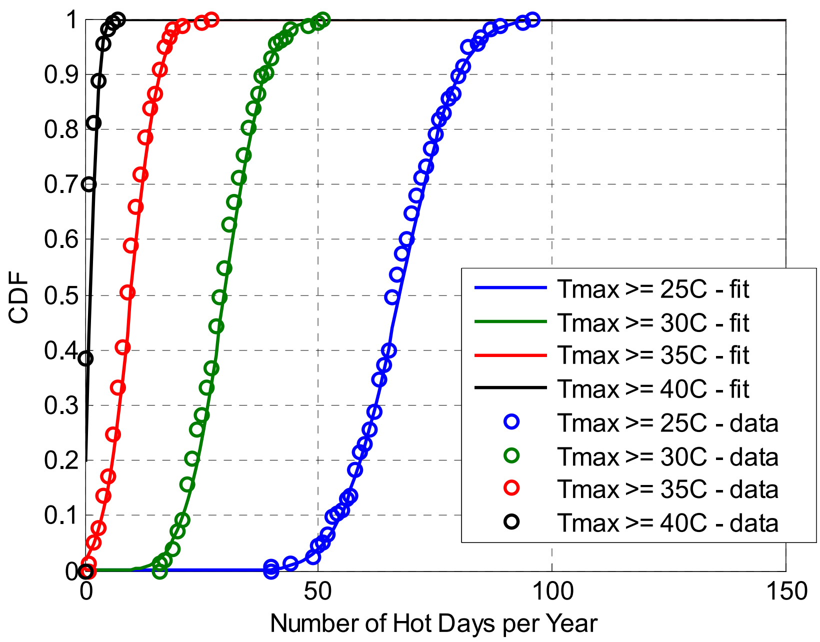


Figure 3.2 – CDF of yearly number of hot days - Melbourne Regional Office Station

2.1.3 Average Recurrence Interval

From the probabilistic models, the annual probability of exceedance F_{ev} of a yearly number of hot days is calculated by

$$F_{ev}(n) = 1 - CDF(n) \qquad (3.2)$$

It expresses the probability of the yearly number of hot days that exceeded *n* in one year.

The Average Recurrence Interval, also often called the Return Period (*R*), in years, can then be evaluated as the inverse of the annual probability of exceedance, i.e.

$$R(n) = 1 / F_{ev}(n). \tag{3.3}$$

Figure 3.3 gives the return period of the yearly number of hot days estimated for Melbourne Regional Station considering four temperature thresholds. Based on that, the frequency of a specific type of hot days occurring in one year within a specified period can be predicted for design purposes.

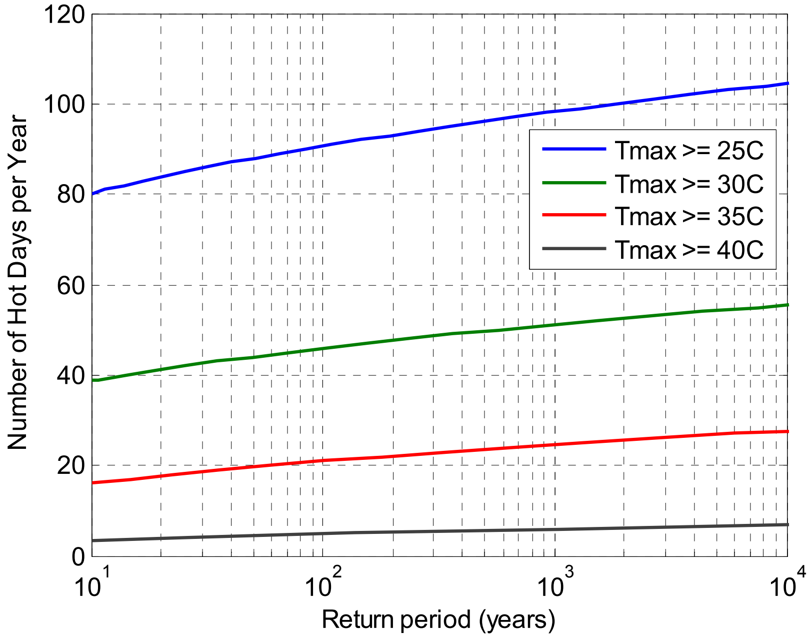


Figure 3.3 – Return period of yearly number of hot days with different maximum temperature thresholds

Mapping of the frequency of hot days for different levels of return periods (10, 20, 50, 100 years) were developed using the results from 548 stations across Australia. Figure 3.4 shows the contour maps of the frequency of number of hot days with a maximum temperature threshold of 35°C and 40°C considering different return periods. More detailed maps are given in Appendix D. From these maps, it can be seen that the number of hot days is higher toward the north and the west of Australia, and lower toward the east and the south. The tendency is somewhat similar to that in the climate zone map of BCA 2007 (ABCB, 2007). Note that the BCA map was based on the climatic zone map of the Bureau of Meteorology (BOM, 2009b), which was in principle based on average temperature and humidity. Further discussion on this matter is given in the next Section.

Total

Figure 3.4 – Contour maps of the frequency of number of hot days with maximum temperature threshold of 35°C and 40°C at different return periods

2.2 Hot Spells

This Section aims at evaluating the conditional probability of the yearly number of hot spells, depending on the daily maximum temperature threshold, and the number of hot days *n* that occur consecutively to form a hot spell.

2.2.1 Data Processing and Modelling

A hot spell comprises a group of consecutive days in which the maximum temperature of the days are continuously equal to or higher than a threshold temperature. Each hot spell is therefore termed as an *n-day* hot spell, where *n* = 1, 2, 3, … is the duration of a hot spell in day(s). There are 2 parameters of interest to be determined and used:

- Number of *n-day* hot spells, i.e. the number of hot spells that last exactly *n* days. Hereafter called as 'individual number of hot spells'.
- Total number of hot spells that last *n or more than n days*. Hereafter referred as 'total number of hot spells'. These total numbers can be calculated by summing up the above individual numbers of *n-day* hot spells correspondingly.

Based on the definition, an algorithm was developed to identify and count the events of hot spells occurring every year, and classify them according to their duration and the maximum temperature threshold. Figure 3.5 shows the number of 1-day, 2-day, and 3-day hot spells with threshold temperature of 35°C, based on the observations at Melbourne Regional Station in the last 30 years. The difference between the two parameters of interest can be found in the Figure 3.5, e.g. by considering the hot spell counts for year 2007. In 2007, there were four individual numbers of hot spells given Tmax≥35C, including nine 1-day hot spells, one 2-day hot spell, one 3-day hot spell, and one 3-day hot spell. The corresponding total number of the hot spells that last one or more than one days is 12; of the hot spells that last two or more than two days is 3; and so on (assumed that there is no hot spell longer than 4 days).

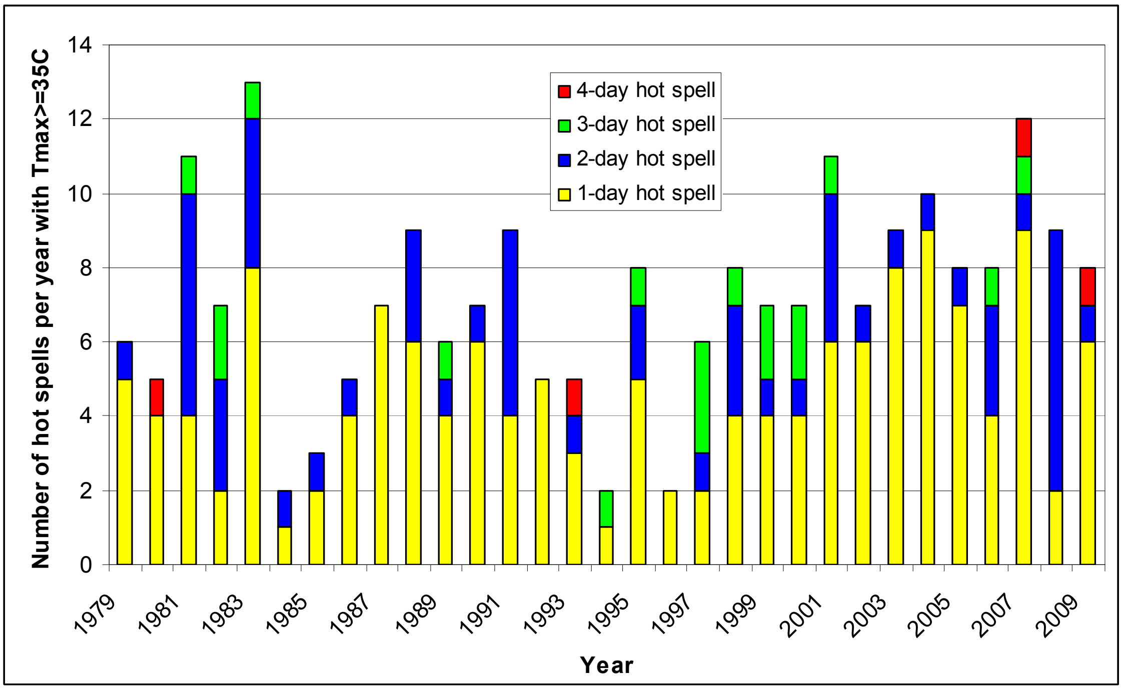


Figure 3.5 – Yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with threshold temperature of 35°C at Melbourne Regional Station

2.2.2 Probabilistic Modelling

The occurrence of hot spells is a kind of random and independent events, or a stochastic process, which are assumed to follow a Poisson process. The yearly total numbers of hot spells data were found to be fitted very well with the Poisson distribution. The Poisson cumulative distribution function (CDF) is expressed by

$$CDF(n) = e^{-\lambda} \sum_{i=0}^{n} \frac{\lambda^i}{i!} \tag{3.4}$$

where λ is the mean, which is also the standard deviation of the distribution.

Figures 3.6, 3.7 and 3.8 show the probability distribution of the yearly total number of hot spells in terms of CDF based on the observations at Melbourne Regional Station considering three different temperature thresholds, i.e. 30°C, 35°C, and 40°C, respectively. The CDF are the probability of yearly number of hot spells given a threshold temperature, and the duration of the hot spells. The model parameters λ are estimated and given in Appendix B for the 548 stations. The same modelling and fitting procedures were applied for the individual number of hot spells. The fittings for some other stations in South East QLD are presented in Appendix C.

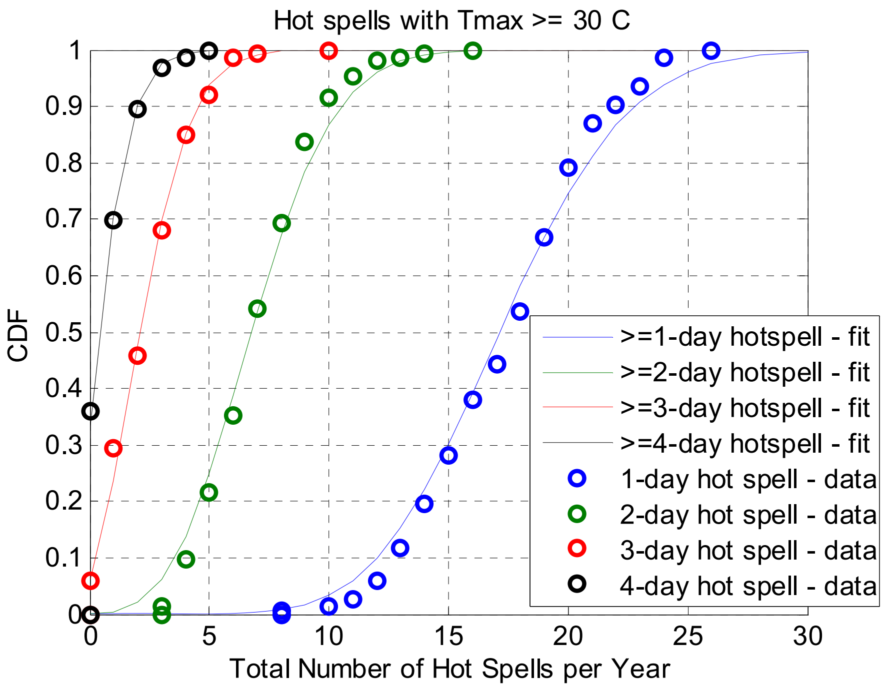


Figure 3.6 – Fitting the Poisson distribution to the yearly total number of hot spells with Tmax ≥ 30°C – Melbourne Regional Office Station

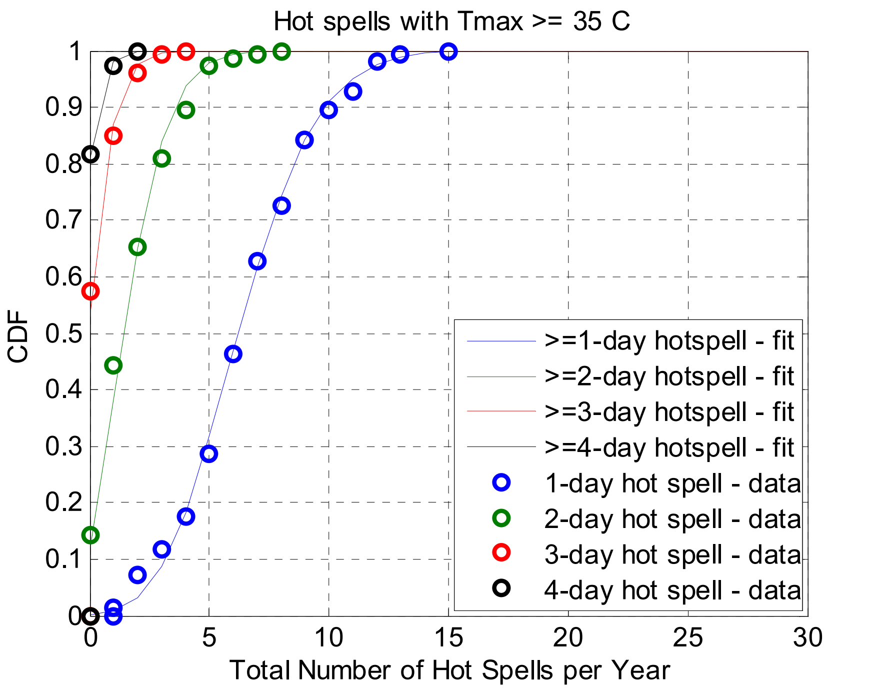


Figure 3.7 – Fitting the Poisson distribution to the yearly total number of hot spells with Tmax ≥ 35°C – Melbourne Regional Office Station

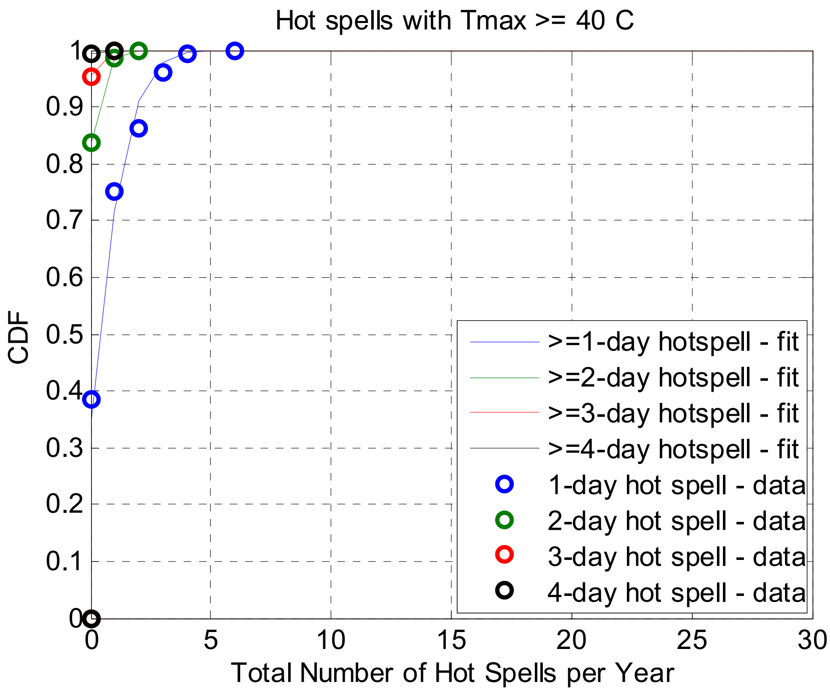


Figure 3.8 – Fitting the Poisson distribution to the yearly total number of hot spells with Tmax ≥ 40°C – Melbourne Regional Office Station

2.2.3 Average Recurrence Interval

From the probabilistic model, the annual probability of exceedance F_{ev} of the total number of hot spells, and the Return Period (*R*) can be calculated in the same way as described in the previous Section by Eqs. (3.2).and (3.3).

Figures 3.9 to 3.11 give the return period of the yearly total number of hot spells considering three different temperature thresholds on the basis of observations recorded at Melbourne Regional Office Station. From this plot, frequency of total number of a specific type of hot spells occurring in one year within a specified period can be predicted and may be used for design purposes.

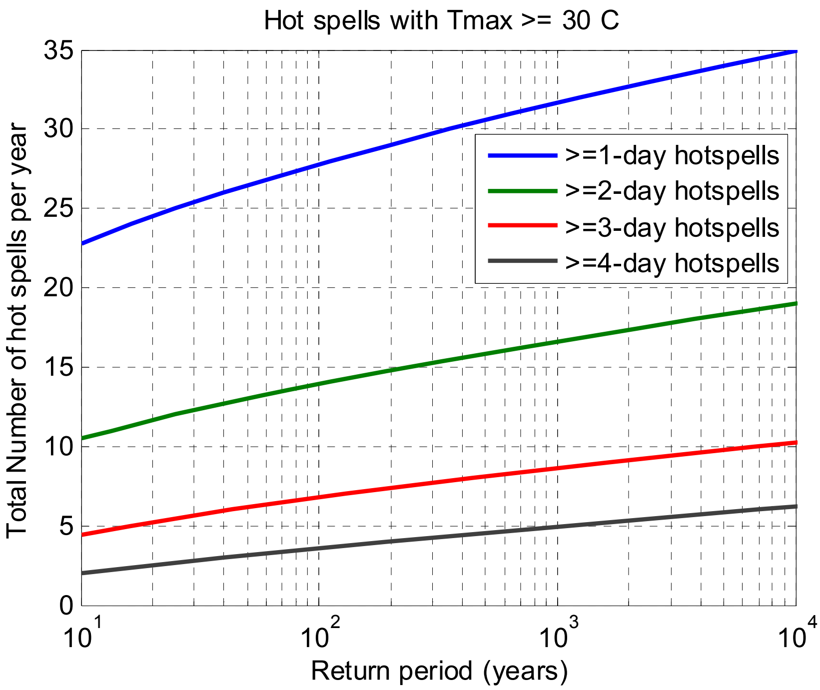


Figure 3.9 – Return period versus yearly total number of hot spells with Tmax ≥ 30°C – Melbourne Regional Office Station

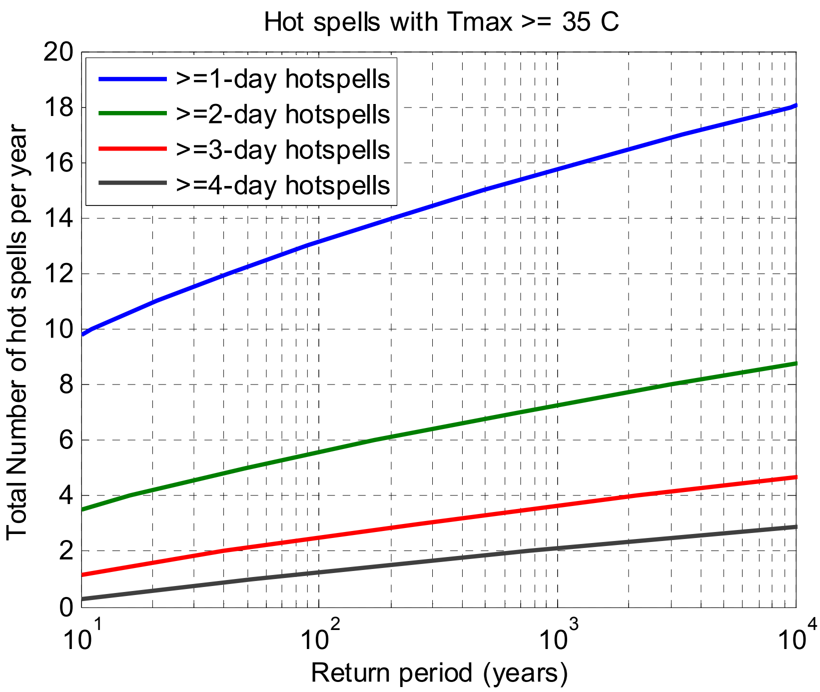


Figure 3.10 – Return period versus yearly total number of hot spells with Tmax ≥ 35°C – Melbourne Regional Office Station

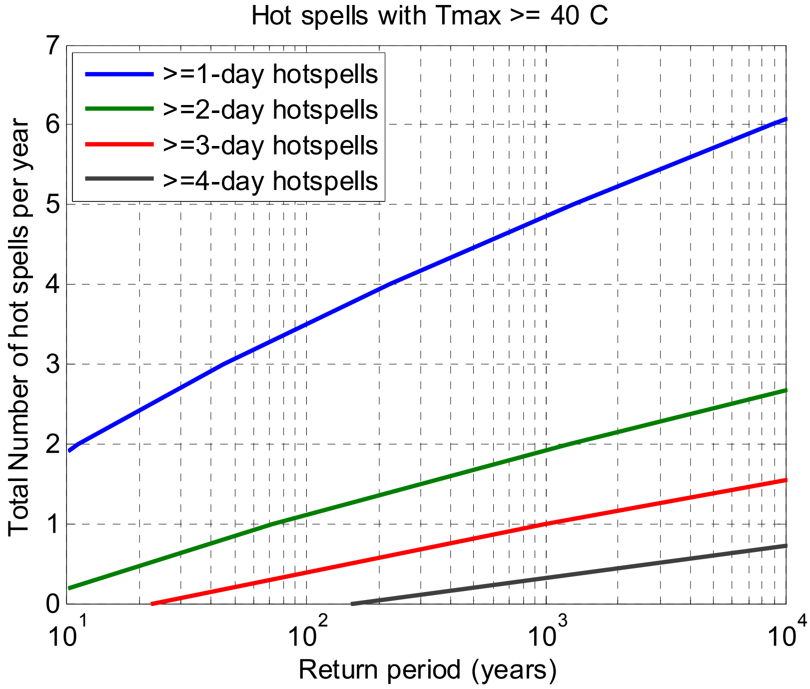


Figure 3.11 – Return period versus yearly total number of hot spells with Tmax ≥ 40°C – Melbourne Regional Office Station

Maps of the frequency for different return periods, i.e. 10, 20, 50, 100, 200, 500 years, were developed by using the results for 548 stations located across Australia. Figures 3.12 and 3.13 show the maps that depicted the frequency of total number of hot spells with a temperature threshold of 35°C and 40°C, respectively. More detailed maps are given in Appendix D. Compared to Figure 3.4 for hot day maps, the pattern of the hot spell maps appears to be different. The high number of hot spells is not as heavily concentrated toward the north and the west of Australia as the case of the number of hot days, but appears to spread further toward the south and east.

As mentioned in the previous Section, the pattern appearing in the hot day maps is somewhat similar to that in the climate zone map defined by BCA 2007 (ABCB, 2007). Note that, however, the BCA map was based on the climatic zone map of the Bureau of Meteorology (BOM, 2009b), which was, in principle, based on *average* temperature and humidity. Therefore, for the design of building and infrastructure under extreme heatwave events, it would be useful to establish extreme temperature map(s).

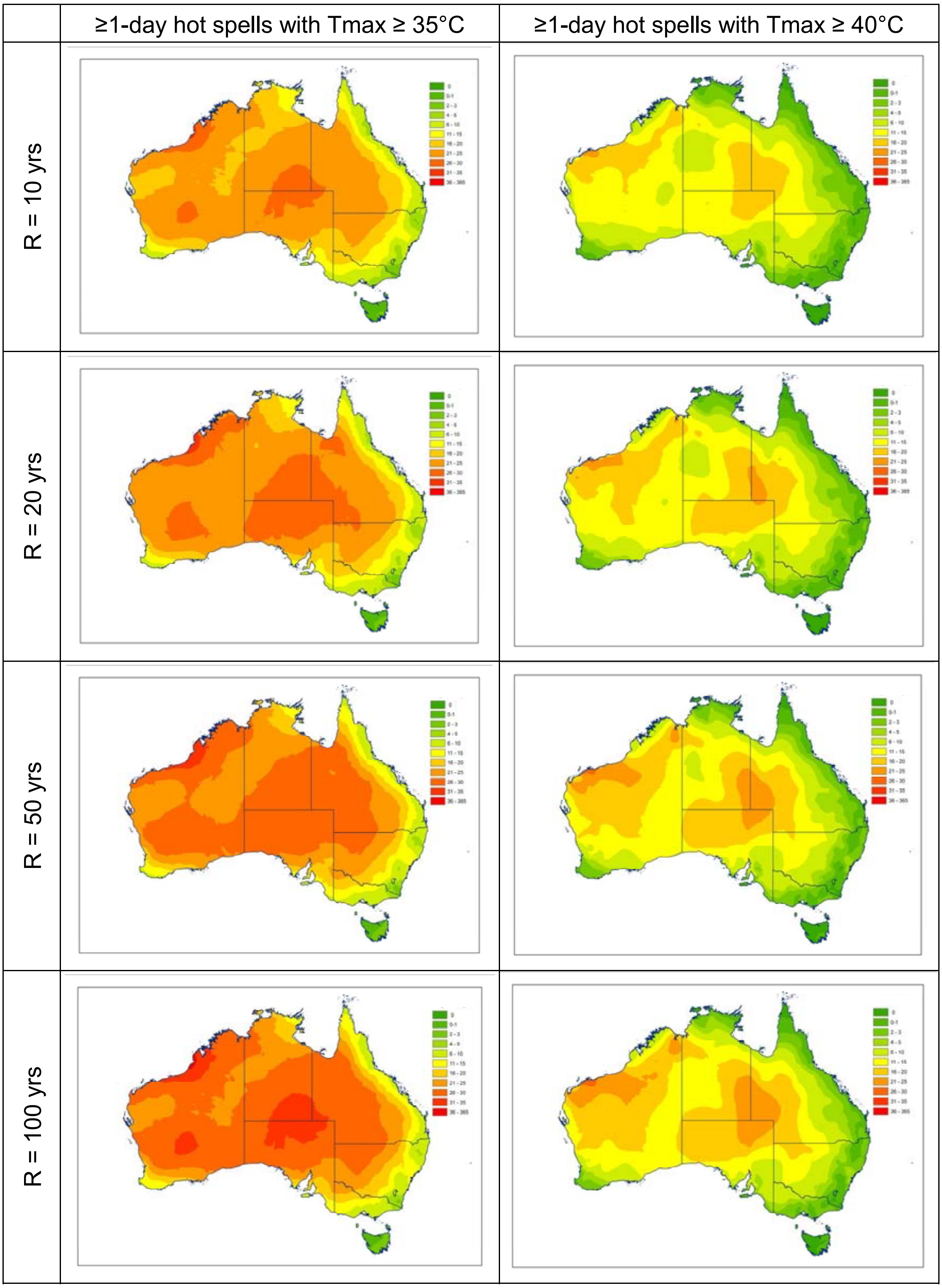


Figure 3.12 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 35°C and 40°C at different return periods

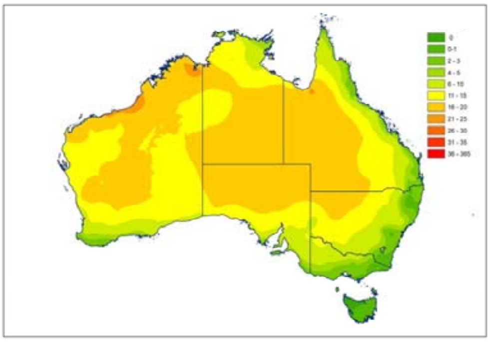
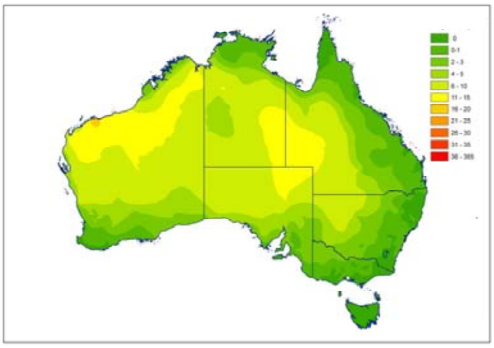
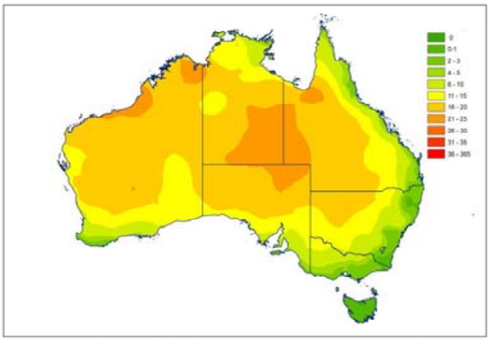
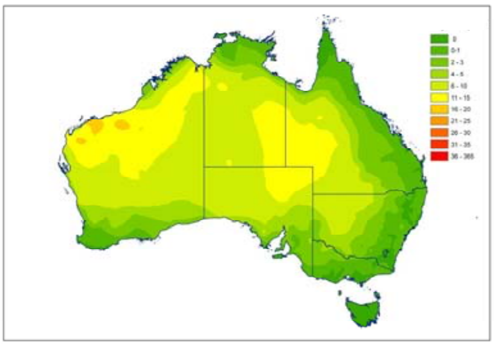
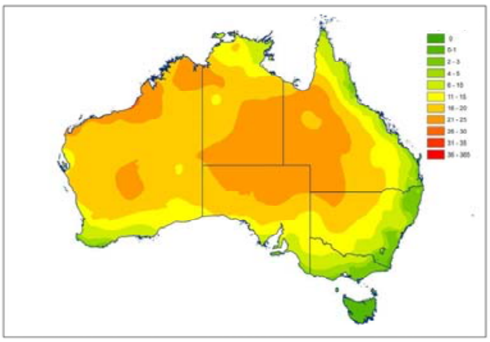
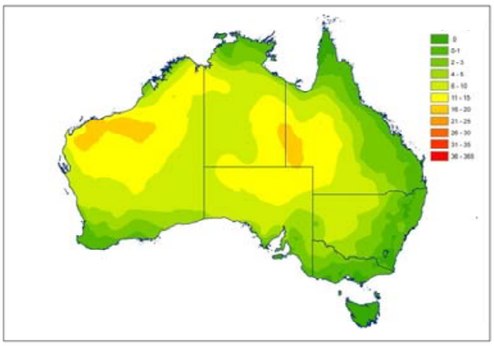
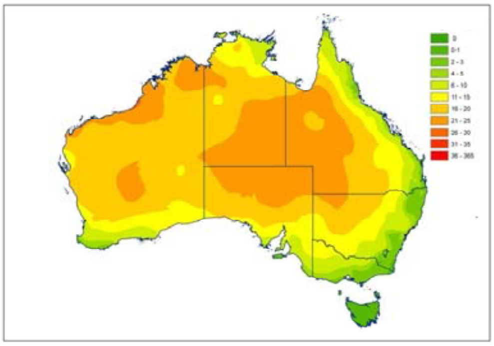
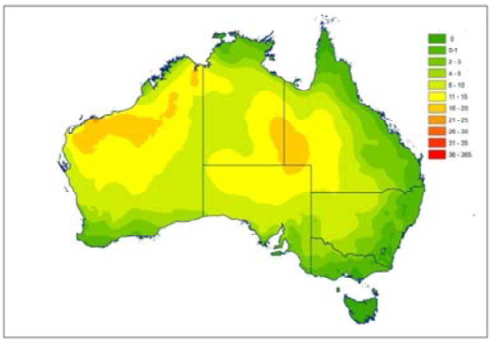
	≥2-day hot spells with Tmax ≥ 35°C	≥2-day hot spells with Tmax ≥ 40°C
R = 10 yrs		
R = 20 yrs		
R = 50 yrs		
R = 100 yrs		

Figure 3.13 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 35°C and 40°C at different return periods

3. OBSERVED CHANGES IN THE NUMBER OF EXTREME HEATWAVE EVENTS

From the investigation of the data, some notable changes of extreme heatwave events have been observed over time. The trends, which would have more or less effects on building and infrastructure performance, were first found from the observations at Melbourne Regional Office station. In the following, the trends in Melbourne are to be presented at first, followed by the assessment of all stations with a record period longer than 90 years. The trends in other major cities, including Hobart, Sydney, Brisbane and Perth are plotted in Appendix F.

3.1 Observed Changes in Melbourne

3.1.1 Changes in the Yearly Number of Hot Days

The yearly average numbers of hot days were determined over every 30 years along the historical data with a moving step of 10 years (running average). Therefore with the 153 years of observation data at Melbourne Regional Office station, 13 data points can be obtained given a specified temperature threshold. Each data point represents the yearly average numbers of hot days estimated from its last 30 years. For example, the last point on the right is at year 2009, so that it is the yearly average numbers of hot days computed from 1980 to 2009.

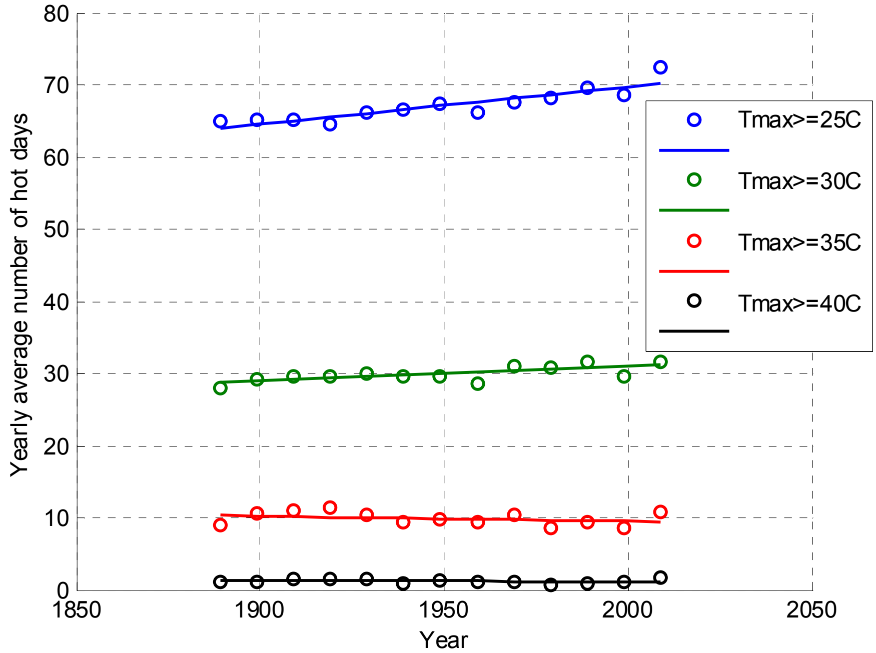


Figure 4.1.1 – Changing trends observed in the yearly number of hot days - Melbourne Regional Office station

Figure 4.1.1 presents the changes in the yearly number of hot days evaluated given four different temperature thresholds by the use of observation at the Melbourne Regional Office station. The data were fitted with a linear line to estimate the trends. It can be seen that whilst the numbers of hot days equal or more than 35°C and 40°C slightly decrease, the numbers of hot days equal or more than 25°C and 30°C has increased over the years. It is anticipated that the increases of the numbers of hot days equal or more than 25°C and 30°C would have certain effects on building indoor environment and human comfort, and would resulting in higher cooling energy demands over the time.

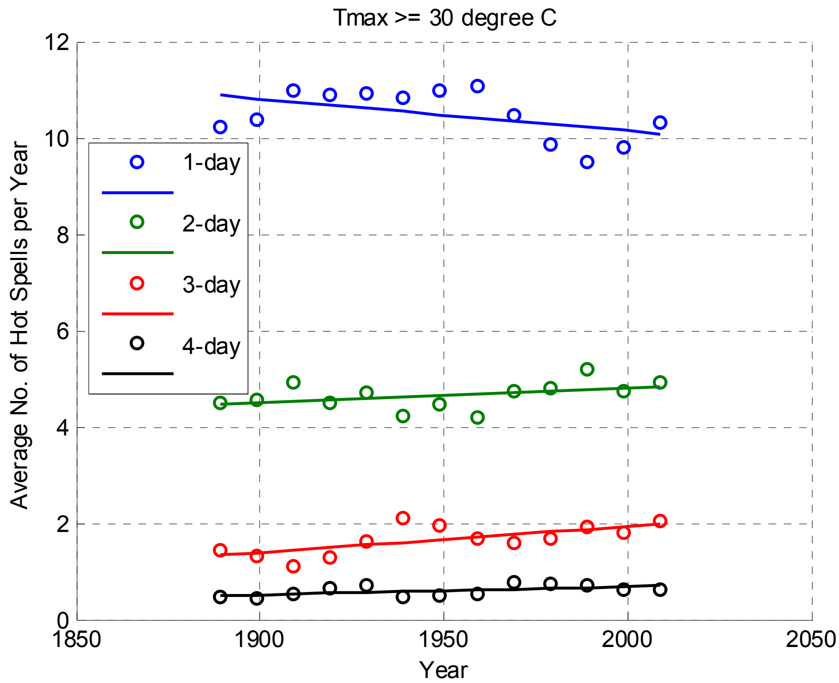
3.1.2 Changes in the Yearly Number of Hot Spells

A similar procedure used for the number of hot days was applied for the hot spells. The yearly average of an individual number of hot spells given a specified temperature threshold were determined over every 30 years along the historical data with a moving step of 10 years (running average). Observation for more than 153 years at Melbourne Regional Office station gives 13 data points. Each data point is the yearly average numbers of the hot spells computed from its last 30 years.

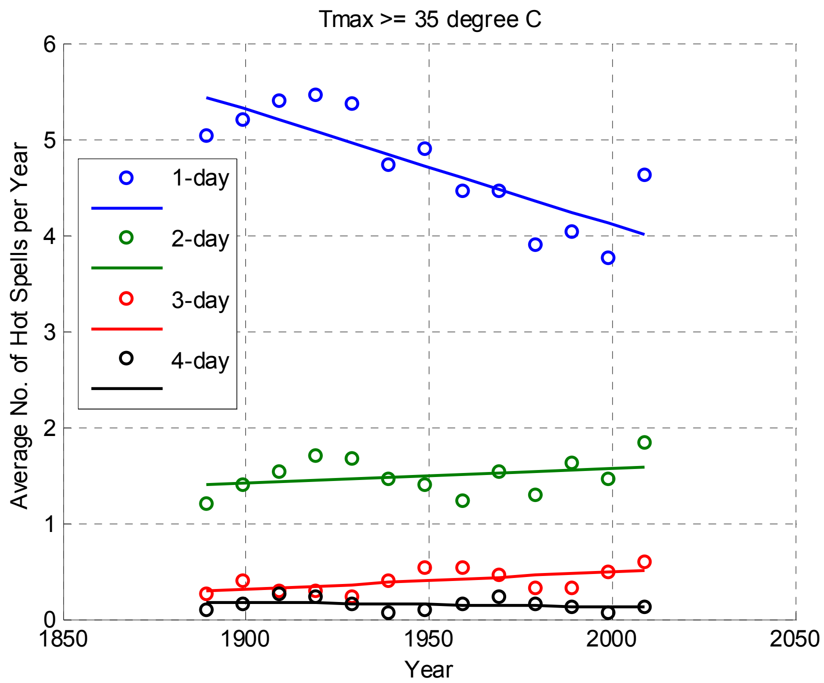
Figures 4.1.2 to 4.1.4 present the changes in the yearly individual numbers of 1-day, 2-day, 3-day, and 4-day hot spells at the Melbourne Regional Office station, given different temperature thresholds. The trends were estimated by linear fittings.

It can be seen that with T_{max} being equal or more than 30°C (Figure 4.1.2), the individual number of 1-day hot spells decreases, and the individual number of 2-day, 3-day and 4-day hot spells all increased over the years. Similar trends are also observed in Figure 4.1.3 for hot spells with $Tmax \geq 35$°C (except that the number of 4-day hot spells slightly decreases). These changes indicated an interesting phenomenon that there have been a growing number of 2-day, 3-day, and even 4-day hot spells. It implies that the hot spells have become longer over the last 150 years in Melbourne. If this trend would continue into the future, more adverse effects on buildings and occupants would be expected due to more prolonged high temperature events.

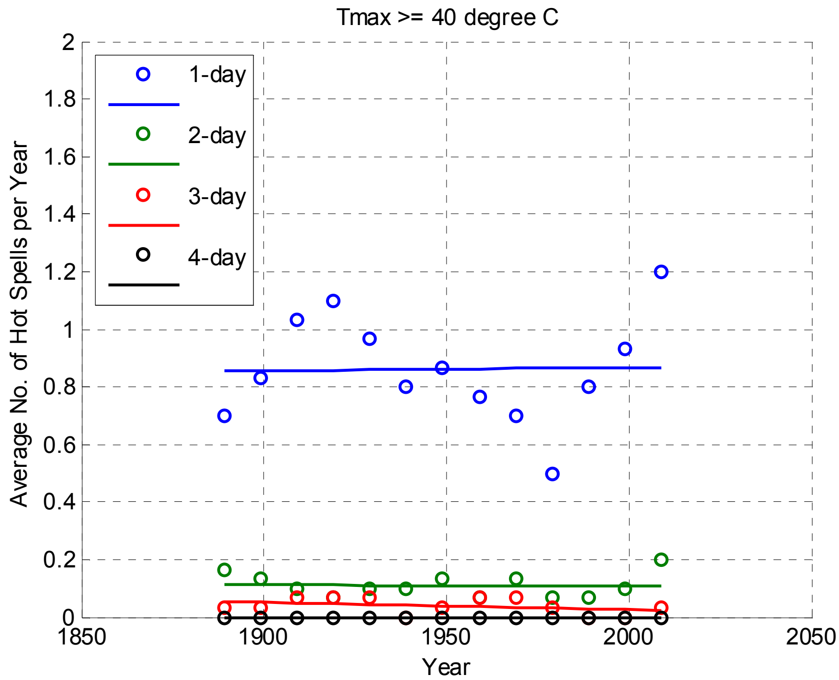
For T_{max} being equal or more than 40°C (Figure 4.1.4), the individual numbers of hot spells, however, are all stable over the years. Note that there is limited data for this case as there was very few hot spell events with this high temperature threshold.



Figures 4.1.2 – Changes in the yearly individual number of 1-day, 2-day, 3-day, and 4-day hot spells with T_{max} ≥ 30°C – Melbourne Regional Office station



Figures 4.1.3 – Changes in the yearly individual number of 1-day, 2-day, 3-day, and 4-day hot spells with T_{max} ≥ 35°C – Melbourne Regional Office station



Figures 4.1.4 – Changes in the yearly individual number of 1-day, 2-day, 3-day, and 4-day hot spells with T_{max} ≥ 40°C – Melbourne Regional Office station

3.2 Analysis for Stations with Long Records

The trends of the historical temperature records at 46 other stations were investigated. These stations have a temperature record period of more than 90 years in order to obtain reliable trends. The same procedure as used in the previous section was applied to these stations. The yearly average of hot days and individual number of hot spells given a specified temperature threshold were determined over every 30 years along the historical data with a moving step of 10 years. The results of the yearly average for each type of events (hot days or individual hot spells) were fitted with a linear line, and the trend was estimated as the slope of the linear fit, and then multiplied by 100. The trends are therefore expressed in terms of the average change in the number of events in 100 years.

Table 4.1 presents the results for a temperature threshold of 30°C. Values of the trend less than 0.1 is considered insignificant, and therefore not given in the Tables. Positive numbers (highlighted in yellow) mean increasing trend, and negative numbers (highlighted in light blue) mean decreasing trend.

The results in the Table 4.1 show the change of the number of heatwave events, including hot days and hot spells with T_{max} ≥ 30°C, which can be considered appropriate for studying the effect of heatwaves on building thermal performance and cooling energy requirement as presented in Sections 5.1, 5.2, and 5.3. The trends for other thresholds, i.e. 35°C and 40°C, are given in Appendix G. It can be seen that that there is no clear or consistent changing trend across over all stations.

Meanwhile, the number of hot days with T_{max} ≥ 30°C (Table 4.1) shows increasing trends at about half of the stations, and decreasing trends at the other half. Some extreme cases are noted here: Perth (WA) has an increasing trend of 20.68 days/100 years; Te Kowai (QLD) has a decreasing trend of –80.87 days/100 years. Similar observations were found for the 1-day and 3-day hot spells, i.e. the trend shows some increases at a half of the stations, and decreases at the other half. For 2-day hot spells, about two-third of the stations shows some increases. For 4-day hot spells, about a third of the stations show some increases.

Considering the trend at each station, there are a few stations showing consistent increases, i.e. increases in all numbers of hot days and hot spells, such as Inverell (NSW); and quite a few stations showing consistent decreases, such as Snowtown (SA), Burketown (QLD), Burdekin (QLD), Te Kowai (QLD), Bathust Gaol (NSW), Cape Otway (VIC), and Low Head (TAS). The phenomenon of increasing long-duration hot spells, as seen for Melbourne, can also be found with more or less extents at a number of stations, such as Cape Leuuwin (WA), Perth (WA), Wanderin (WA), Port Lincoln (WA), Dalby (QLD), Goondiwindi (QLD), Tibooburra (NSW), Inverell (NSW), and Rutheglen (VIC).

In summary, the analysis has revealed some interesting insights on how the heatwave events have occurred in various locations across Australia. Further insights can be obtained from more detailed analysis for individual stations of interest. Nevertheless, the following notes on the trends can be made:

- Number of heatwave events is increasing at a number of locations, not only in terms of the number of hot days, but also in the numbers of hot spells with duration of 2 days or more.
- The phenomenon of increasing long-duration hot spells, as observed in Melbourne, was also found at a number of stations with different extents.

These trends, particularly those related to long-duration hot spells are expected to have considerable effects on city/urban physical assets, including building, infrastructure, and people. Some of the effects are outlined in Section 5.

Table 4.1 – Changing trends in number of heatwave events in 46 long-record stations with temperature threshold of 30°C

ID and Location							Average change in number of events in 100 years								Tmax >= 30C		
Station No	Station Name	State	Lat-itude	Long-itude	No.of yrs	BCA Climate Zone	Hot day	1-day hotspell	2-day hotspell	3-day hotspell	4-day hotspell	5-day hotspell	6-day hotspell	7-day hotspell	8-day hotspell	9-day hotspell	10-day hotspell
4020	MARBLE BAR COMPARISON	WA	-21.18	119.75	105	1	-17.72	0.63	1.03	-0.12	0.40	0.49			0.12	-0.28	-0.19
9034	**PERTH REGIONAL OFFICE**	WA	-31.96	115.87	95	5	20.68	-0.80	-0.23	0.63	0.20	0.37	0.43	0.93	-0.21	0.48	0.11
9500	ALBANY	WA	-35.03	117.88	101	6	-9.98	-7.17	-1.40								
9510	BRIDGETOWN COMPARISON	WA	-33.96	116.14	101	5	-7.91	-1.25		-1.27	-0.98	0.66	0.12	0.24	-0.21		
9518	CAPE LEEUWIN	WA	-34.37	115.14	101	5	1.12	-0.59	0.54		0.11						
9534	DONNYBROOK	WA	-33.57	115.82	101	5	7.23	-1.27	0.66	-0.61		0.32	0.42	0.15	0.29	0.17	-0.14
9581	MOUNT BARKER	WA	-34.63	117.64	101	6	-11.28	-5.03	-2.44	-0.61			0.10				
10073	KELLERBERRIN	WA	-31.62	117.72	98	4	-21.04	1.02	-0.37	-1.46	0.36	-1.20	-0.30	0.12	-0.27	-0.38	-0.60
10111	NORTHAM	WA	-31.65	116.66	101	5	-3.67	1.34	-0.71	0.16		-0.83	-0.16	-0.49		0.44	
10579	KATANNING COMPARISON	WA	-33.69	117.56	101	4	1.44	0.95	0.65	-0.62	-0.40	0.28	0.23		0.15	-0.17	
10614	NARROGIN	WA	-32.93	117.18	95	4	-2.29	2.39	0.89	-0.58	-0.71	0.39			0.14	-0.26	0.13
10648	WANDERING COMPARISON	WA	-32.68	116.68	102	4	10.87	-0.58	1.10	0.13	-0.33	-0.16		0.37	0.37	-0.23	
12074	SOUTHERN CROSS	WA	-31.23	119.33	100	4	-18.31	0.11	0.23	-1.16	-0.29	-0.24			-0.21		-0.34
18070	PORT LINCOLN	SA	-34.72	135.86	110	5	0.71	-1.50	1.35	0.61	-0.35	-0.20					
21046	SNOWTOWN	SA	-33.78	138.21	93	5	-6.87	-1.42	-1.70	-0.33	-1.04	0.65	0.42	0.26		-0.62	0.24
23000	**ADELAIDE WEST TERRACE**	SA	-34.93	138.59	92	5	-16.68	-2.95	0.65	-0.12	-0.60	-0.73	-0.20	-0.33		-0.21	-0.26
26026	ROBE COMPARISON	SA	-37.16	139.76	124	6	0.11	0.61	0.17		-0.17						
29004	BURKETOWN POST OFFICE	QLD	-17.74	139.55	118	1	-45.22	-2.67	-1.11	-0.46	-0.43	-0.47	-0.23	-0.33		-0.27	
30018	GEORGETOWN POST OFFICE	QLD	-18.29	143.55	113	1	22.44	-0.47	0.16	-0.17		0.23	-0.43	-0.39			
30045	RICHMOND POST OFFICE	QLD	-20.73	143.14	115	3	0.82	0.15	0.21	-0.39		0.49	0.16	-0.30	-0.22	-0.38	-0.21
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.58	147.41	94	1	-29.46	-4.18	-2.11	-1.24	-0.76	-0.50	-0.23	-0.21	-0.29	-0.19	
33047	TE KOWAI EXP STN	QLD	-21.16	149.12	100	2	-80.87	-0.27	-0.45	-0.58	-0.28	-0.99	0.26	-0.41			
34002	CHARTERS TOWERS POST OFFICE	QLD	-20.08	146.26	99	3	-5.40	0.52	1.82	-0.32	-0.94	-0.68	0.29	0.45		-0.12	
35027	EMERALD POST OFFICE	QLD	-23.53	148.16	103	2	1.75	0.33	0.32	-0.77	-0.52	0.40		0.23	0.15	-0.17	
38003	BOULIA AIRPORT	QLD	-22.91	139.90	120	3	9.55	0.22	-0.33	0.22		-0.16	-0.32		-0.19	-0.16	0.41
39015	BUNDABERG POST OFFICE	QLD	-24.87	152.35	98	2	-5.43		-0.30	0.33	0.63	0.69	-0.60	0.57	-0.68	0.37	
39039	GAYNDAH POST OFFICE	QLD	-25.63	151.61	115	3	3.95		-1.17		-0.41	0.40	-0.17		0.29		
40214	**BRISBANE REGIONAL OFFICE**	QLD	-27.48	153.03	99	2	-28.46	2.56	0.99	-0.85	-1.51	-0.31	-0.68	-0.40	-0.46		-0.35
40264	TEWANTIN POST OFFICE	QLD	-26.39	153.04	101	2	3.14	4.32	2.13	0.52	-0.25	0.20		-0.11	-0.40		
41023	DALBY POST OFFICE	QLD	-27.18	151.26	99	3	-13.31	-0.74	0.55	0.64	0.18	0.29	-0.33	0.60	0.14	0.13	
41038	GOONDIWINDI POST OFFICE	QLD	-28.55	150.31	100	3	-4.78	0.47	0.34			-0.21	0.21	-0.27		0.18	0.36
46037	TIBOOBURRA POST OFFICE	NSW	-29.43	142.01	98	4	22.98	-0.43	1.14	1.11	-0.14	-0.18	0.29		0.12	0.49	
48013	BOURKE POST OFFICE	NSW	-30.09	145.94	125	4	-25.61	-0.14	0.40	0.35	-0.49		0.16	0.68	-0.17	-0.13	-0.10
52026	WALGETT COUNCIL DEPOT	NSW	-30.02	148.12	115	4	5.94	1.81	0.23		-1.00			0.12	0.39	0.34	
55023	GUNNEDAH POOL	NSW	-30.98	150.25	132	4	-19.30	1.78	1.42		0.26	0.86	0.45		-0.12	-0.18	-0.11
56017	INVERELL COMPARISON	NSW	-29.78	151.11	123	4	1.03	1.35	1.04	0.72	0.46	0.31	0.58	0.39			
63004	BATHURST GAOL	NSW	-33.42	149.55	125	7	-18.90	-0.75	-1.42	-0.55		-0.37	-0.12	-0.45	0.18	-0.33	
65016	FORBES (CAMP STREET)	NSW	-33.39	148.01	125	4	-19.25	0.80	1.56	0.12	0.13	-0.17	-0.21	-0.11	-0.27		-0.23
66062	**SYDNEY (OBSERVATORY HILL)**	NSW	-33.86	151.21	149	5	2.01	2.52	-0.34								
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.53	144.95	145	4	-23.66	1.20	0.89		0.44		-0.76	-0.21		-0.22	
78031	NHILL	VIC	-36.33	141.64	111	2	11.53	0.51	-0.32		1.11	0.29	0.13	-0.12			0.21
82039	RUTHERGLEN RESEARCH	VIC	-36.10	146.51	96	4	2.75	-2.25	0.42	0.96	-1.13	0.46	-0.49	0.26	-0.51		
86071	**MELBOURNE REGIONAL OFFICE**	VIC	-37.81	144.97	153	6	2.02	-0.65	0.25	0.55	0.18						
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.86	143.51	144	6	-4.31	-0.69	-0.76	-0.42							
91057	LOW HEAD (COMPARISON)	TAS	-41.06	146.79	106	7											
94029	**HOBART (ELLERSLIE ROAD)**	TAS	-42.89	147.33	126	7	3.08	2.66	0.26								

4. EFFECTS OF EXTREME HEATWAVE EVENTS

4.1 Effects of Hot Spells on Cooling Energy Requirement

This section investigates the effect of long-duration hot spells on the cooling energy requirement of a typical house by using AccuRate (CSIRO, 2010), an accredited house energy rating software developed in Australia. AccuRate was designed for assessing building thermal performance. It calculates the energy requirement for heating and cooling and gives a star rating for a house design in a specific climate. In this study, the commercial version of the software, AccuRate Ver.1.1.4.1 was used to estimate the effects of extreme heatwave events on the cooling energy requirement.

The 'Example 1-storey house', which is available as one of the example houses implemented in AccuRate was used for this investigation. This house is a typical detached medium size one-storey 3-bedroom brick veneer house.

AccuRate uses typical meteorological year (TMY) weather data which contains one year of hourly data of a number of parameters, including temperature, absolute air moisture content, air pressure, wind speed and direction, solar radiation (global, diffuse, and direct normal), and cloud cover. The current TMY weather data file in AccuRate database for Melbourne was established from months of different years in the beginning of the 70's. For example, data of January was based on January 1971; data of February was based on February 1972; data of March was based on March 1970; etc.

To study the cooling energy requirement for a number of scenarios during extreme heatwave events, the following 2 days are picked up from the weather file: (1) the hottest day, date-stamped as the 8 Jan, with T_{max} of 38.1°C; and (2) a 'pleasant' day, date-stamped as the 5 Jan, with T_{max} of 23.5°C. The weather data of the two days are used to make up different scenarios for 14 day period, where the hottest day is used to make up hot spells, and the pleasant day is used for the other remaining days. The ambient air temperature profiles for the scenarios studied are shown in Figure 5.1.1, including:

- Four 1-day hot spells, abbreviated '4x1hp'. Each hot spell is made up by one hottest day. The 4 hot spells are separated from each other by 2 pleasant days.
- Two 2-day hot spells, abbreviated '2x2hp'. Each hot spell is made up by two consecutive hottest days. The hot spells are separated from each other by 4 pleasant days.
- One 3-day hot spell, abbreviated '1x3hp'. The hot spell is made up by three consecutive hottest days.
- One 4-day hot spell, abbreviated '1x4hp'. The hot spell is made up by four consecutive hottest days.

- No hot spell, abbreviated '0x0hp'. This scenario is for evaluating the cooling energy requirement due to other heat loads such as solar gain and other internal heat loads (human body, cooking activities, and appliances).

In order to easily demonstrate the impact of the designed hot spell scenarios, for the days other than these 14 days, all the weather parameters are assigned with constant values, i.e, dry-bulb ambient air temperature = 24°C; absolute air moisture content = 6.0g/kg; air pressure = 1000 kPA, wind speed = 5 m/s, wind direction =0 (North), cloud cover = 1 oktas, and all solar radiation values have been set to zero. These constant weather conditions are obviously unrealistic and were designed to maintain a comfortable environment in the house, so that neither heating nor cooling due to external weather influences would be needed.

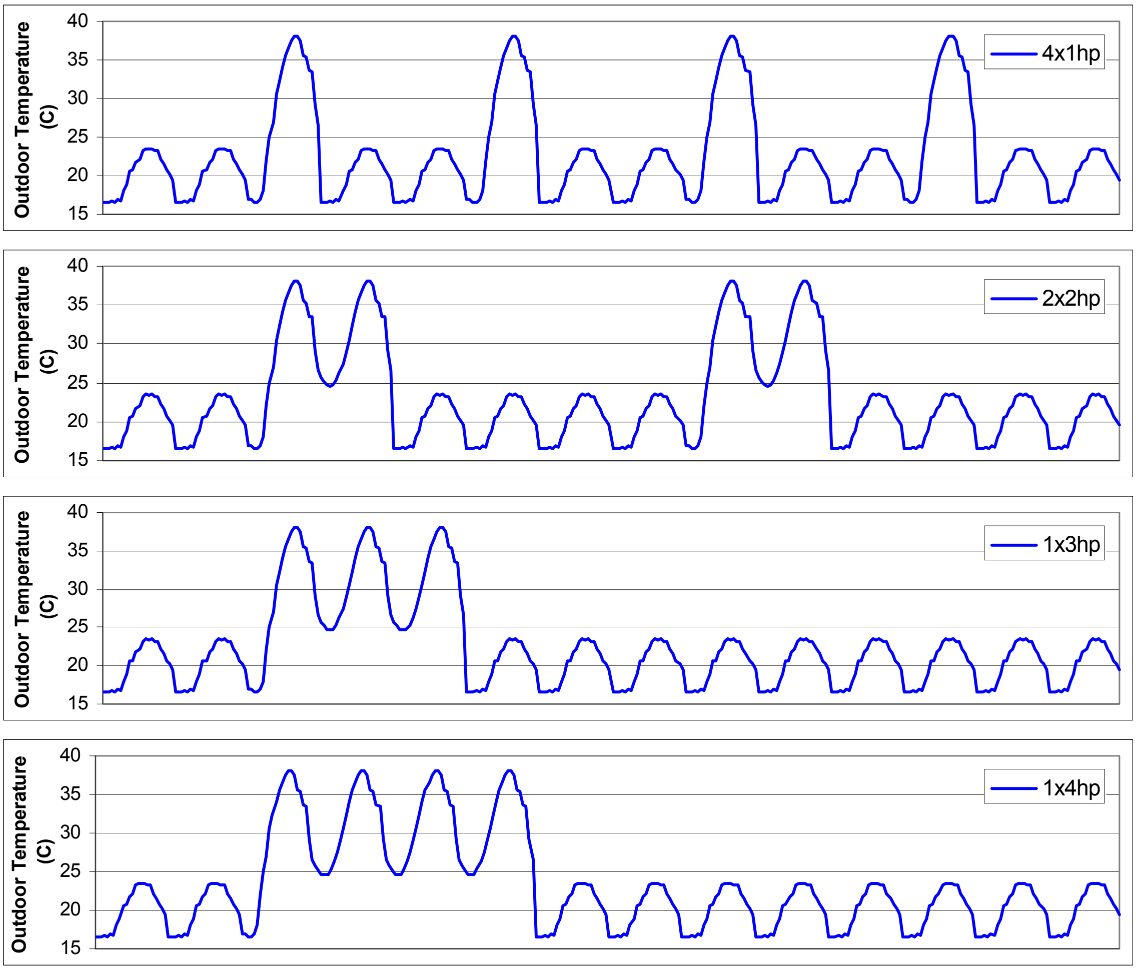


Figure 5.1.1 – Temperature profiles for the hot spell scenarios used in this study

The corresponding weather data file for each hot spell scenario was established accordingly and AccuRate simulations were carried out. Table 5.1.1 presents the results of cooling energy requirement for each hot spell scenarios. Columns 1 to 3 are the scenario information, and column 4 shows the total cooling energy requirement for maintaining proper occupants' thermal comfort, which is defined in the Accurate. Column 5 presents the total extra cooling energy requirement due to hot spells after subtracting the total cooling energy requirement for the '0x0hp' scenario, i.e. 4.5 MJ. The averagTwo separatee daily cooling energy requirement due to hot spells in column 6 is then obtained by dividing the values in column 5 with the number of hot days in column 2.

Table 5.1.2 compares average daily cooling energy requirements for different hot spell scenarios. It was found that compared to that of a 1-day hot spell, the average daily cooling energy requirement increases by 19% for a 2-day hot spell; by 27% for a 3-day hot spell; and 32% for a 4-day hot spell. This is clearly due to the building thermal mass effect. For a hot spell with consecutive 2 or more days, the building envelope has already been heated in a previous hot day and thus requires more energy to cool the building during the next hot day(s). Therefore, the longer a hot spell is, the higher the average daily cooling energy requirements.

For the same reason, the maximum indoor air temperature is higher with longer hot spells for free-floating operation (i.e. no cooling). As shown in column 4 of Table 5.1.2, it is seen that the maximum indoor air temperature increases with the length of the hot spells.

Table 5.1.1 – Extreme heatwave event scenarios and results from AccuRate simulations

Scenario	No. of hot days	No. of hot spells	Total cooling energy computed by AccuRate (MJ)	Total cooling energy due to hot spells (MJ)	Average daily cooling energy due to hot spells (MJ)
0x0hp	0	0	4.5	0.0	-
4x1hp	4	4	16.9	12.4	3.1
2x2hp	4	2	19.3	14.8	3.7
1x3hp	3	1	16.3	11.8	3.9
1x4hp	4	1	20.8	16.3	4.1

Table 5.1.2 – Comparison of cooling energy requirement for different hot spell scenarios

Hot spell	Average daily cooling energy due to hot spells (MJ)	Increase from average daily cooling energy for 1-day hot spell	Max indoor temperature w/o air conditioning
1-day	3.1	0.0%	34.2°C
2-day	3.7	19%	36.5°C
3-day	3.9	27%	37.0°C
4-day	4.1	32%	37.0°C

4.2 A Scenario Analysis using the Melbourne Heatwave Event in Jan – Feb 2009

This section investigates the effect of long-duration hot spells on the cooling energy requirement of a typical house using real Melbourne temperature data for 9 days from 28 January to 5 February 2009, which includes the 3-day hot spell of more than 40°C that occurred one week before the Black Saturday. The dry-bulb air temperatures, obtained from BOM, are shown in Figure 5.2.1.

Two scenarios of temperature are designed to assess the cooling energy required during these 9 days:

- The first scenario uses the real air temperature record as shown in Figure 5.2.1, which includes 3 hot days of more than 40°C occurring consecutively to make a 3-day hot spell.

- The second scenario uses an assumed air temperature profile, where the 3-day hot spell is separated into 3 hot days, which occur separately from each other by 2 other days in the record, as shown in Figure 5.2.2.

Because the data of other weather parameters during these 9 days were not available from the BOM at the time of this analysis, the parameters, including air moisture, air pressure, wind, solar radiation and cloud cover were assumed to be the same as those of the 'hottest' day defined in the previous Section. In this way, the analysis result can be considered to be valid for the effect of air temperature, which is effective enough for the purpose of this study. The analysis can be refined when all relevant data are available.

Additionally, as discussed in the previous Section, the weather parameters are assigned with constant values for the remaining days of the year to maintain a comfortable indoor environment, so that neither heating nor cooling would be needed.

The AccuRate simulation results are shown in Table 5.2.1. The extra total cooling energy requirement due to a hot spell is adjusted by taking away 4.5 MJ, which is the cooling energy required without the hot spell (as discussed in the previous Section). It is shown that if the 3 hot days occurred separately, the cooling energy require would reduce by 8.5%. This again can be explained as the effect of thermal mass. During a hot day in the 3-day hot spell, the building materials absorb heat, which results in higher cooling energy requirement during the next hot day(s). On the contrary, in the case where the 3 hot days occur separately, the building envelope has time to cool down, and thus resulting in lower daily cooling energy requirement.

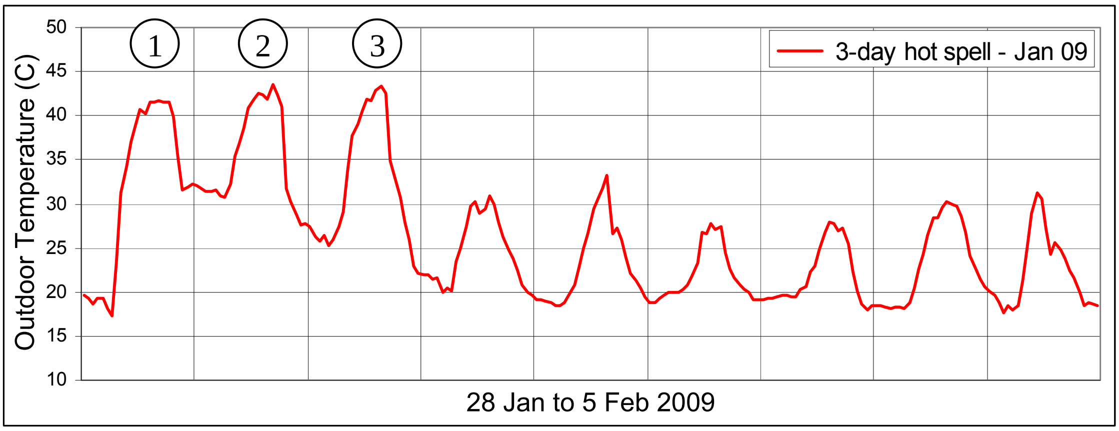


Figure 5.2.1 – Scenario 1: Temperature record from 28 Jan to 5 Feb 2009

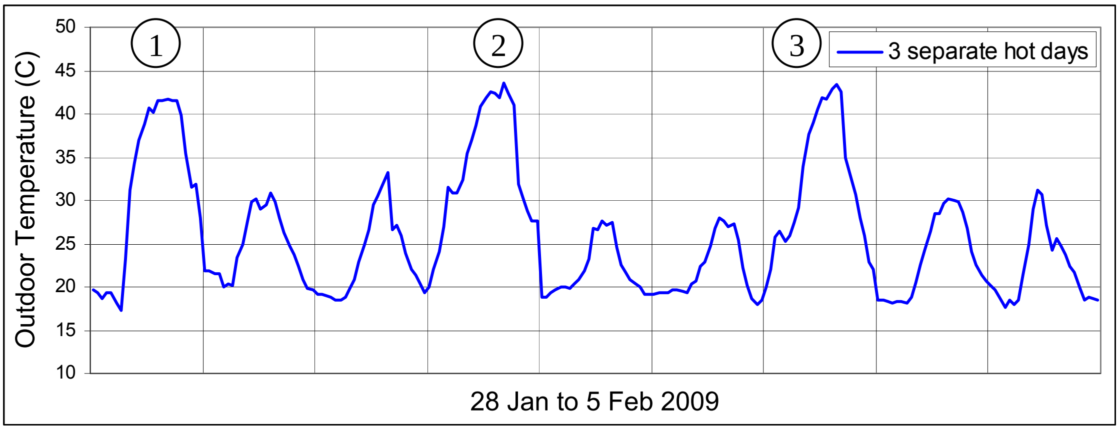


Figure 5.2.2 – Scenario 2: Assumed temperature record from 28 Jan to 5 Feb 2009 by separating the 3-day hot spell into 3 separate hot days

Table 5.2.1 – Comparison of AccuRate predicted cooling energy requirement

Scenario	Total cooling energy predicted by AccuRate (MJ)	Total cooling energy requirement due to hot spell* (MJ)	Percentage change of total cooling energy requirement due to hot spell
Scenario 1: One 3-day hot spell	23.1	18.6	-
Scenario 2: 3-separate hot days	21.5	17.0	– 8.6%

The results here and also from the previous section have demonstrated that the effect of an *n*-day hot spell on building thermal performance is more pronounced than the effect of *n* hot days occurring separately. Through the investigation, it is also found that the extent of the difference in the effect also depends on the relative differences between the weather of the hot days and the other normal days and the insulation of the building envelope. A sensitivity check of insulation on building thermal performance is made in the next Section.

Therefore, when considering the effects of heatwave events on building thermal performance, the duration of a heatwave event is also important. The hot spell therefore is the appropriate parameter to be used for evaluating the effects.

This result is in line with and may be used to *partly* explain an observation in the energy consumptions of VIC from 19 Jan to 15 Feb 2009 shown in Figure 5.2.3 (Grozev, 2009). The peak energy consumptions of a day during the 3-day hot spell (28 – 30 Jan) is about 10,400 MW, whilst the peak consumption of the Black Saturday (7 Feb), which occurred as an isolated 1-day hot spell, is 15% lower at about 9,000 MW.

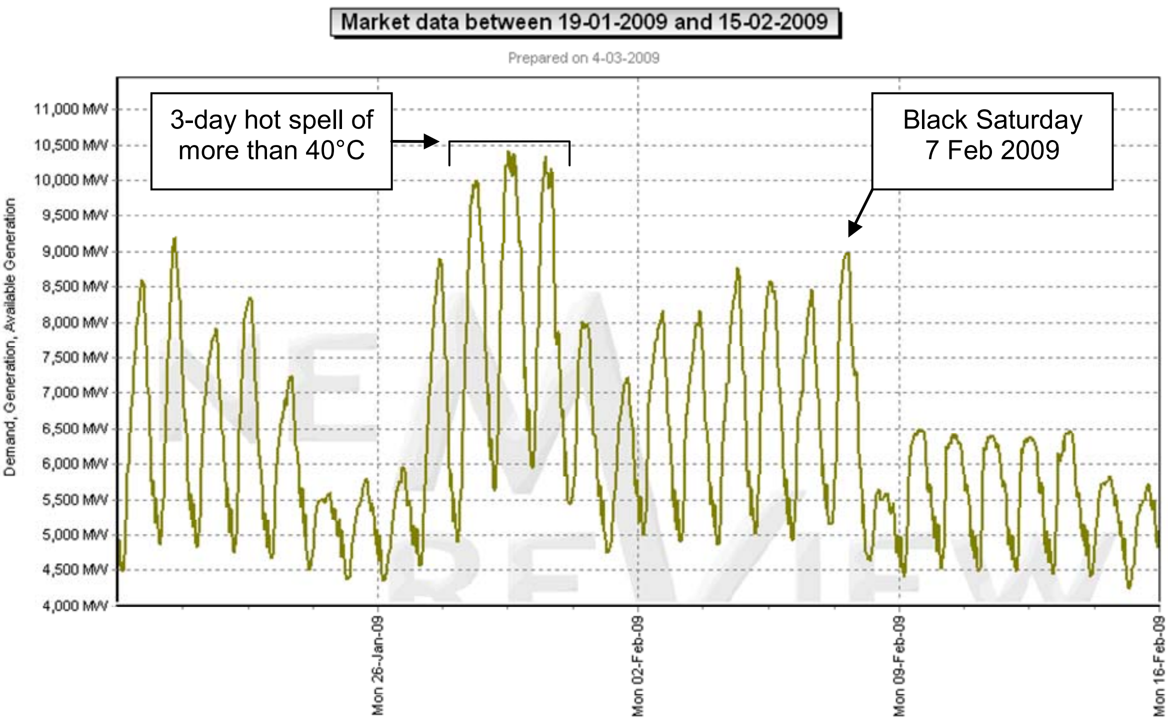


Figure 5.2.3 – Electricity consumption of VIC from 19/01/09 to 15/02/09

4.3 A Sensitivity Check of the Effects of Insulation on Building Thermal Performance

In this section, the effect of insulation on building thermal performance is investigated by using the commercial version of AccuRate, version 1.1.4.1. The 'House 1 base design', which was used for NatHERS software accreditation, is used for this investigation. This house is a medium size detached one-storey 4-bedroom house with a steel roof and steel wall cladding. The house plan and construction details are given in Appendix H.

It was assume that the house was on free-floating operation (with no cooling), and experienced the real temperature condition during January and February 2009. To see the effect of insulation, different thermal resistance R values of the insulation (R = 0.14, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 m^2.K/W) are assigned to the external walls and ceiling, and the results of temperature in the Bedroom 1 and the Kitchen-family room of the house are obtained for each case.

Figures 5.3.1 and 5.3.2 respectively show the Bedroom 1 and the Kitchen-family room temperature with different R-values of the wall and ceiling insulation for the period from 16 Jan to 10 Feb 2009. The results show that the change of the insulation R-value clearly affects the indoor air temperature, but to different extents depending on the outdoor temperature. Figure 5.3.3 and 5.3.4 respectively shows the sensitivity of the maximum temperature in Bedroom 1 and the Kitchen-family room to the insulation R-values at 7 days with the maximum outdoor temperature above 35°C. It can be seen that an increase in insulation R-value is more efficient in reducing indoor air temperature for R-value less than 2.0. When R-value is more than 2.0, its effect on reducing indoor temperature is decreased. It should be noted that R=2.0 is the required insulation for houses in Melbourne specified in Building Code of Australia (ABCB, 2007).

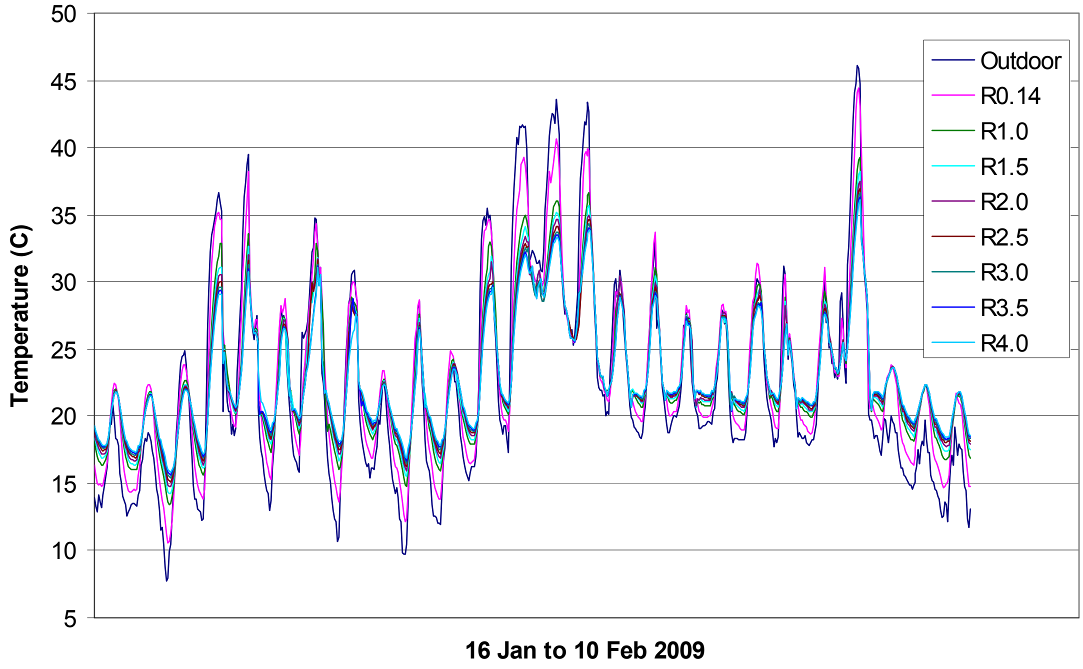


Figure 5.3.1 – Changes of temperature in Bedroom 1 with time at different R values

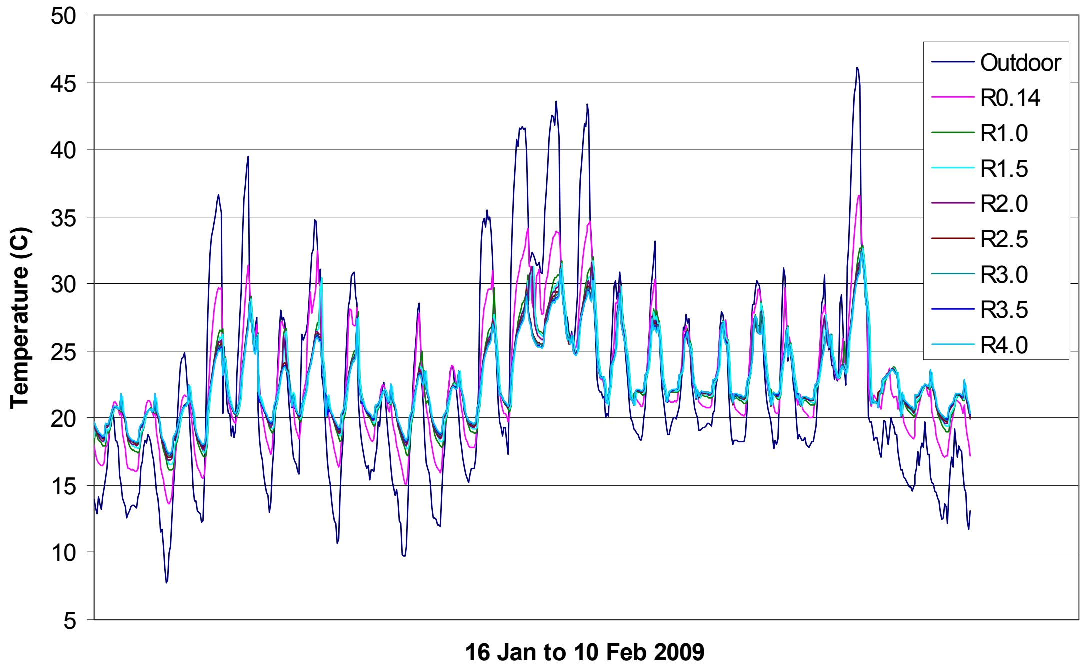


Figure 5.3.2 – Changes of temperature in Kitchen-Family room with time at different R values

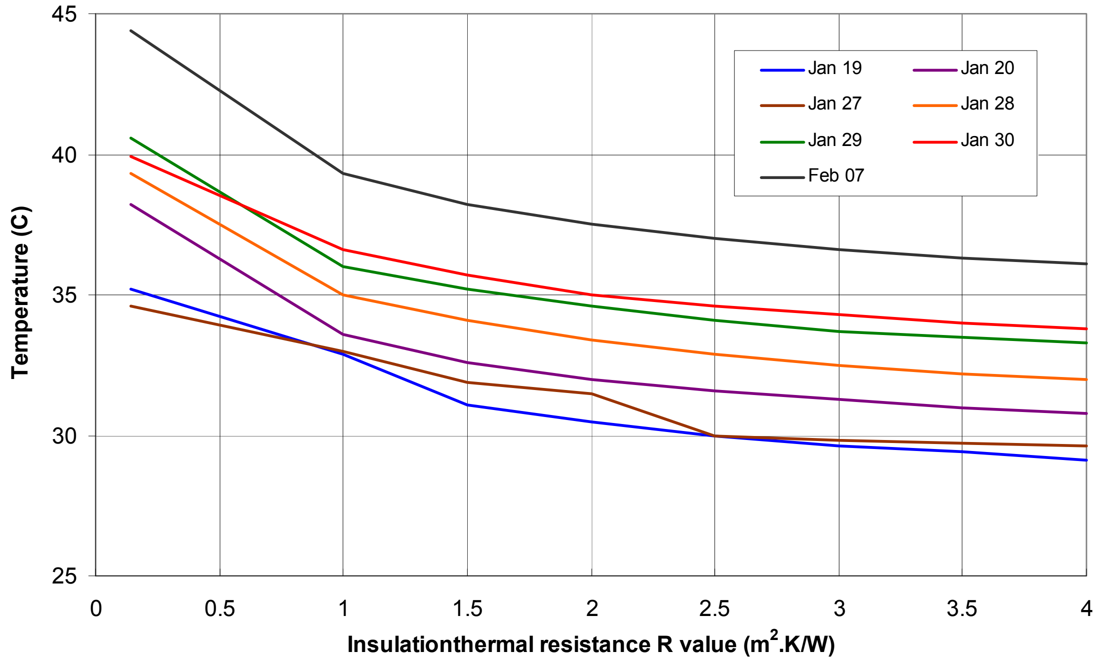


Figure 5.3.3 – Changes of daily maximum temperature in Bedroom 1 with R values on days hotter than 35°C

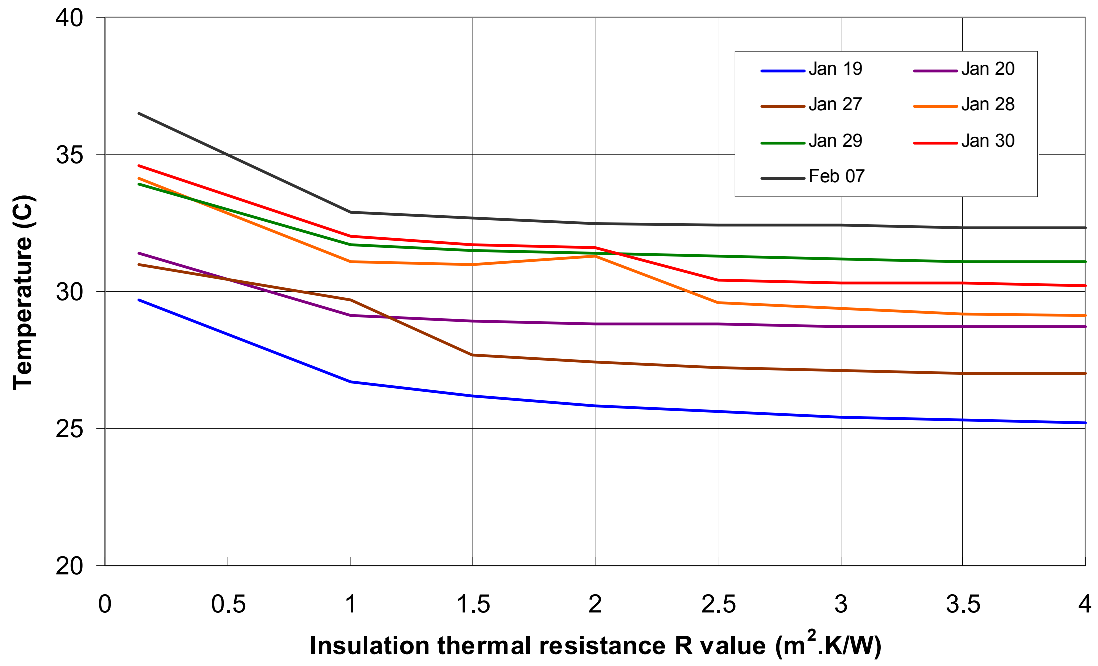


Figure 5.3.4 – Changes of daily maximum temperature in Kitchen-Family room with R values on days hotter than 35°C

4.4 Some Other Effects of Extreme Heatwave events

This Section outlines the effects of extreme heatwave events on power utilities and transport. Further detailed analysis can be made once more relevant data become available.

4.4.1 Electric Power Losses in Transmission and Distribution Networks due to Temperature Increases

Transmission networks transport electricity over long distance from generators to distribution networks, and then to retailers. In the Australian National Electricity Market (NEM), the total length of the transmission networks is 42,000 km, and the total length of the distribution networks is 700,000 km (AER, 2007).

To minimise the loss of electricity energy, electricity is first converted to high voltage for efficient transmission along a network. In the distribution networks, however, the voltage has to be lower due to safety and usage issues. The electricity energy loss occurs in the transformers and the transmission and distribution lines. It was reported (CCTP, 2005) that the total loss of electricity energy per year was about 7.2% in the US (1995); about 7.4% in the UK (1998) and about 5.7% in Japan (2004). About 60% of the losses are from lines, and 40% are from transformers, most of which are in the distribution networks.

In principle, the power energy loss P_{loss} (Watt) can be evaluated by

$$P_{loss} = I^2 R \tag{5.1}$$

where I is the current in Ampere, R is the resistance in Ohm. Given the power loss depends on the square of current, it is important to keep the current as low as possible to minimise the loss. For a given power, the voltage therefore is transformed to a higher level to lower the current, and therefore reduce the energy loss in a long transmission line.

Ambient temperature affects the power energy loss. When the temperature increases, it is expected that the power losses would increase due to the following two reasons:

- A temperature increase will make the electricity resistance of the conductors increase. The increase of the resistance ΔR (Ohm) with temperature change ΔT (°C) is expressed by the following relationship

  $$\Delta R / R = \alpha \, \Delta T \tag{5.2}$$

  where α is the temperature coefficient of resistance, which depends on the conductor material. For a conductor material like copper, $\alpha = 4.0 \times 10^{-3}$ / °C. From this value, it can be estimated that the resistance and thus the power loss will increase 0.4% as the temperature increases 1°C.

- A temperature increase will make the electricity demand/load increase due to the increased use of air-conditioning. This will result in higher current in the networks, provided the power does not exceed the capacity of the conductor. As the power loss depends on the square of current, this loss will increase significantly. For example, when the energy demand increases by 20%, the energy loss will increase by 44%. During the 3-day hot spell in Jan 2009, the peak power demand in Vic jumped by about 2000MW (Figure 5.2.3), i.e. about 24% above the average maximum values for Jan/Feb. The electrical loss then would increase by 53%.

According to most climate change projections (IPCC (2007a), CSIRO (2007)), temperature is the climate parameter that certainly increases. The changes are not only in higher temperature values, but also in longer duration of hot spells as observed in Section 3 at some locations. Therefore, it is expected that with higher temperature coupled with longer duration of hot spells, significant power energy loss would be resulted, presenting significant waste of natural resource. Further detailed investigation on the issue and its adaptation options therefore is recommended using relevant data available from the electric power industry.

4.4.2 Mechanical Thermal Stress and Buckling in Steel Structures

A high temperature for a long duration of an extreme heatwave event would cause a structural failure, as the structure may have not been designed for such an extreme condition. A typical example was the buckling of railways in Melbourne during the extreme heatwave event in Jan 2009 (Ham, 2009).

The buckling of the railways occurs as a result of the thermal stress in the rail exceeding a critical value. As temperature increases, thermal expansion occurs, mainly elongating the length of the rail. There may be a ‘thermal’ gap between two rails designed to accommodate the thermal expansion. However, when the temperature increases to a level high enough for the thermal expansion filling up the gap, or the rail is connected all together by welding, the rail is considered to be fully constrained at its ends, and a thermal compression load starts to build up along the rail. Buckling then can occur when the thermal load exceeds a critical load, which depends on the material, length, geometry, and configuration of the rail.

The thermal expansion δ_T (m) along a rail due to a temperature change ΔT (°C) can be estimated by

$$\delta_T = \alpha \; L \; \Delta T \tag{5.3}$$

where L is the length of the rail; and α is thermal expansion coefficient. For steel, $\alpha = 12x10^6$ m/m°C.

The thermal load P_T (N) in a rail that is fully restrained at both ends due to a temperature change ΔT (°C) can be computed by

$$P_T = \alpha \; \Delta T \; EA \tag{5.4}$$

where A (m^2) is the rail cross-section area; E is the Young's modulus of the rail material. For a steel rail, E = 200 GPa = 2×10^{11} N/m^2

The critical load P_{crit} (N) for a straight and axial loaded bar is defined by

$$P_{crit} = \pi^2 EI / (kL)^2 \quad (5.5)$$

where I (m^4) is the second moment of the rail cross-section area about its weak axis, which is often the vertical axis; k is the effective length factor depending on the type of the constraint at the rail's ends. For both ends fixed, k= 0.5; for both ends pinned, k= 1.0; for one end fixed and one end free, k = 2.0.

Using these formulas, the thermal compression load can be estimated for a rail in an extreme heat condition and checked against the defined critical load to see if buckling would occur. As an example, an estimation of failure probability is made here for the case of Melbourne railway buckling scenario near Jolimont station as in Figure 5.4.1, which occurred during the 3-day hot spell in Jan 2009.

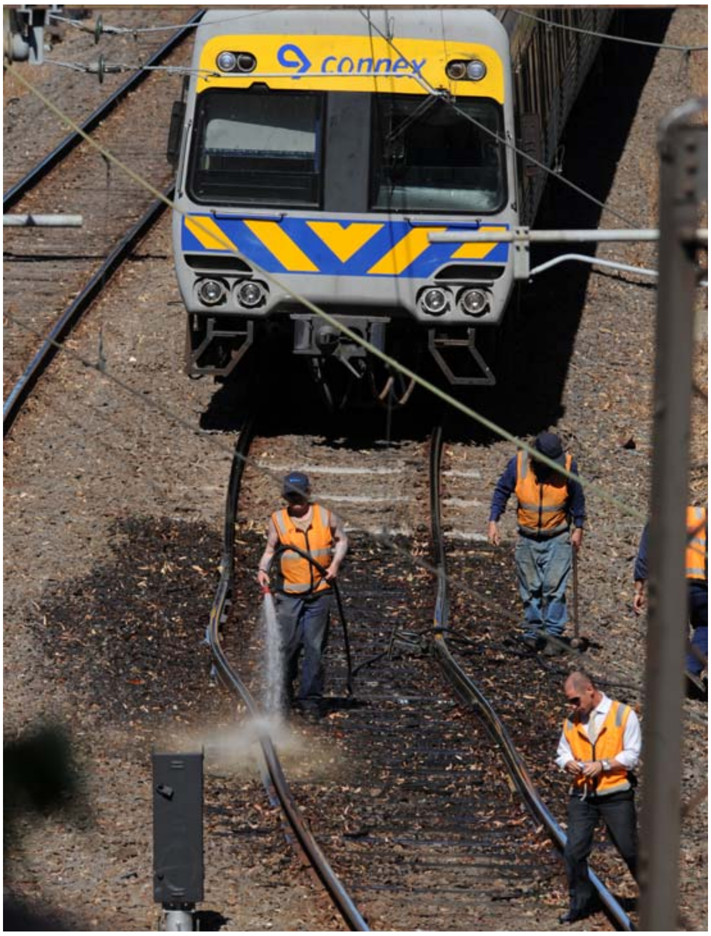


Figure 5.4.1 – Buckling of a railway track near Jolimont Station during the Jan 2009 heatwave in Melbourne (Joe Armao / Fairfax Photos)
(Photo used under a license from Fairfax Photos)

From observations of the rail system and the rail buckling photo in Figure 5.4.1, the following parameters are assumed and/or estimated:

- The rail is of 50kg type, which is commonly used for branch rail lines. From AS1085.1, the geometric properties of the rail cross section are:
  - o Area: $A = 6.45 \times 10^{-3}\ m^2$
  - o Second moment about the weak axis (vertical): $I = 3.26 \times 10^{-6}\ m^4$
- The rail is continuous. There is no thermal gap between adjacent rails. The rails therefore has fixed along-the-length constrains at both ends. This is based on observations of the railway system, where the rails are connected to each other by welding.
- The rail material is steel. The Young's modulus $E = 2 \times 10^{11}\ N/m^2$. The thermal expansion coefficient is $\alpha = 12 \times 10^{-6}$ m/m°C.

Because there are many uncertainties involved, an estimate will be made by using Monte-Carlo simulation with assumed distributions for some parameters including the temperature change ΔT, the buckling length L, and the constraint factor k. The assumptions are as follows,

- For the temperature change, it is assumed and estimated that
  - o During the heatwave, at the time the maximum air temperature reached 43.6°C, it is assumed that the rail temperature reached 61°C to 66°C. This is based on a 'rule of thumb' approach, where the rail temperature was estimated to be 17°C higher than the air temperature or 1.5 times the air temperature (Yates and Mendis, 2009). The rail temperature is higher than the air temperature due to the high thermal conductivity and diffusivity of rail steel. It is therefore assumed that the rail temperature during the hot spell followed a normal distribution with a mean value of 63°C and a standard deviation of 1°C.
  - o At the time of construction, the rail is laid at the rail neutral temperature and restrained to prevent buckling. The neutral temperature is a temperature between expected hot and cold maximums of the region. It is generally selected at 75% of the expected maximum temperature of the region, or 22°C less than the maximum expected rail temperature (Yates and Mendis, 2009). For the Melbourne region, with an expected maximum temperature of 45°C, the neutral temperature is therefore in the range of 33°C to 43°C. It is therefore assumed that the rail neutral temperature followed a normal distribution with a mean value of 38°C and a standard deviation of 2°C.
  - o The temperature change ΔT is the difference between the rail temperature and the neutral temperature. As the rail temperature and neural temperature are normally distributed, the temperature change ΔT

also follows a normal distribution with the mean value of (63°C -38°C) = 25°C and a standard deviation of $(2^2+1^2)^{1/2}$ = 2.2°C.

- From Figure 5.4.1, it is it is assumed that
  - The length of the buckling part is L = 2.5m. It is thus assumed that the buckling length L follows a normal distribution with a mean of 2.5m and a standard deviation of 0.4m.
  - The failure mode of the rail suggests that the effective length factor k may vary from 0.5 to 1.0. It is thus assumed that effective length factor k follows a normal distribution with a mean of 0.8 and a standard deviation of 0.1.

A Monte Carlo simulation was undertaken for 1,000,000 runs. In each run, random values of ΔT, L, and k were picked up from their assumed distributions and used to compute the thermal load and the critical load using Eqs.(5.4) and (5.5). The distributions of the thermal load and the critical load were then obtained from the simulation, as plotted in Figure 5.4.2. The thermal load followed a normal distribution with the mean of 0.39×10^6 N, and the standard deviation of 0.036×10^6 N. The critical load followed the type II extreme value distribution with the shape parameter k = 0.16, the scale parameter $\sigma = 0.54 \times 10^6$ N, and the location parameter $\mu = 1.43 \times 10^6$ N.

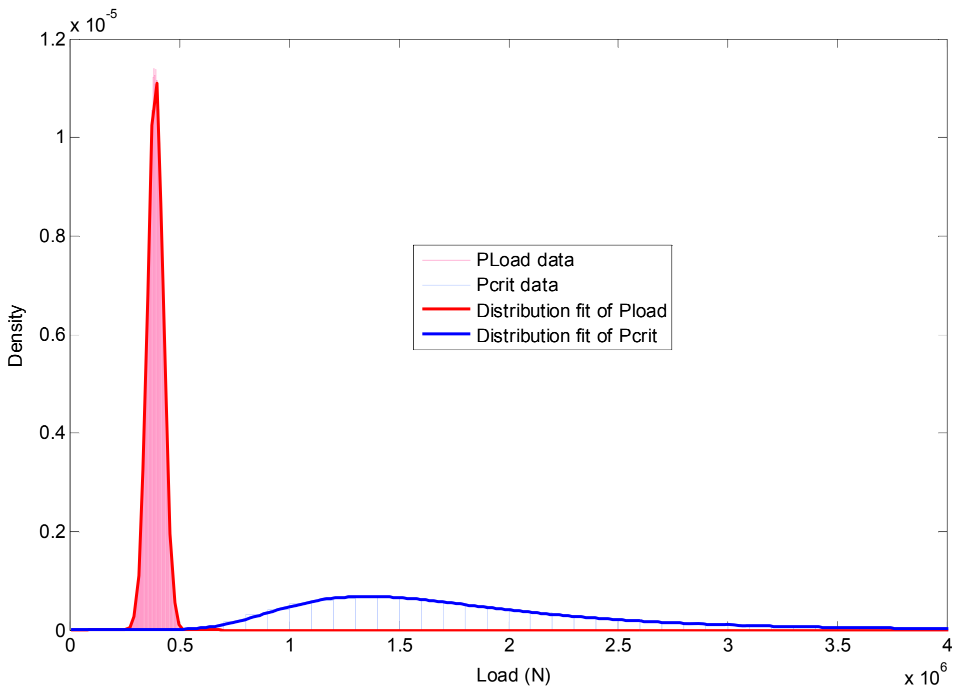


Figure 5.4.2 – Distributions of thermal loads and critical loads estimated for Melbourne railways due to Jan 2009 heatwave in Melbourne

In Figure 5.4.2, it can be seen that the thermal load distribution overlapped the critical load distribution, indicating a likelihood of buckling occurrence. The failure probability then can be estimated theoretically using the fitted distribution of the thermal load and critical load, or estimated numerically from the simulation by repeating the simulation for 1000 times. Among the 1,000,000 runs in each simulation, there were about 23 'failure' cases where the thermal load exceeded the critical load, leading to the rail buckling. The number of failure cases ranged from 7 to 40, and following a binomial distribution with the mean of 22.77 and the variance of 22.25, as shown in Figure 5.4.3. This result is in line with the theory of a simulation-based reliability method described in Sundararajan (1995).

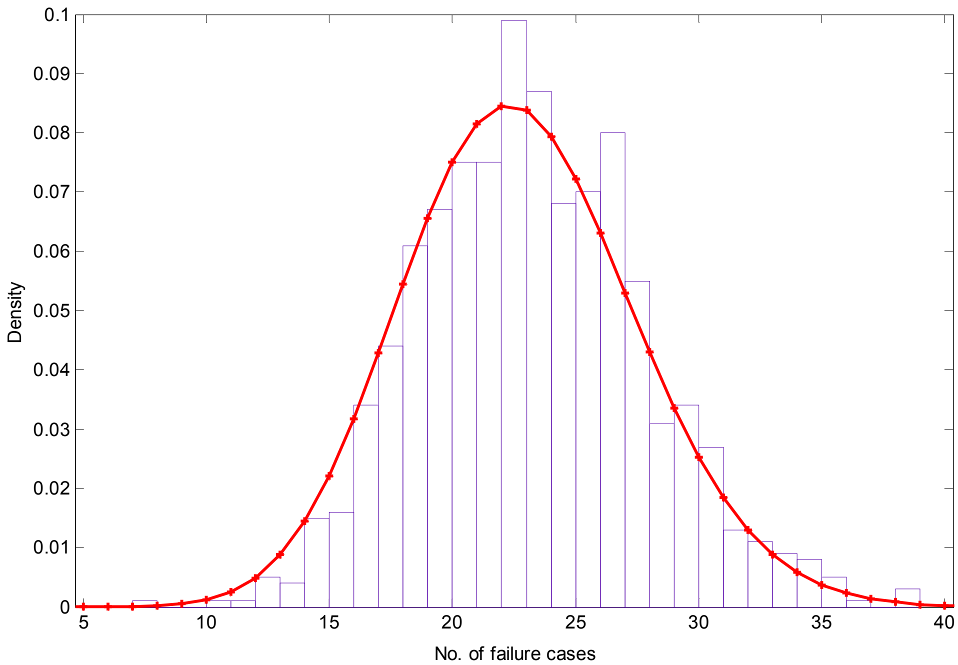


Figure 5.4.3 – Distributions of the number of failure cases in 1000 times repeating the Monte-Carlo simulation

It is therefore estimated that the failure probability of the rail buckling scenario similar to the one in Jolimont station in Figure 5.4.1 is about 2/100,000 on average during an extreme heatwave event like the one which occurs in Jan 2009 in Melbourne. The Melbourne railway network has a total length of about 272km, which can be divided into more than 100,000 sections of L=2.5m rail. Then on average, it was anticipated that 2 out of the 100,000 sections had buckled like the one in Figure 5.4.1.

In reality, the railways have been buckled in such a specific scenario at a couple of places in Melbourne. The buckling also occurred at different buckling modes and extents as shown in Adelaide Now (2009) for South Australia. Note that for simplicity and due to limited data available, some assumptions have been made in the above estimation:

- Effects of solar radiation and heat built up in the rail and its surrounding during the long hot spell were neglected. The rail temperature could be even higher and un-evenly distributed due to these factors. These would increase the thermal load and reduce the critical load.

- The critical load was computed for a straight and axial loaded bar. In reality, the rail was curved and may buckle in some flexural-torsional modes.

- For a section of rail buckling, it is assumed the lateral restraints of the rail, usually in the form of spikes or clips located at about every 0.8 m along the rail, had failed due to degradation of rail fastening system (deterioration of sleepers, corrosion of rail spikes, etc.) and/or poor maintenance.

Further detailed investigation of the reliability issue and adaptation options for the railway are needed and therefore recommended using relevant data available from the railway industry/authorities. Nevertheless, through this work, the need for reviewing the design and construction of railway tracks for adaptation to changing climate is identified. This would be done as follows:

- Reviewing and revising rail construction procedure, where rails are laid at its ‘neutral temperature’, to cope with increasing average and wider variation of temperature in the projected changing climate
- Reviewing and improving rail performance by improved or new construction configurations or designs of rail joints to accommodate the thermal expansion
- Re-emphasizing the importance of proper maintenance for railway tracks, using more durable materials for sleepers, spikes, etc.
- Using new materials for rails, which are less sensitive to changes of temperature

5. CONCLUDING REMARKS

A preliminary study of extreme heatwave events using a historical dataset of daily maximum temperature was undertaken. The study aims at establishing an analysis framework for modelling extreme heatwave events and their effects on the building and infrastructure performance. The following remarks are made:

- To characterise heatwave events for their impact on buildings and infrastructure performance, 'hot spells' is a more appropriate parameter than the conventional 'hot days'. The effect of an *n*-day hot spell on building thermal performance is more pronounced than the effect of *n* hot days occurring separately. This has been proved by case studies carried out by using the CSIRO AccuRate software to assess building thermal performance and cooling energy requirement of typical houses in Melbourne under assumed hot spell scenarios or the real hot spell temperature record in January 2009.

- The average recurrence interval, also known as the return period, of the yearly number of extreme heatwave events (hot days and hot spells) for a given threshold temperature were estimated and mapped for Australia. It is suggested that extreme temperature map(s) for the design of building and infrastructure under extreme heatwave events be developed based on the hot spell maps to provide a basis to assess vulnerability and to identify adaptation options for buildings and infrastructures on various aspects.

- Other case studies on infrastructure (electric power and railways) performance under an extreme heatwave have been investigated. The analysis approaches were outlined to provide basic information for further detailed investigations when more data become available from the relevant industries/authorities.

In summary, the study is providing essential components that can be combined to form a consistent analysis/simulation framework for further investigation of heatwave impacts on different types of physical infrastructures.

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APPENDIX A – PROBABILISTIC MODEL PARAMETERS FOR YEARLY NUMBER OF HOT DAYS

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
1007	TROUGHTON ISLAND	WA	-13.7542	126.1485	138.12	122.06	0.96	1.80	0.00	0.00
1009	KURI BAY	WA	-15.4875	124.5222	287.07	96.43	50.69	30.59	0.21	0.56
1013	WYNDHAM	WA	-15.4872	128.1247	331.64	17.36	214.54	22.50	45.00	19.48
1021	KALUMBURU MISSION	WA	-14.2961	126.6431	334.60	31.36	155.17	33.67	3.87	4.43
2011	OLD HALLS CREEK	WA	-18.2519	127.7817	214.11	115.57	121.44	67.85	22.41	19.21
2012	HALLS CREEK AIRPORT	WA	-18.2292	127.6636	266.84	41.86	154.41	36.41	28.40	14.84
2014	KIMBERLEY RES.STATION	WA	-15.6547	128.7092	319.17	31.41	192.00	27.73	31.43	15.89
2032	WARMUN	WA	-17.0156	128.2175	299.49	33.75	187.84	35.23	48.76	24.09
3002	BROOME POST OFFICE	WA	-17.95	122.25	265.21	47.90	64.82	22.58	3.16	3.31
3003	BROOME AIRPORT	WA	-17.9475	122.2353	281.37	17.40	60.56	15.25	4.40	3.45
3006	FITZROY CROSSING COMP.	WA	-18.1919	125.5644	281.76	98.51	183.62	69.57	64.28	33.36
3007	DERBY POST OFFICE	WA	-17.3044	123.6292	233.88	147.89	116.76	77.06	8.45	6.89
3030	BIDYADANGA	WA	-18.6844	121.7803	283.84	47.25	105.80	24.91	11.52	6.65
3032	DERBY AERO	WA	-17.3706	123.6611	202.31	153.85	104.37	81.56	8.86	8.63
4002	PORT HEDLAND POST OFFICE	WA	-20.3139	118.5742	239.17	20.22	88.06	27.00	12.06	5.84
4019	MANDORA	WA	-19.7419	120.8436	256.18	33.99	131.84	26.21	27.49	11.18
4020	MARBLE BAR COMPARISON	WA	-21.1756	119.7497	278.60	14.62	201.54	17.41	105.09	25.48
4032	PORT HEDLAND AIRPORT	WA	-20.3725	118.6317	263.78	15.61	136.86	21.05	30.37	11.54
4035	ROEBOURNE	WA	-20.7767	117.1456	265.38	29.34	170.28	24.86	60.28	18.45
5007	LEARMONTH AIRPORT	WA	-22.2406	114.0967	217.28	14.21	117.91	14.59	29.59	11.77
5008	MARDIE	WA	-21.1906	115.9797	270.76	18.60	155.70	19.52	45.58	14.24
5016	ONSLOW	WA	-21.6364	115.1117	187.74	55.39	69.96	26.30	15.34	7.88
5017	ONSLOW AIRPORT	WA	-21.6689	115.1092	138.81	106.98	65.12	51.26	16.39	14.03
5026	WITTENOOM	WA	-22.2425	118.3358	230.96	18.82	156.20	18.90	56.75	20.60
5058	BARROW ISLAND	WA	-20.8206	115.3931	159.94	56.59	56.00	22.24	4.16	3.23
5069	PANNAWONICA	WA	-21.6392	116.3308	213.00	38.62	147.30	27.75	65.45	20.15
6011	CARNARVON AIRPORT	WA	-24.8878	113.67	83.42	22.52	25.85	8.46	5.76	3.41
6022	GASCOYNE JUNCTION	WA	-25.0544	115.21	152.36	83.10	101.67	56.84	45.38	29.86
6062	CARNARVON POST OFFICE	WA	-24.9	113.65	75.28	15.55	24.16	6.62	5.53	2.94
6072	EMU CREEK STATION	WA	-23.0314	115.0414	236.06	19.52	160.31	15.52	70.74	16.08
7045	MEEKATHARRA AIRPORT	WA	-26.6136	118.5372	169.65	13.58	99.05	17.36	27.00	12.23
7057	MOUNT MAGNET	WA	-28.0619	117.8503	115.54	70.66	68.79	43.41	21.26	14.96
7080	THREE RIVERS	WA	-25.1256	119.1514	151.28	39.35	94.67	31.72	29.97	14.04
7139	PAYNES FIND	WA	-29.2708	117.6836	124.41	49.81	68.50	29.18	19.47	10.63
7151	NEWMAN	WA	-23.3683	119.7314	205.13	30.04	133.81	20.12	37.44	16.05
8025	CARNAMAH	WA	-29.6889	115.8869	123.18	16.20	62.85	12.43	15.73	6.98
8028	NABAWA	WA	-28.5008	114.7897	107.90	14.84	51.02	9.37	12.66	6.08
8039	DALWALLINU COMPARISON	WA	-30.2772	116.6619	117.40	14.48	54.42	10.71	10.90	5.12
8050	GERALDTON PORT	WA	-28.7758	114.6017	49.57	10.29	21.85	5.86	3.91	2.61
8051	GERALDTON AIRPORT	WA	-28.7953	114.6975	78.24	15.91	35.03	8.37	8.74	4.96
8091	MOORA	WA	-30.6417	116.0072	76.18	38.33	34.37	18.66	6.89	5.07
8093	MORAWA	WA	-29.2103	116.0089	133.61	19.28	72.94	13.74	20.25	8.00
8095	MULLEWA	WA	-28.5367	115.5142	106.20	58.99	58.52	33.53	15.80	11.40
8137	WONGAN HILLS	WA	-30.8917	116.7186	107.49	15.21	46.66	10.17	9.66	4.93
8138	WONGAN HILLS RES.STATION	WA	-30.8408	116.7267	87.45	19.45	36.29	10.72	6.12	3.79
8151	WALEBING	WA	-30.665	116.1386	103.38	11.60	46.76	9.21	10.38	4.58
8225	ENEABBA	WA	-29.8183	115.2722	111.43	15.64	57.89	10.62	17.86	5.20
8251	KALBARRI	WA	-27.7119	114.165	109.30	14.73	44.19	9.17	9.68	4.62
9021	PERTH AIRPORT	WA	-31.9275	115.9764	74.06	11.87	26.17	7.14	3.84	2.94
9034	PERTH REGIONAL OFFICE	WA	-31.9556	115.8697	54.54	10.80	17.24	6.86	1.77	1.68
9037	BADGINGARRA RESEARCH STN	WA	-30.3381	115.5394	84.71	31.61	40.14	16.05	9.57	5.37
9038	ROTTNEST ISLAND LIGHTHOUSE	WA	-32.0089	115.5022	21.17	6.38	5.10	2.25	0.23	0.43
9053	PEARCE RAAF	WA	-31.6669	116.0189	51.80	37.26	20.76	15.61	4.36	4.06
9064	KWINANA BP REFINERY	WA	-32.2258	115.7611	42.08	9.56	11.13	4.86	0.92	1.04
9111	KARNET	WA	-32.44	116.0744	60.50	14.70	16.50	7.44	1.24	1.45
9114	LANCELIN	WA	-31.0164	115.33	51.76	9.56	18.98	5.55	2.60	1.91
9131	JURIEN BAY	WA	-30.3081	115.0311	58.71	9.13	20.97	5.48	2.79	2.07
9500	ALBANY	WA	-35.0289	117.8808	3.83	3.72	1.01	1.36	0.12	0.33
9510	BRIDGETOWN COMPARISON	WA	-33.9575	116.1375	53.66	11.74	15.10	6.48	1.18	1.55
9518	CAPE LEEUWIN	WA	-34.3728	115.1358	3.39	2.01	0.59	0.87	0.02	0.14
9519	CAPE NATURALISTE	WA	-33.5372	115.0189	16.26	6.93	1.98	1.91	0.02	0.14
9534	DONNYBROOK	WA	-33.5719	115.8247	59.99	10.17	16.78	5.81	1.05	1.31
9538	DWELLINGUP	WA	-32.7103	116.0594	52.52	12.48	13.26	4.96	0.60	0.95
9541	ESPERANCE POST OFFICE	WA	-33.85	121.8833	22.29	5.59	8.82	3.20	1.94	1.54
9573	MANJIMUP	WA	-34.2508	116.145	31.52	8.01	6.96	3.74	0.42	0.67
9581	MOUNT BARKER	WA	-34.625	117.6361	23.57	10.40	6.91	4.21	0.58	0.89
9592	PEMBERTON	WA	-34.4478	116.0433	26.14	6.55	5.36	2.95	0.38	0.57
9631	ESPERANCE DOWNS RESEARCH S	WA	-33.6031	121.7828	41.91	11.75	14.60	5.11	2.40	1.75
9642	WOKALUP	WA	-33.1328	115.8792	57.63	12.15	16.31	5.20	0.89	1.13
9741	ALBANY AIRPORT	WA	-34.9414	117.8022	15.10	4.27	3.86	2.08	0.79	0.87

APPENDIX A – PROBABILISTIC MODEL PARAMETERS FOR YEARLY NUMBER OF HOT DAYS

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
9754	METTLER	WA	-34.5961	118.5519	17.28	5.62	4.90	2.37	0.86	0.92
9789	ESPERANCE	WA	-33.83	121.8925	31.39	5.61	11.00	3.11	2.61	1.70
9842	JARRAHWOOD	WA	-33.7964	115.6658	48.16	11.21	10.75	4.49	0.56	0.88
10007	BENCUBBIN	WA	-30.8081	117.8603	104.22	23.24	46.06	12.26	9.58	5.01
10035	CUNDERDIN	WA	-31.6494	117.2322	102.95	11.03	44.39	7.84	8.80	3.63
10058	GOOMALLING	WA	-31.2994	116.8269	62.45	41.35	27.50	18.51	6.05	5.11
10073	KELLERBERRIN	WA	-31.6183	117.7217	100.14	13.38	42.13	9.38	8.38	4.29
10092	MERREDIN	WA	-31.4756	118.2789	100.29	12.98	41.07	7.88	7.66	3.77
10093	MERREDIN RESEARCH STATION	WA	-31.4994	118.2242	99.04	12.94	39.38	9.50	6.55	3.56
10111	NORTHAM	WA	-31.6508	116.6586	103.73	13.97	45.69	9.85	9.60	4.86
10144	YORK POST OFFICE	WA	-31.8836	116.7581	97.64	14.16	40.98	8.30	7.66	4.03
10515	BEVERLEY	WA	-32.1083	116.9247	102.64	16.08	43.28	9.99	8.64	4.68
10524	BROOKTON	WA	-32.3725	117.0072	78.39	15.28	29.49	8.00	4.90	2.71
10536	CORRIGIN	WA	-32.3292	117.8733	78.31	14.82	29.25	8.73	4.12	2.72
10568	HYDEN	WA	-32.4419	118.8983	92.38	24.90	39.16	13.31	8.78	4.95
10579	KATANNING COMPARISON	WA	-33.6886	117.5553	56.13	9.62	16.87	5.17	1.63	1.61
10582	KOJONUP	WA	-33.8383	117.1514	41.66	10.41	11.66	3.68	1.00	1.22
10592	LAKE GRACE COMPARISON	WA	-33.1006	118.4625	68.57	12.34	23.92	6.78	3.16	2.14
10612	NAREMBEEN	WA	-32.0656	118.3956	86.38	17.11	34.12	9.00	5.95	3.69
10614	NARROGIN	WA	-32.9342	117.1797	57.06	14.18	16.88	6.31	1.46	1.71
10622	ONGERUP	WA	-33.9644	118.4889	43.73	8.11	13.41	4.27	1.34	1.28
10626	PINGELLY	WA	-32.5336	117.0831	72.03	11.83	23.73	6.50	3.14	2.42
10633	RAVENSTHORPE	WA	-33.5803	120.0458	48.42	7.10	16.29	4.38	2.71	2.12
10647	WAGIN	WA	-33.3075	117.3403	61.22	13.91	18.43	6.38	2.30	1.91
10648	WANDERING COMPARISON	WA	-32.6814	116.6756	72.86	10.66	24.54	7.23	2.70	2.24
11003	EUCLA	WA	-31.6797	128.8792	42.06	13.38	19.20	7.99	6.00	3.37
11004	FORREST AERO	WA	-30.8389	128.1139	94.31	12.81	40.27	7.15	10.88	4.26
11017	BALLADONIA	WA	-32.4569	123.8653	76.83	13.74	29.10	7.88	7.64	3.90
12022	CASHMERE DOWNS	WA	-28.97	119.5686	131.57	14.46	63.43	11.63	13.77	7.39
12038	KALGOORLIE-BOULDER AIRPORT	WA	-30.7847	121.4533	99.91	20.52	39.93	11.21	8.56	4.70
12039	KALGOORLIE POST OFFICE	WA	-30.75	121.4667	110.80	15.20	47.78	11.49	10.43	5.32
12046	LEONORA	WA	-28.8836	121.3303	146.70	17.92	78.56	15.36	23.58	10.00
12052	MENZIES	WA	-29.6917	121.0297	128.33	17.68	62.31	11.79	15.15	6.47
12065	NORSEMAN	WA	-32.1981	121.7794	85.88	10.71	29.18	6.59	4.74	3.11
12071	SALMON GUMS RES.STN.	WA	-32.9869	121.6239	59.03	18.32	20.11	7.85	3.51	2.48
12074	SOUTHERN CROSS	WA	-31.2319	119.3281	113.84	13.24	51.08	11.68	10.88	5.61
12090	YEELIRRIE	WA	-27.2842	120.0931	162.91	14.32	90.44	15.62	26.18	12.12
13011	WARBURTON AIRFIELD	WA	-26.1317	126.5839	81.84	89.70	48.39	54.35	14.95	18.81
13012	WILUNA	WA	-26.5914	120.225	169.80	20.96	100.34	19.73	30.52	13.07
13017	GILES METEOROLOGICAL OFFICE	WA	-25.0341	128.301	182.73	16.94	101.06	21.29	17.65	9.65
13030	TELFER AERO	WA	-21.7125	122.2281	233.18	32.02	163.12	27.74	73.30	23.94
14008	CAPE DON	NT	-11.3167	131.7667	242.06	34.63	2.50	4.40	0.00	0.00
14015	DARWIN AIRPORT	NT	-12.4239	130.8925	316.33	20.80	10.08	6.04	0.00	0.00
14016	DARWIN POST OFFICE	NT	-12.4	130.8	329.29	17.89	41.55	28.34	0.02	0.13
14042	OENPELLI	NT	-12.3263	133.0581	320.23	32.95	121.09	24.60	1.45	2.14
14090	MIDDLE POINT	NT	-12.5781	131.3145	310.53	74.57	69.47	23.63	0.13	0.34
14198	JABIRU AIRPORT	NT	-12.6594	132.8939	276.44	104.84	124.53	57.53	2.50	4.48
14400	MANINGRIDA	NT	-12.0482	134.2263	278.07	57.09	10.07	8.10	0.00	0.00
14401	WARRUWI	NT	-11.6502	133.3796	241.15	34.44	10.41	8.72	0.00	0.00
14402	MILINGIMBI	NT	-12.1239	134.9078	176.82	104.78	9.08	11.11	0.00	0.00
14504	GALIWINKU	NT	-12.028	135.5648	287.29	46.51	11.79	8.84	0.00	0.00
14508	GOVE AIRPORT	NT	-12.2741	136.8203	155.83	103.96	5.49	5.94	0.00	0.00
14609	NGUKURR	NT	-14.7295	134.7274	84.93	129.91	41.44	64.65	6.22	11.28
14612	LARRIMAH	NT	-15.5748	133.2138	304.67	18.36	147.55	30.60	12.43	8.66
14626	DALY WATERS AWS	NT	-16.2636	133.3782	163.32	147.28	86.82	80.68	10.01	13.16
14703	CENTRE ISLAND	NT	-15.7426	136.8192	225.64	25.05	46.82	19.77	0.27	0.98
14704	MCARTHUR RIVER MINE	NT	-16.4423	136.076	211.32	113.90	114.79	63.96	16.16	13.35
14707	WOLLOGORANG	NT	-17.2122	137.9462	224.85	122.89	109.36	66.51	10.70	9.24
14825	VICTORIA RIVER DOWNS	NT	-16.403	131.0145	281.64	36.98	159.83	27.89	24.12	14.82
14829	LAJAMANU	NT	-18.3325	130.6358	97.38	125.21	59.88	78.85	14.50	24.27
14840	WAVE HILL	NT	-17.3871	131.1166	292.74	19.36	176.56	28.66	41.24	21.82
14901	DOUGLAS RIVER	NT	-13.8345	131.1872	124.13	149.65	56.33	69.16	1.77	4.68
14903	KATHERINE AVIATION MUSEUM	NT	-14.4437	132.2737	118.66	155.80	56.62	75.78	1.69	3.42
15085	BRUNETTE DOWNS	NT	-18.637	135.945	220.86	94.79	131.62	60.56	30.30	21.16
15087	TENNANT CREEK POST OFFICE	NT	-19.6475	134.1896	238.52	14.81	141.80	22.58	28.47	14.08
15135	TENNANT CREEK AIRPORT	NT	-19.6423	134.1833	235.18	15.92	127.66	29.79	19.24	11.56
15511	CURTIN SPRINGS	NT	-25.3139	131.7571	178.05	19.48	103.07	20.53	29.24	12.09
15528	YUENDUMU	NT	-22.2562	131.8017	178.43	40.10	92.62	33.11	12.00	9.29
15540	ALICE SPRINGS POST OFFICE	NT	-23.71	133.8683	169.81	18.72	90.56	19.10	17.13	12.10
15590	ALICE SPRINGS AIRPORT	NT	-23.7951	133.889	172.92	19.12	89.05	20.49	14.73	8.34

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
15602	JERVOIS	NT	-22.9494	136.1442	194.00	32.57	117.59	27.12	37.36	15.35
16001	WOOMERA AERODROME	SA	-31.1558	136.8054	111.36	11.79	51.24	11.85	11.76	6.20
16032	NONNING	SA	-32.5226	136.4926	94.45	11.49	41.61	9.61	8.82	4.86
16044	TARCOOLA	SA	-30.7111	134.5694	126.08	20.74	62.84	13.65	20.30	8.40
16065	ANDAMOOKA	SA	-30.449	137.1692	140.63	13.05	73.61	12.97	23.08	10.00
17005	LEIGH CREEK AERO	SA	-30.4667	138.4075	126.28	13.17	58.52	9.96	12.86	6.80
17024	MARREE (FARINA)	SA	-30.066	138.2739	138.07	14.25	73.37	14.06	17.93	7.17
17031	MARREE COMPARISON	SA	-29.6481	138.0637	159.69	14.42	92.51	14.25	33.57	10.99
17043	OODNADATTA AIRPORT	SA	-27.5553	135.4456	141.28	58.91	81.49	35.35	27.87	14.88
17099	ARKAROOLA	SA	-30.311	139.3357	109.69	14.19	48.48	12.46	10.34	5.72
18012	CEDUNA AMO	SA	-32.1297	133.6976	58.74	12.26	28.19	7.05	8.79	3.81
18014	CLEVE	SA	-33.7011	136.4937	47.14	8.40	19.46	4.97	3.88	2.40
18040	KIMBA	SA	-33.1414	136.4125	75.50	9.86	31.63	7.93	5.93	4.13
18044	KYANCUTTA	SA	-33.1332	135.5552	93.14	10.97	43.79	8.55	13.48	5.59
18052	MINNIPA AGRICULTURAL CENTRE	SA	-32.8361	135.15	78.86	11.37	34.44	8.02	7.58	3.93
18069	ELLISTON	SA	-33.6501	134.888	32.80	6.12	11.78	4.18	1.38	1.13
18070	PORT LINCOLN	SA	-34.7225	135.8558	20.47	6.39	5.85	2.87	1.03	1.23
18079	STREAKY BAY	SA	-32.7963	134.2116	57.92	9.11	22.86	6.30	4.36	2.82
18103	WHYALLA (NORRIE)	SA	-33.0303	137.5328	56.09	10.26	24.59	6.68	6.75	3.62
18110	COOK	SA	-30.6143	130.4136	107.50	11.97	52.03	9.19	17.00	4.98
18115	NEPTUNE ISLAND	SA	-35.3365	136.1174	1.71	1.49	0.07	0.25	0.00	0.00
18139	POLDA (GUM VIEW)	SA	-33.5085	135.2928	71.25	11.22	31.61	7.88	8.67	4.30
19017	HAWKER	SA	-31.8846	138.435	104.32	14.28	44.71	13.18	7.54	5.67
19062	YONGALA	SA	-33.0287	138.7489	67.76	12.15	22.62	8.78	2.00	2.56
19066	PORT AUGUSTA POWER STATION	SA	-32.528	137.79	83.53	10.93	35.21	6.72	9.65	4.37
20026	YUNTA	SA	-32.5819	139.5611	90.13	13.94	38.28	11.15	8.09	5.16
21014	CLARE POST OFFICE	SA	-33.8364	138.6125	50.11	11.58	15.92	6.58	1.35	1.62
21043	PORT PIRIE NYRSTAR COMPARISO	SA	-33.1708	138.0104	80.46	15.98	33.56	10.35	6.98	4.90
21046	SNOWTOWN	SA	-33.7844	138.2133	72.50	9.61	30.23	7.60	5.73	3.64
22006	KADINA	SA	-33.9551	137.6953	64.94	10.18	25.85	7.04	4.50	3.51
22008	MAITLAND	SA	-34.3745	137.6733	50.60	8.97	17.76	6.11	2.44	2.30
22015	PRICE	SA	-34.2971	138.0014	35.10	5.50	15.17	4.45	4.33	2.69
22018	WAROOKA	SA	-34.9906	137.3995	32.57	7.19	9.71	4.86	0.67	1.00
22801	CAPE BORDA COMPARISON	SA	-35.7529	136.5938	9.63	5.29	0.63	0.93	0.00	0.00
22803	CAPE WILLOUGHBY	SA	-35.8426	138.1327	8.95	3.48	1.78	1.44	0.08	0.27
22807	KINGSCOTE	SA	-35.6569	137.6364	10.02	4.25	1.69	1.24	0.09	0.29
23000	ADELAIDE WEST TERRACE	SA	-34.9254	138.5869	48.98	9.51	16.81	6.76	2.45	2.72
23013	PARAFIELD AIRPORT	SA	-34.7977	138.6281	41.66	26.44	16.12	11.78	2.90	3.60
23015	PENFIELD WEAPONS RESEARCH	SA	-34.7333	138.65	32.47	27.92	12.26	11.12	1.82	2.30
23020	ROSEWORTHY AGRIC COLLEGE	SA	-34.5267	138.6883	53.38	18.06	21.13	8.12	3.88	2.69
23034	ADELAIDE AIRPORT	SA	-34.9524	138.5204	42.42	9.05	13.79	5.96	1.42	1.73
23037	ADELAIDE (PARAFIELD PLANT INTR	SA	-34.7833	138.6242	59.23	9.68	22.81	6.01	3.68	2.83
23083	EDINBURGH RAAF	SA	-34.7111	138.6222	59.14	11.25	24.00	7.70	4.86	3.46
23090	ADELAIDE (KENT TOWN)	SA	-34.9211	138.6216	54.83	11.21	19.73	7.43	2.93	2.41
23321	NURIOOTPA COMPARISON	SA	-34.4767	139.0047	49.37	8.89	15.51	5.83	1.46	1.76
23343	ROSEDALE (TURRETFIELD RESEAR	SA	-34.5519	138.8342	62.47	10.41	25.84	7.00	5.36	3.48
23703	BELAIR (KALYRA)	SA	-35.0042	138.6147	30.67	8.83	7.97	4.47	0.42	0.83
23733	MOUNT BARKER	SA	-35.0639	138.8509	38.80	9.03	11.48	5.78	0.72	0.99
23747	STRATHALBYN	SA	-35.256	138.8901	42.70	7.22	16.39	5.39	2.48	1.90
23751	VICTOR HARBOR COMPARISON	SA	-35.555	138.6217	21.78	5.03	7.92	3.26	1.47	1.32
23801	LENSWOOD RESEARCH CENTRE	SA	-34.9482	138.8071	27.32	6.19	5.29	3.70	0.03	0.18
24016	RENMARK	SA	-34.1711	140.7494	82.73	11.01	34.16	8.70	7.41	4.65
24511	EUDUNDA	SA	-34.1754	139.0847	49.24	11.06	15.45	7.22	1.62	1.92
24518	MENINGIE	SA	-35.6902	139.3375	31.56	6.09	10.63	4.73	1.17	1.32
24521	MURRAY BRIDGE COMPARISON	SA	-35.1234	139.2592	54.95	9.04	22.15	7.16	4.49	3.09
25507	KEITH	SA	-36.098	140.3556	57.67	9.17	22.29	7.14	4.36	3.02
25509	LAMEROO COMPARISON	SA	-35.3288	140.5175	67.28	11.16	26.68	8.07	5.34	3.61
26005	CAPE NORTHUMBERLAND	SA	-38.0573	140.6725	13.30	4.46	4.30	2.69	0.49	0.66
26013	KYBYBOLITE RESEARCH CENTRE	SA	-36.8803	140.9286	41.48	9.47	13.34	6.04	1.86	2.07
26019	MOUNT BURR FOREST RESERVE	SA	-37.5575	140.4197	24.92	6.50	7.95	3.87	1.11	1.47
26020	MOUNT GAMBIER POST OFFICE	SA	-37.8333	140.7833	20.95	6.79	5.93	3.74	0.53	0.96
26021	MOUNT GAMBIER AERO	SA	-37.7473	140.7739	24.98	6.66	8.06	4.41	0.92	1.27
26023	NARACOORTE	SA	-36.9564	140.7402	42.76	8.20	14.92	5.67	2.03	1.81
26026	ROBE COMPARISON	SA	-37.1628	139.756	7.46	4.03	0.59	0.91	0.00	0.00
27005	COEN POST OFFICE	QLD	-13.9447	143.2006	71.02	95.16	6.66	10.17	0.07	0.26
27006	COEN AIRPORT EVAP	QLD	-13.7636	143.1172	232.00	29.72	26.68	9.05	0.06	0.24
27022	THURSDAY ISLAND MO	QLD	-10.5853	142.21	134.12	35.22	0.02	0.15	0.00	0.00
27042	WEIPA EASTERN AVE	QLD	-12.6264	141.8836	275.24	102.15	34.00	16.44	0.00	0.00
28004	PALMERVILLE	QLD	-16.0008	144.0758	162.46	153.38	47.26	47.57	1.03	2.05
28008	LOCKHART RIVER AIRPORT	QLD	-12.785	143.305	163.00	25.33	5.81	4.76	0.02	0.15

APPENDIX A – PROBABILISTIC MODEL PARAMETERS FOR YEARLY NUMBER OF HOT DAYS

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
29004	BURKETOWN POST OFFICE	QLD	-17.7425	139.5475	248.57	54.63	82.49	29.36	4.16	4.03
29009	CLONCURRY AERO	QLD	-20.6717	140.5083	231.40	45.88	132.46	31.64	28.09	12.60
29012	CROYDON TOWNSHIP	QLD	-18.2044	142.2447	299.31	24.86	142.56	24.51	11.64	7.62
29025	JULIA CREEK POST OFFICE	QLD	-20.6569	141.7458	251.53	33.31	149.28	28.58	33.47	15.21
29038	KOWANYAMA AIRPORT	QLD	-15.4839	141.7475	278.05	57.02	78.80	23.60	0.68	1.59
29039	MORNINGTON ISLAND	QLD	-16.664	139.1837	197.80	42.44	13.69	15.94	0.00	0.00
29041	NORMANTON POST OFFICE	QLD	-17.6706	141.0672	304.39	21.24	136.52	30.08	6.00	5.10
29090	TOORAK RESEARCH STATION	QLD	-21.0344	141.8008	174.72	91.64	104.90	60.05	25.44	17.29
29127	MOUNT ISA AERO	QLD	-20.6778	139.4875	230.93	19.58	121.95	27.29	18.08	10.44
29141	CLONCURRY AIRPORT	QLD	-20.6664	140.505	117.90	122.45	72.72	78.67	16.83	21.48
30018	GEORGETOWN POST OFFICE	QLD	-18.2922	143.5483	276.19	22.80	108.67	33.09	4.68	5.48
30024	HUGHENDEN POST OFFICE	QLD	-20.8447	144.1986	228.40	14.94	101.74	24.15	8.71	5.95
30045	RICHMOND POST OFFICE	QLD	-20.7289	143.1425	252.94	26.21	141.15	28.09	26.99	15.35
31010	CAIRNS POST OFFICE	QLD	-16.9333	145.7833	147.57	28.39	5.32	6.69	0.13	0.49
31011	CAIRNS AERO	QLD	-16.8736	145.7458	142.42	17.70	3.05	2.90	0.05	0.21
31016	COOKTOWN POST OFFICE	QLD	-15.4633	145.25	128.83	16.29	4.83	3.85	0.03	0.18
31017	COOKTOWN MISSION STRIP	QLD	-15.4486	145.1861	46.44	71.80	3.32	6.50	0.08	0.38
31029	HERBERTON WHITE ST	QLD	-17.3851	145.3869	48.76	17.27	1.03	1.77	0.00	0.00
31034	KAIRI RESEARCH STATION	QLD	-17.215	145.5656	36.19	15.16	1.17	1.87	0.00	0.00
31037	LOW ISLES LIGHTHOUSE	QLD	-16.3842	145.5592	160.75	21.65	6.48	6.62	0.00	0.00
31066	MAREEBA QWRC	QLD	-16.995	145.4253	77.89	40.58	7.00	6.06	0.06	0.24
31108	WALKAMIN DPI	QLD	-17.1347	145.4281	87.38	19.05	4.38	3.05	0.00	0.00
32004	CARDWELL MARINE PDE	QLD	-18.2553	146.0197	150.20	25.93	4.98	5.77	0.12	0.44
32005	CAPE CLEVELAND LIGHTHOUSE	QLD	-19.1833	147.0167	101.53	26.40	1.27	1.89	0.00	0.00
32025	INNISFAIL	QLD	-17.5249	146.0345	83.66	31.07	2.30	2.47	0.08	0.34
32037	SOUTH JOHNSTONE EXP STN	QLD	-17.6053	145.9972	117.71	25.33	5.17	4.85	0.07	0.26
32040	TOWNSVILLE AERO	QLD	-19.2483	146.7661	144.70	25.49	3.42	3.79	0.13	0.39
32078	INGHAM COMPOSITE	QLD	-18.6494	146.1769	148.18	34.00	15.08	11.34	0.56	1.25
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.5775	147.4075	137.86	31.98	9.09	14.61	0.34	1.73
33002	AYR DPI RESEARCH STN	QLD	-19.6169	147.3758	136.35	39.91	5.42	6.25	0.25	0.64
33013	COLLINSVILLE POST OFFICE	QLD	-20.5534	147.8464	172.12	44.78	36.24	20.08	0.92	1.74
33045	MACKAY AERO	QLD	-21.1706	149.1794	27.93	41.36	0.54	1.55	0.00	0.00
33046	MACKAY POST OFFICE	QLD	-21.15	149.1833	77.10	26.17	1.77	2.92	0.00	0.00
33047	TE KOWAI EXP STN	QLD	-21.1642	149.1192	95.33	35.45	4.70	5.74	0.07	0.26
33058	PINE ISLET LIGHTHOUSE	QLD	-21.6667	150.2167	73.55	21.93	0.10	0.31	0.00	0.00
33065	ST LAWRENCE POST OFFICE	QLD	-22.3458	149.5356	133.24	24.90	4.88	5.13	0.24	0.82
33119	MACKAY M.O	QLD	-21.1172	149.2169	62.69	26.21	0.69	1.60	0.00	0.00
34002	CHARTERS TOWERS POST OFFICE	QLD	-20.0781	146.2614	189.71	25.08	53.75	18.76	3.25	3.43
35019	CLERMONT SIRIUS ST	QLD	-22.8239	147.6425	183.00	22.74	58.78	21.63	3.16	3.48
35027	EMERALD POST OFFICE	QLD	-23.5267	148.1617	173.02	29.38	61.15	27.43	5.04	5.46
35065	SPRINGSURE DAME ST	QLD	-24.1222	148.0867	132.12	32.37	35.55	16.11	2.07	2.18
35069	TAMBO POST OFFICE	QLD	-24.8819	146.2564	165.76	20.97	60.92	19.35	4.18	3.92
35070	TAROOM POST OFFICE	QLD	-25.6408	149.7958	152.66	21.06	41.14	18.23	2.20	2.67
35149	BRIGALOW RESEARCH STN	QLD	-24.8353	149.8003	147.90	28.83	32.54	18.88	1.26	1.58
36007	BARCALDINE POST OFFICE	QLD	-23.5544	145.2883	198.31	16.22	87.78	23.14	9.29	6.08
36026	ISISFORD POST OFFICE	QLD	-24.2589	144.4406	171.82	37.47	94.24	26.98	18.66	10.53
36030	LONGREACH POST OFFICE	QLD	-23.45	144.25	211.05	26.31	121.46	26.74	28.16	14.64
36031	LONGREACH AERO	QLD	-23.4372	144.2769	219.05	15.22	120.59	24.52	23.00	12.36
36143	BLACKALL TOWNSHIP	QLD	-24.4214	145.4672	195.93	14.09	93.98	20.23	10.49	7.51
37010	CAMOOWEAL TOWNSHIP	QLD	-19.9225	138.1214	250.81	31.13	152.97	31.05	35.54	18.14
37043	URANDANGI	QLD	-21.6119	138.3136	235.08	17.11	152.64	21.94	53.28	18.72
37051	WINTON POST OFFICE	QLD	-22.3908	143.0386	235.18	13.66	137.82	22.51	30.36	13.86
38002	BIRDSVILLE POLICE STATION	QLD	-25.9003	139.3486	195.47	15.68	122.77	16.92	45.06	14.12
38003	BOULIA AIRPORT	QLD	-22.9117	139.9039	214.50	23.32	137.34	21.80	45.15	18.78
38024	WINDORAH POST OFFICE	QLD	-25.4228	142.6564	183.95	58.26	112.00	41.35	32.57	19.30
39004	BARALABA POST OFFICE	QLD	-24.1819	149.8117	188.44	19.50	56.17	23.21	2.20	2.63
39006	BILOELA DPI	QLD	-24.3789	150.5164	154.83	19.09	30.10	15.26	0.77	1.25
39015	BUNDABERG POST OFFICE	QLD	-24.8667	152.3467	74.81	27.56	2.15	5.93	0.01	0.10
39023	CAPE CAPRICORN LIGHTHOUSE	QLD	-23.4833	151.2333	6.00	5.19	0.07	0.25	0.00	0.00
39039	GAYNDAH POST OFFICE	QLD	-25.6258	151.6094	141.63	25.44	29.84	20.84	1.78	3.77
39059	LADY ELLIOT ISLAND	QLD	-24.1119	152.7158	30.76	24.00	0.00	0.00	0.00	0.00
39083	ROCKHAMPTON AERO	QLD	-23.3753	150.4775	134.91	20.87	17.97	10.01	0.40	0.83
39085	SANDY CAPE LIGHTHOUSE	QLD	-24.7297	153.2083	33.34	22.74	0.00	0.00	0.00	0.00
39104	MONTO TOWNSHIP	QLD	-24.8642	151.1247	90.16	58.42	14.80	12.78	0.29	0.69
39122	HERON ISLAND RES STN	QLD	-23.4422	151.9131	27.32	28.36	0.00	0.00	0.00	0.00
39123	GLADSTONE RADAR	QLD	-23.8553	151.2628	111.29	23.94	4.57	6.03	0.06	0.24
39128	BUNDABERG AERO	QLD	-24.8885	152.3235	35.00	35.06	0.85	1.88	0.00	0.00
40004	AMBERLEY AMO	QLD	-27.6297	152.7111	92.32	21.95	12.09	8.17	0.64	1.05
40043	CAPE MORETON LIGHTHOUSE	QLD	-27.0314	153.4661	1.72	3.06	0.02	0.14	0.00	0.00
40062	CROHAMHURST	QLD	-26.8094	152.87	29.74	14.00	2.97	2.54	0.06	0.24

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
40068	DOUBLE ISLAND POINT LIGHTHOU	QLD	-25.9319	153.1906	12.48	17.73	0.14	0.35	0.00	0.00
40082	UNIVERSITY OF QUEENSLAND GAT	QLD	-27.5436	152.3375	101.48	27.07	16.71	11.34	1.12	1.56
40093	GYMPIE	QLD	-26.1831	152.6414	83.45	25.82	12.40	8.47	0.31	0.68
40100	IMBIL FORESTRY	QLD	-26.4619	152.6644	55.29	15.87	7.46	5.06	0.17	0.57
40112	KINGAROY PRINCE STREET	QLD	-26.5544	151.8456	60.21	16.37	4.60	3.22	0.05	0.21
40126	MARYBOROUGH	QLD	-25.5161	152.7156	79.54	22.95	3.24	3.05	0.02	0.14
40190	SOUTHPORT RIDGEWAY AVE	QLD	-27.9833	153.4053	29.44	10.88	1.41	1.69	0.06	0.34
40211	ARCHERFIELD AIRPORT	QLD	-27.5717	153.0078	30.90	36.19	2.19	3.16	0.09	0.41
40214	BRISBANE REGIONAL OFFICE	QLD	-27.4778	153.0306	50.08	17.87	3.51	3.01	0.14	0.43
40223	BRISBANE AERO	QLD	-27.4178	153.1142	37.00	14.00	1.28	1.68	0.00	0.00
40264	TEWANTIN POST OFFICE	QLD	-26.3919	153.0408	33.27	17.77	2.33	3.01	0.04	0.24
40265	REDLANDS HRS	QLD	-27.5278	153.25	17.88	9.79	0.45	0.71	0.00	0.00
40282	NAMBOUR DPI	QLD	-26.6431	152.9392	43.98	12.11	4.93	3.69	0.17	0.44
40428	BRIAN PASTURES	QLD	-25.655	151.745	135.79	20.55	20.87	9.69	0.85	1.33
40436	GATTON QDPI RESEARCH STN	QLD	-27.5456	152.3286	106.82	21.53	17.79	10.95	1.34	2.26
40451	TOOLARA FORESTRY	QLD	-25.9961	152.8339	50.53	13.70	4.13	3.29	0.07	0.37
41023	DALBY POST OFFICE	QLD	-27.1839	151.2639	110.13	22.87	23.95	14.03	1.29	1.98
41038	GOONDIWINDI POST OFFICE	QLD	-28.5481	150.3075	130.23	25.17	43.04	20.05	4.56	5.53
41044	HERMITAGE	QLD	-28.2061	152.1003	54.09	14.71	5.24	4.89	0.15	0.44
41095	STANTHORPE LESLIE PARADE	QLD	-28.6617	151.9339	22.52	14.59	1.06	1.97	0.00	0.00
41100	TEXAS POST OFFICE	QLD	-28.8544	151.1681	104.71	29.07	28.42	13.56	2.08	2.46
41103	TOOWOOMBA	QLD	-27.5836	151.9317	28.54	13.83	2.76	2.88	0.00	0.00
41175	APPLETHORPE	QLD	-28.6217	151.9533	14.54	11.78	0.61	1.07	0.00	0.00
41359	OAKEY AERO	QLD	-27.4034	151.7413	70.88	23.99	9.53	7.53	0.12	0.41
42023	MILES POST OFFICE	QLD	-26.6581	150.1844	123.32	28.05	30.02	14.87	1.55	1.90
43015	INJUNE POST OFFICE	QLD	-25.8428	148.5669	117.45	28.10	32.33	14.93	1.78	1.98
43020	MITCHELL POST OFFICE	QLD	-26.4888	147.9777	143.18	26.98	49.15	20.83	3.69	4.59
43030	ROMA POST OFFICE	QLD	-26.5719	148.7897	154.51	18.43	56.60	19.18	5.00	4.63
43034	ST GEORGE POST OFFICE	QLD	-28.0361	148.5814	147.11	17.07	53.69	17.12	4.83	4.05
43035	SURAT	QLD	-27.159	149.0703	141.16	22.31	49.36	19.64	3.69	3.46
44010	BOLLON MARY ST	QLD	-28.0336	147.4803	151.94	18.15	68.78	22.49	12.30	7.56
44021	CHARLEVILLE AERO	QLD	-26.4139	146.2558	155.57	22.08	62.86	22.54	6.18	5.41
44022	CHARLEVILLE POST OFFICE	QLD	-26.4025	146.2381	164.89	25.43	82.63	30.10	14.90	11.96
44026	CUNNAMULLA POST OFFICE	QLD	-28.0706	145.6808	158.18	22.47	75.70	22.44	13.64	8.82
45015	QUILPIE AIRPORT	QLD	-26.6125	144.2578	179.24	17.36	97.14	22.15	19.52	11.05
45017	THARGOMINDAH POST OFFICE	QLD	-27.9978	143.8197	164.72	25.69	90.30	24.89	23.34	12.74
46037	TIBOOBURRA POST OFFICE	NSW	-29.4345	142.0098	141.51	17.37	74.31	16.07	18.71	9.06
46042	WHITE CLIFFS POST OFFICE	NSW	-30.8506	143.0893	131.87	27.06	67.49	19.04	18.33	9.22
46043	WILCANNIA(REID ST)	NSW	-31.5631	143.3747	128.36	15.57	64.04	13.16	16.56	8.58
47007	BROKEN HILL (PATTON STREET)	NSW	-31.9759	141.4676	79.18	32.02	31.68	15.90	5.36	4.97
47016	LAKE VICTORIA STORAGE	NSW	-34.0398	141.2652	74.12	18.26	27.57	10.42	5.05	3.62
47019	MENINDEE POST OFFICE	NSW	-32.3937	142.4173	89.46	20.82	42.90	14.88	10.35	6.56
47048	BROKEN HILL AIRPORT AWS	NSW	-32.0012	141.4694	36.96	45.43	15.40	20.50	2.60	4.53
48013	BOURKE POST OFFICE	NSW	-30.0917	145.9358	147.41	24.96	76.00	24.60	21.53	15.09
48015	BREWARRINA HOSPITAL	NSW	-29.9614	146.8651	129.05	25.69	59.76	19.09	13.17	8.63
48027	COBAR MO	NSW	-31.484	145.8294	112.38	15.97	44.49	16.96	6.62	5.05
48030	COBAR POST OFFICE	NSW	-31.5	145.8	116.13	37.80	57.19	24.43	13.31	9.70
48031	COLLARENEBRI (ALBERT ST)	NSW	-29.5407	148.5818	117.33	33.98	47.57	22.72	7.12	5.79
49002	BALRANALD (RSL)	NSW	-34.6398	143.561	71.45	18.22	28.50	10.76	6.52	4.80
49019	IVANHOE POST OFFICE	NSW	-32.8999	144.2995	106.98	25.57	51.27	18.41	13.40	8.41
50014	CONDOBOLIN RETIREMENT VILLA(	NSW	-33.0818	147.1524	89.90	17.42	31.03	15.70	4.55	5.00
50031	PEAK HILL POST OFFICE	NSW	-32.7235	148.1902	96.79	20.11	31.98	15.71	3.19	3.53
50052	CONDOBOLIN AG RESEARCH STN	NSW	-33.0664	147.2283	89.38	25.92	33.60	15.79	5.40	4.57
51010	COONAMBLE COMPARISON	NSW	-30.9753	148.3806	113.26	21.84	40.14	15.90	5.02	4.46
51039	NYNGAN AIRPORT	NSW	-31.5495	147.1961	121.52	16.19	46.44	14.95	7.27	5.38
51049	TRANGIE RESEARCH STATION AW	NSW	-31.9861	147.9489	97.55	19.25	32.66	14.95	3.66	3.89
52020	MUNGINDI POST OFFICE	NSW	-28.9786	148.9899	123.88	27.47	51.57	20.50	7.21	5.42
52026	WALGETT COUNCIL DEPOT	NSW	-30.0236	148.1218	137.07	20.34	61.61	20.65	11.91	9.11
53002	BARADINE FORESTRY	NSW	-30.9469	149.0654	79.33	14.53	24.26	10.90	2.12	2.35
53030	NARRABRI WEST POST OFFICE	NSW	-30.3401	149.7552	125.45	25.39	42.00	19.26	2.75	2.61
53048	MOREE COMPARISON	NSW	-29.4819	149.8383	122.42	19.11	32.42	15.87	2.03	2.38
54003	BARRABA POST OFFICE	NSW	-30.3781	150.6096	85.20	23.57	15.02	10.85	0.44	0.81
54104	PINDARI DAM	NSW	-29.3899	151.2448	81.83	20.65	10.50	6.73	0.08	0.28
55023	GUNNEDAH POOL	NSW	-30.9841	150.254	105.66	27.97	37.70	23.07	4.72	6.37
55024	GUNNEDAH RESOURCE CENTRE	NSW	-31.0261	150.2687	87.97	20.48	19.81	12.55	1.02	1.86
55049	QUIRINDI POST OFFICE	NSW	-31.5086	150.6792	82.81	22.46	20.57	12.72	0.93	1.80
55054	TAMWORTH AIRPORT	NSW	-31.0867	150.8467	76.57	18.56	13.83	9.44	0.51	1.01
55136	WOOLBROOK (DANGLEMAH ROAD	NSW	-30.9672	151.3451	24.65	14.64	1.00	1.67	0.00	0.00
56002	ARMIDALE (RADIO STATION 2AD)	NSW	-30.5167	151.6681	20.10	10.46	0.56	1.07	0.00	0.00
56011	GLEN INNES POST OFFICE	NSW	-29.7368	151.7366	14.71	9.46	0.24	0.61	0.00	0.00

APPENDIX A – PROBABILISTIC MODEL PARAMETERS FOR YEARLY NUMBER OF HOT DAYS

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
56013	GLEN INNES AG RESEARCH STN	NSW	-29.6953	151.6936	7.30	6.42	0.00	0.00	0.00	0.00
56017	INVERELL COMPARISON	NSW	-29.7783	151.1114	66.31	26.92	9.53	10.42	0.36	1.06
56018	INVERELL RESEARCH CENTRE	NSW	-29.7752	151.0819	41.43	17.88	2.52	2.48	0.00	0.00
56032	TENTERFIELD (FEDERATION PARK	NSW	-29.0479	152.0172	21.57	11.34	1.05	1.67	0.00	0.00
57095	TABULAM (MUIRNE)	NSW	-28.7551	152.4507	27.30	14.24	2.24	2.82	0.00	0.00
58009	BYRON BAY (CAPE BYRON LIGHTH	NSW	-28.6388	153.6361	11.31	5.77	0.06	0.25	0.00	0.00
58012	YAMBA PILOT STATION	NSW	-29.4333	153.3633	5.37	4.72	0.81	1.33	0.06	0.30
58037	LISMORE (CENTRE STREET)	NSW	-28.807	153.2628	62.85	13.89	8.00	4.39	0.37	0.85
58063	CASINO AIRPORT	NSW	-28.8755	153.0493	79.88	19.17	14.50	8.45	0.93	1.50
58130	GRAFTON OLYMPIC POOL	NSW	-29.6823	152.9278	68.29	18.50	9.93	6.40	0.78	1.29
58131	ALSTONVILLE TROPICAL FRUIT RE	NSW	-28.8521	153.4556	19.64	16.43	1.64	2.53	0.03	0.16
58158	MURWILLUMBAH (BRAY PARK)	NSW	-28.3395	153.3809	56.97	18.47	4.60	3.64	0.20	0.63
59017	KEMPSEY (WIDE STREET)	NSW	-31.077	152.8235	40.31	19.22	3.19	2.64	0.26	0.59
59030	SOUTH WEST ROCKS (SMOKY CAF	NSW	-30.9225	153.087	7.70	7.81	0.42	0.91	0.04	0.28
59040	COFFS HARBOUR MO	NSW	-30.3107	153.1187	12.03	7.75	1.34	1.60	0.28	0.58
60026	PORT MACQUARIE (BELLEVUE GAI	NSW	-31.4399	152.911	3.02	2.65	0.41	0.78	0.11	0.38
60030	TAREE (ROBERTSON ST)	NSW	-31.9033	152.4496	53.08	16.23	9.28	6.61	0.67	1.03
60085	YARRAS (MOUNT SEAVIEW)	NSW	-31.3865	152.2482	53.08	18.57	9.05	6.15	0.66	1.07
61051	MURRURUNDI POST OFFICE	NSW	-31.7631	150.8362	57.26	21.40	9.95	7.47	0.12	0.33
61054	NELSON BAY (NELSON HEAD)	NSW	-32.7103	152.1612	2.79	5.46	0.21	0.52	0.03	0.16
61055	NEWCASTLE NOBBYS SIGNAL STA	NSW	-32.9185	151.7985	13.90	5.42	3.02	2.15	0.16	0.37
61078	WILLIAMTOWN RAAF	NSW	-32.7932	151.8359	33.42	15.63	8.06	5.82	0.94	1.38
61086	JERRYS PLAINS POST OFFICE	NSW	-32.4972	150.9093	76.00	20.16	23.18	12.00	3.04	2.97
61087	GOSFORD (NARARA RESEARCH ST	NSW	-33.3949	151.3289	18.10	18.13	4.14	5.04	0.57	0.89
61089	SCONE SCS	NSW	-32.0632	150.9272	69.50	19.22	18.24	10.06	1.29	2.10
61242	CESSNOCK (NULKABA)	NSW	-32.8093	151.349	64.32	19.03	19.15	10.80	2.32	2.52
61250	PATERSON (TOCAL AWS)	NSW	-32.6296	151.5919	52.10	19.42	14.92	10.16	1.46	1.64
61260	CESSNOCK AIRPORT AWS	NSW	-32.7886	151.3377	23.18	29.43	6.21	9.90	0.69	1.56
61273	NORAH HEAD LIGHTHOUSE	NSW	-33.2815	151.5759	9.12	5.23	2.35	2.03	0.24	0.55
61288	LOSTOCK DAM	NSW	-32.3322	151.4595	52.74	20.44	12.84	9.49	0.68	1.28
62013	GULGONG POST OFFICE	NSW	-32.3634	149.5329	63.81	21.55	15.92	10.43	0.97	1.99
62021	MUDGEE (GEORGE STREET)	NSW	-32.5956	149.5956	60.33	16.22	13.52	7.62	0.30	0.59
63004	BATHURST GAOL	NSW	-33.4167	149.55	42.63	21.71	7.97	8.65	0.29	0.91
63005	BATHURST AGRICULTURAL STATI(	NSW	-33.4289	149.5559	32.17	16.03	4.12	4.40	0.02	0.16
63023	COWRA RESEARCH CENTRE (EVA	NSW	-33.8087	148.7071	65.40	22.62	16.67	11.56	0.86	1.62
63039	KATOOMBA (MURRI ST)	NSW	-33.7122	150.3087	7.38	6.00	0.32	0.62	0.00	0.00
63063	OBERON (SPRINGBANK)	NSW	-33.6774	149.8374	5.45	7.02	0.05	0.22	0.00	0.00
63224	LITHGOW (BIRDWOOD ST)	NSW	-33.4901	150.1498	18.00	11.02	1.58	2.11	0.00	0.00
63231	ORANGE AIRPORT COMPARISON	NSW	-33.3815	149.1229	14.69	10.85	0.46	0.88	0.00	0.00
63254	ORANGE AGRICULTURAL INSTITUT	NSW	-33.3211	149.0828	16.90	10.57	0.68	1.62	0.00	0.00
64008	COONABARABRAN (NAMOI STREE	NSW	-31.2712	149.2714	76.68	22.51	16.54	10.75	0.54	1.01
64009	DUNEDOO POST OFFICE	NSW	-32.0163	149.3953	74.64	23.37	22.36	12.55	1.74	2.12
65012	DUBBO (DARLING STREET)	NSW	-32.2388	148.6089	90.54	17.65	26.85	12.10	2.46	2.71
65016	FORBES (CAMP STREET)	NSW	-33.3892	148.0081	91.20	21.73	32.59	17.41	4.16	4.69
65026	PARKES (MACARTHUR STREET)	NSW	-33.1439	148.1633	82.24	20.27	23.92	13.82	2.14	2.90
65034	WELLINGTON (AGROWPLOW)	NSW	-32.5635	148.9503	81.64	22.24	23.05	12.85	1.83	2.93
65035	WELLINGTON RESEARCH CENTRE	NSW	-32.5059	148.9708	67.38	20.33	16.56	9.70	1.15	2.42
65091	COWRA AIRPORT COMPARISON	NSW	-33.8451	148.6534	79.02	20.01	25.07	13.47	2.73	2.77
66037	SYDNEY AIRPORT AMO	NSW	-33.9411	151.1725	21.84	7.89	4.88	2.98	0.75	0.97
66062	SYDNEY (OBSERVATORY HILL)	NSW	-33.8607	151.205	14.67	5.75	3.07	2.25	0.27	0.58
66124	PARRAMATTA NORTH (MASONS DI	NSW	-33.7917	151.0181	41.23	13.28	10.15	6.11	1.25	1.46
66131	RIVERVIEW OBSERVATORY	NSW	-33.8258	151.1556	13.16	13.79	2.29	2.90	0.24	0.57
66137	BANKSTOWN AIRPORT AWS	NSW	-33.9181	150.9864	36.54	10.93	8.54	5.24	1.08	1.29
67019	PROSPECT DAM	NSW	-33.8193	150.9127	43.17	14.68	10.07	6.49	0.95	1.32
67033	RICHMOND RAAF	NSW	-33.6022	150.7794	47.17	25.65	13.09	9.51	1.89	2.09
67035	LIVERPOOL(WHITLAM CENTRE)	NSW	-33.9272	150.9128	41.68	12.14	10.39	5.74	1.26	1.66
68034	JERVIS BAY (POINT PERPENDICUL	NSW	-35.0936	150.8048	7.02	4.07	0.94	1.17	0.02	0.15
68076	NOWRA RAN AIR STATION	NSW	-34.9449	150.545	22.36	10.13	5.05	3.64	0.89	1.26
68102	BOWRAL (PARRY DRIVE)	NSW	-34.4869	150.4019	17.22	10.78	2.34	2.93	0.02	0.16
68188	WOLLONGONG UNIVERSITY	NSW	-34.403	150.8795	14.49	6.71	2.68	1.81	0.30	0.74
68192	CAMDEN AIRPORT AWS	NSW	-34.0391	150.689	45.66	22.31	12.03	8.93	1.89	2.10
69017	MONTAGUE ISLAND LIGHTHOUSE	NSW	-36.2519	150.2275	1.89	1.66	0.16	0.37	0.03	0.16
69018	MORUYA HEADS PILOT STATION	NSW	-35.9093	150.1532	6.46	3.62	1.92	1.68	0.30	0.58
69022	NAROOMA RVCP	NSW	-36.2144	150.1358	1.67	1.96	0.36	0.66	0.02	0.15
69049	NERRIGA COMPOSITE	NSW	-35.1165	150.0847	25.28	11.31	4.69	4.29	0.00	0.00
70005	BOMBALA (THERRY STREET)	NSW	-36.9113	149.2379	18.50	9.89	2.62	2.75	0.02	0.15
70014	CANBERRA AIRPORT	NSW	-35.3049	149.2014	31.12	14.14	5.12	4.85	0.07	0.31
70080	TARALGA POST OFFICE	NSW	-34.4048	149.8197	18.62	11.24	2.12	2.66	0.00	0.00
70091	YASS (LINTON HOSTEL)	NSW	-34.8305	148.9117	44.78	17.67	10.05	8.45	0.32	0.61
70263	GOULBURN TAFE	NSW	-34.7495	149.7034	27.28	15.69	5.39	5.34	0.08	0.37

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
70278	COOMA VISITORS CENTRE	NSW	-36.2318	149.1243	25.91	11.48	2.35	2.46	0.00	0.00
71003	CHARLOTTE PASS (KOSCIUSKO CH	NSW	-36.4335	148.3327	0.03	0.16	0.00	0.00	0.00	0.00
71032	THREDBO AWS	NSW	-36.4917	148.2859	0.00	0.00	0.00	0.00	0.00	0.00
71041	THREDBO VILLAGE	NSW	-36.5031	148.304	0.53	0.76	0.00	0.00	0.00	0.00
71072	PERISHER VALLEY SKI CENTRE	NSW	-36.4033	148.4104	0.03	0.18	0.00	0.00	0.00	0.00
72023	HUME RESERVOIR	NSW	-36.1039	147.0329	58.76	19.38	14.40	9.76	1.02	1.39
72043	TUMBARUMBA POST OFFICE	NSW	-35.7781	148.0121	27.02	15.95	3.07	3.11	0.00	0.00
72060	KHANCOBAN SMHEA	NSW	-36.2254	148.1431	46.50	16.84	7.72	6.24	0.25	0.62
72091	CABRAMURRA SMHEA	NSW	-35.9383	148.3842	0.14	0.54	0.00	0.00	0.00	0.00
72150	WAGGA WAGGA AMO	NSW	-35.1583	147.4573	66.46	17.03	19.22	10.11	2.00	2.35
72151	WAGGA WAGGA (KOORINGAL)	NSW	-35.1333	147.3667	86.20	23.85	33.76	16.27	5.77	5.74
73007	BURRINJUCK DAM	NSW	-34.9997	148.5984	47.50	21.05	11.83	9.97	0.36	0.69
73009	COOTAMUNDRA POST OFFICE	NSW	-34.6411	148.0236	67.50	15.07	18.71	10.21	1.29	1.58
73014	GRENFELL (QUONDONG RD)	NSW	-33.9029	148.1718	63.07	23.56	18.60	11.97	1.38	1.97
73032	QUANDIALLA POST OFFICE	NSW	-34.0112	147.7937	86.29	24.19	30.40	16.74	3.88	4.26
73038	TEMORA RESEARCH STATION	NSW	-34.4061	147.5248	71.10	13.65	21.28	10.73	2.10	2.06
73054	WYALONG POST OFFICE	NSW	-33.9262	147.2418	85.21	17.95	28.79	13.24	3.69	3.29
73127	WAGGA WAGGA AGRICULTURAL I	NSW	-35.0517	147.3493	39.74	34.48	12.85	13.39	1.34	2.02
74034	COROWA AIRPORT	NSW	-35.9887	146.3574	70.22	16.47	22.41	10.08	2.70	2.60
74106	TOCUMWAL AIRPORT	NSW	-35.817	145.6004	74.25	15.48	26.33	10.98	4.56	4.40
74114	WAGGA WAGGA RESEARCH CENT	NSW	-35.1311	147.3091	58.07	15.40	15.29	8.66	1.18	1.69
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.5269	144.952	77.68	20.64	31.53	14.70	7.15	6.80
74148	NARRANDERA AIRPORT	NSW	-34.705	146.514	23.56	37.58	8.22	14.50	1.06	2.55
74221	NARRANDERA GOLF CLUB	NSW	-34.7325	146.5592	82.59	16.22	29.68	12.95	4.78	4.36
75031	HAY (MILLER STREET)	NSW	-34.5194	144.8545	90.74	13.56	34.84	9.93	6.66	4.52
75032	HILLSTON AIRPORT	NSW	-33.4915	145.5249	99.30	14.51	38.62	12.87	7.04	5.00
75039	LAKE CARGELLIGO AIRPORT	NSW	-33.2833	146.3707	89.21	23.77	34.48	13.72	6.55	5.07
75041	GRIFFITH AIRPORT AWS	NSW	-34.2487	146.0695	63.57	34.07	24.27	17.91	4.11	5.02
76031	MILDURA AIRPORT	VIC	-34.2358	142.0867	79.16	12.75	30.79	9.94	5.36	4.19
76047	OUYEN (POST OFFICE)	VIC	-35.0694	142.3158	81.60	10.84	32.72	8.80	7.16	4.70
76064	WALPEUP RESEARCH	VIC	-35.12	142.0039	74.21	10.92	29.21	8.76	6.52	4.60
76077	MILDURA POST OFFICE	VIC	-34.1833	142.2	89.15	18.43	40.78	13.24	10.97	7.94
77042	SWAN HILL POST OFFICE	VIC	-35.3406	143.5533	73.61	10.33	24.81	8.63	3.86	3.62
78031	NHILL	VIC	-36.3347	141.6367	51.32	15.95	18.81	7.93	3.39	3.05
78072	DONALD	VIC	-36.3696	142.9724	51.94	9.74	14.79	6.63	1.55	1.62
78077	WARRACKNABEAL MUSEUM	VIC	-36.2614	142.405	63.03	11.47	23.03	8.15	4.37	3.53
79023	HORSHAM POLKEMMET RD	VIC	-36.6613	142.0687	53.68	11.40	18.84	7.66	2.94	2.43
79028	LONGERENONG	VIC	-36.6722	142.2992	51.79	11.96	18.29	8.42	2.95	2.65
80015	ECHUCA AERODROME	VIC	-36.1661	144.7631	63.84	13.14	20.58	8.71	2.98	2.81
80023	KERANG	VIC	-35.7236	143.9197	71.09	13.02	24.44	9.08	4.67	3.66
80091	KYABRAM DPI	VIC	-36.3369	145.0617	51.02	13.01	13.98	7.89	1.55	1.95
81003	BENDIGO PRISON	VIC	-36.7533	144.2825	42.53	9.72	10.29	5.80	0.65	0.98
81049	TATURA INST SUSTAINABLE AG	VIC	-36.4378	145.2672	46.57	11.64	11.05	6.32	0.74	1.08
81084	LEMNOS (CAMPBELLS SOUP)	VIC	-36.3608	145.4594	52.13	10.73	13.50	7.53	1.37	1.69
82002	BENALLA (SHADFORTH STREET)	VIC	-36.5483	145.9703	60.86	12.99	14.94	7.36	0.90	1.29
82011	CORRYONG (PARISH LANE)	VIC	-36.2003	147.8956	58.36	18.10	12.48	9.38	0.39	0.66
82039	RUTHERGLEN RESEARCH	VIC	-36.1047	146.5094	61.08	20.58	16.91	9.18	1.66	2.09
82042	STRATHBOGIE	VIC	-36.8472	145.7308	28.55	11.03	4.42	3.84	0.03	0.17
82053	WANGARATTA	VIC	-36.3667	146.3	62.93	12.31	16.55	9.01	1.31	1.75
82076	DARTMOUTH RESERVOIR	VIC	-36.5353	147.4984	41.44	16.71	6.97	6.81	0.09	0.30
83025	OMEO COMPARISON	VIC	-37.1011	147.598	19.28	9.77	1.76	2.45	0.04	0.28
84016	GABO ISLAND LIGHTHOUSE	VIC	-37.5679	149.9158	1.22	1.30	0.22	0.51	0.02	0.14
84030	ORBOST (COMPARISON)	VIC	-37.6917	148.4589	26.14	7.22	6.94	4.07	0.86	0.97
84070	POINT HICKS (LIGHTHOUSE)	VIC	-37.8017	149.2747	10.83	4.39	1.61	1.39	0.07	0.26
84083	LAKES ENTRANCE	VIC	-37.8692	147.9961	14.05	5.36	3.75	2.51	0.50	0.72
85072	EAST SALE AIRPORT	VIC	-38.1156	147.1322	19.42	5.86	5.29	3.48	0.47	0.72
85096	WILSONS PROMONTORY LIGHTHO	VIC	-39.1297	146.4244	5.88	3.54	1.18	1.22	0.06	0.24
85106	OLSENS BRIDGE (MORWELL RIVER	VIC	-38.4861	146.3233	14.97	6.06	3.26	2.80	0.12	0.33
85279	BAIRNSDALE AIRPORT	VIC	-37.8817	147.5669	8.98	11.58	2.95	4.50	0.41	0.85
86017	CAPE SCHANCK LIGHTHOUSE	VIC	-38.4931	144.8858	9.66	5.26	2.29	2.35	0.03	0.17
86038	ESSENDON AIRPORT	VIC	-37.7278	144.9064	16.01	15.44	5.16	5.89	0.62	1.23
86071	MELBOURNE REGIONAL OFFICE	VIC	-37.8075	144.97	29.90	6.88	9.88	4.77	1.29	1.52
86077	MOORABBIN AIRPORT	VIC	-37.98	145.0964	26.42	6.87	8.47	4.64	0.86	1.20
86104	SCORESBY RESEARCH INSTITUTE	VIC	-37.8711	145.2561	27.07	10.68	6.88	4.73	0.48	0.92
86127	WONTHAGGI	VIC	-38.6089	145.595	18.03	5.95	4.15	2.92	0.28	0.51
86142	TOOLANGI (MOUNT ST LEONARD D	VIC	-37.5708	145.5047	9.51	5.77	0.73	1.30	0.02	0.16
86282	MELBOURNE AIRPORT	VIC	-37.6655	144.8321	30.97	8.40	9.49	5.40	1.11	1.33
87021	DURDIDWARRAH	VIC	-37.8233	144.2078	17.94	7.57	3.51	3.09	0.06	0.24
87031	LAVERTON RAAF	VIC	-37.8565	144.7566	26.03	6.13	9.14	4.31	1.27	1.69
87036	MACEDON FORESTRY	VIC	-37.4155	144.5569	15.97	7.25	2.69	2.39	0.00	0.00

APPENDIX A – PROBABILISTIC MODEL PARAMETERS FOR YEARLY NUMBER OF HOT DAYS

ID and Location					Tmax>=30C		Tmax>=35C		Tmax>=40C	
Station No	Station Name	State	Latitude	Longitude	Mean	Std	Mean	Std	Mean	Std
88023	LAKE EILDON	VIC	-37.2311	145.9122	43.03	14.09	8.51	6.29	0.35	0.68
88043	MARYBOROUGH	VIC	-37.0561	143.7319	44.17	10.22	12.29	6.27	1.05	1.41
88068	RUBICON SEC	VIC	-37.3389	145.8547	6.37	5.09	0.17	0.57	0.00	0.00
88109	MANGALORE AIRPORT	VIC	-36.89	145.1828	44.69	12.93	12.75	7.26	1.42	1.75
88110	CASTLEMAINE PRISON	VIC	-37.0811	144.2392	37.80	11.96	8.98	5.62	0.51	0.84
89002	BALLARAT AERODROME	VIC	-37.5128	143.7911	22.72	8.49	4.56	3.64	0.26	0.60
89018	LISMORE (POST OFFICE)	VIC	-37.9543	143.3437	27.36	10.37	7.97	5.23	0.69	1.06
89085	ARARAT PRISON	VIC	-37.2775	142.9811	32.21	10.04	7.95	4.70	0.42	0.76
90014	CAPE NELSON LIGHTHOUSE COMF	VIC	-38.4319	141.5419	8.81	3.27	2.52	1.58	0.14	0.35
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.8556	143.5128	9.80	4.36	2.57	2.10	0.26	0.62
90048	HEYWOOD FORESTRY	VIC	-38.1353	141.6319	20.62	5.34	7.05	3.96	0.88	1.11
90103	HAMILTON RESEARCH STATION	VIC	-37.825	142.0644	25.85	8.29	6.97	4.36	0.74	1.02
90135	CASTERTON SHOWGROUNDS	VIC	-37.5908	141.4131	34.72	8.65	11.30	5.41	1.54	1.68
91009	BURNIE (ROUND HILL)	TAS	-41.0661	145.9431	0.26	0.50	0.00	0.00	0.00	0.00
91049	LAUNCESTON (PUMPING STATION	TAS	-41.5	147.2	4.53	3.90	0.33	0.70	0.00	0.00
91057	LOW HEAD (COMPARISON)	TAS	-41.0567	146.7883	0.00	0.00	0.00	0.00	0.00	0.00
91080	QUOIBA	TAS	-41.2083	146.3467	0.19	0.40	0.00	0.00	0.00	0.00
91091	SHEFFIELD	TAS	-41.3831	146.3278	1.03	1.40	0.00	0.00	0.00	0.00
91092	SMITHTON (GRANT STREET)	TAS	-40.8492	145.1125	0.20	0.58	0.00	0.00	0.00	0.00
91104	LAUNCESTON AIRPORT COMPARIS	TAS	-41.5397	147.2033	3.57	2.75	0.09	0.33	0.00	0.00
91107	WYNYARD AIRPORT	TAS	-40.9972	145.7292	0.24	0.52	0.00	0.00	0.00	0.00
91112	WYNYARD (JACKSON STREET)	TAS	-40.9942	145.7292	0.29	0.53	0.00	0.00	0.00	0.00
91119	ERRIBA (CRADLE MOUNTAIN ROAD	TAS	-41.4506	146.1089	0.46	0.90	0.00	0.00	0.00	0.00
91186	FORTHSIDE RESEARCH STATION	TAS	-41.2039	146.265	0.10	0.31	0.00	0.00	0.00	0.00
91219	SCOTTSDALE (WEST MINSTONE R	TAS	-41.1708	147.4883	3.11	2.54	0.08	0.37	0.00	0.00
91223	MARRAWAH	TAS	-40.9089	144.7094	0.44	0.69	0.00	0.00	0.00	0.00
92003	BICHENO (COUNCIL DEPOT)	TAS	-41.8739	148.3036	1.55	1.68	0.40	0.83	0.00	0.00
92027	ORFORD (AUBIN COURT)	TAS	-42.5519	147.8753	3.46	2.00	0.74	0.88	0.00	0.00
92033	ST HELENS POST OFFICE	TAS	-41.3225	148.2489	5.93	3.28	0.93	1.03	0.00	0.00
92038	SWANSEA POST OFFICE	TAS	-42.1242	148.0761	4.76	2.85	1.10	1.04	0.02	0.14
92045	EDDYSTONE POINT	TAS	-40.9928	148.3467	0.84	1.08	0.04	0.20	0.00	0.00
92094	SCAMANDER	TAS	-41.4639	148.2644	3.03	2.91	0.30	0.64	0.00	0.00
93014	OATLANDS POST OFFICE	TAS	-42.3019	147.3694	3.56	2.70	0.39	0.80	0.00	0.00
94008	HOBART AIRPORT	TAS	-42.8339	147.5033	6.86	2.96	1.35	1.16	0.04	0.20
94010	CAPE BRUNY LIGHTHOUSE	TAS	-43.4892	147.1453	1.92	1.52	0.28	0.57	0.00	0.00
94027	HASTINGS CHALET	TAS	-43.4144	146.8731	3.47	2.29	0.57	0.86	0.00	0.00
94029	HOBART (ELLERSLIE ROAD)	TAS	-42.8897	147.3278	5.64	3.36	1.03	1.18	0.06	0.26
94041	MAATSUYKER ISLAND LIGHTHOUS	TAS	-43.6578	146.2711	0.88	0.94	0.00	0.00	0.00	0.00
94069	GROVE (COMPARISON)	TAS	-42.9831	147.0772	7.42	3.37	1.35	1.24	0.04	0.19
94087	MOUNT WELLINGTON	TAS	-42.8967	147.235	0.02	0.15	0.00	0.00	0.00	0.00
94137	GEEVESTON (CEMETERY ROAD)	TAS	-43.1639	146.9172	3.86	3.93	0.44	0.69	0.00	0.00
95003	BUSHY PARK (BUSHY PARK ESTAT	TAS	-42.7097	146.8983	11.12	5.70	1.66	1.52	0.00	0.00
96003	BUTLERS GORGE	TAS	-42.2811	146.2808	1.69	1.79	0.00	0.00	0.00	0.00
96015	LAKE ST CLAIR (HEC)	TAS	-42.1	146.2167	1.00	1.61	0.03	0.18	0.00	0.00
97014	WARATAH (MOUNT ROAD)	TAS	-41.4372	145.5258	0.48	1.23	0.00	0.00	0.00	0.00
97034	QUEENSTOWN (7XS)	TAS	-42.0967	145.5447	6.14	3.55	0.52	1.02	0.00	0.00
97053	STRATHGORDON VILLAGE	TAS	-42.7681	146.0461	2.92	2.43	0.08	0.28	0.00	0.00
98001	CURRIE POST OFFICE	TAS	-39.9322	143.8486	3.10	2.07	0.43	0.71	0.00	0.00
99005	FLINDERS ISLAND AIRPORT	TAS	-40.0928	148.0008	5.00	3.28	0.80	0.99	0.00	0.00
200283	WILLIS ISLAND	QLD	-16.2878	149.9652	95.66	33.17	0.02	0.22	0.00	0.00
200284	COCOS ISLAND AIRPORT	WA	-12.1892	96.8344	72.69	41.34	0.00	0.00	0.00	0.00
200288	NORFOLK ISLAND AERO	NSW	-29.0389	167.9408	0.00	0.00	0.00	0.00	0.00	0.00
200440	LORD HOWE ISLAND	NSW	-31.55	159.0833	0.00	0.00	0.00	0.00	0.00	0.00
200790	CHRISTMAS ISLAND AERO	WA	-10.4528	105.6875	3.34	11.66	0.00	0.00	0.00	0.00
300000	DAVIS	ANT	-68.5772	77.9725	0.00	0.00	0.00	0.00	0.00	0.00
300001	MAWSON	ANT	-67.6014	62.8731	0.00	0.00	0.00	0.00	0.00	0.00
300004	MACQUARIE ISLAND	ANT	-54.4994	158.9369	0.00	0.00	0.00	0.00	0.00	0.00
300005	HEARD ISLAND (ATLAS COVE)	ANT	-53.019	73.3918	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX B – PROBABILISTIC MODEL PARAMETERS FOR YEARLY TOTAL NUMBER OF HOT SPELLS

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
1007	TROUGHTON ISLAND	WA	-13.75	126.15	8.50	5.88	4.82	4.10	0.80	0.14	0.02	0.00	0.00	0.00	0.00	0.00
1009	KURI BAY	WA	-15.49	124.52	10.52	9.07	8.24	7.60	22.31	11.26	6.21	3.64	0.21	0.00	0.00	0.00
1013	WYNDHAM	WA	-15.49	128.12	8.69	7.77	7.28	6.72	22.26	16.72	13.41	11.18	15.31	9.51	6.05	3.95
1021	KALUMBURU MISSION	WA	-14.30	126.64	9.29	8.49	7.78	7.35	30.10	19.87	14.78	11.44	2.81	0.67	0.22	0.13
2011	OLD HALLS CREEK	WA	-18.25	127.78	11.04	9.01	7.74	6.59	13.97	10.80	9.04	7.69	7.70	4.59	3.04	2.13
2012	HALLS CREEK AIRPORT	WA	-18.23	127.66	13.19	10.83	9.17	7.75	16.90	12.90	10.48	9.02	10.00	6.05	3.95	2.56
2014	KIMBERLEY RES.STATION	WA	-15.65	128.71	10.19	9.07	8.24	7.45	22.17	16.24	12.98	10.55	11.02	6.17	3.88	2.74
2032	WARMUN	WA	-17.02	128.22	11.20	9.56	8.64	7.56	18.93	14.40	11.62	9.80	13.78	8.87	6.62	4.84
3002	BROOME POST OFFICE	WA	-17.95	122.25	19.75	14.77	11.34	9.23	26.86	14.36	8.59	5.11	2.45	0.57	0.13	0.02
3003	BROOME AIRPORT	WA	-17.95	122.24	22.03	16.78	13.19	10.94	26.76	14.19	7.96	4.63	3.28	0.91	0.18	0.03
3006	FITZROY CROSSING COMP.	WA	-18.19	125.56	10.31	8.55	7.41	6.69	15.07	11.28	9.34	8.14	12.28	9.31	7.14	5.76
3007	DERBY POST OFFICE	WA	-17.30	123.63	7.91	6.58	5.88	5.36	23.82	16.09	12.21	9.52	5.97	1.79	0.55	0.12
3030	BIDYADANGA	WA	-18.68	121.78	16.42	12.84	11.02	9.32	29.06	19.18	13.04	8.98	7.26	2.96	1.00	0.24
3032	DERBY AERO	WA	-17.37	123.66	7.66	6.69	5.97	5.37	16.03	11.74	8.97	7.29	5.71	2.20	0.74	0.14
4002	PORT HEDLAND POST OFFICE	WA	-20.31	118.57	20.20	13.26	10.14	8.17	26.97	16.49	10.97	7.66	8.54	2.57	0.71	0.20
4019	MANDORA	WA	-19.74	120.84	15.87	11.82	9.91	8.13	24.33	18.02	13.64	10.71	14.11	7.13	3.29	1.42
4020	MARBLE BAR COMPARISON	WA	-21.18	119.75	12.68	9.95	8.12	6.96	12.11	9.68	8.29	7.37	14.55	11.23	9.31	7.69
4032	PORT HEDLAND AIRPORT	WA	-20.37	118.63	16.12	11.68	9.29	7.80	26.14	19.59	15.73	12.75	15.51	7.76	3.54	1.73
4035	ROEBOURNE	WA	-20.78	117.15	13.96	10.38	8.28	6.76	17.22	13.12	11.02	9.52	19.70	13.28	9.18	6.02
5007	LEARMONTH AIRPORT	WA	-22.24	114.10	15.56	11.34	8.81	7.31	21.66	15.44	11.81	9.66	13.09	6.88	3.94	2.09
5008	MARDIE	WA	-21.19	115.98	16.92	12.70	10.36	8.30	20.88	16.06	12.88	10.94	18.22	11.04	6.38	3.80
5016	ONSLOW	WA	-21.64	115.11	18.56	12.86	9.72	7.68	25.24	15.62	9.52	6.28	9.34	3.70	1.28	0.54
5017	ONSLOW AIRPORT	WA	-21.67	115.11	11.82	8.12	6.06	5.00	16.67	11.76	8.70	6.42	8.60	4.27	1.78	0.94
5026	WITTENOOM	WA	-22.24	118.34	11.09	8.41	7.07	5.98	12.79	10.32	8.71	7.46	12.09	8.39	6.30	4.86
5058	BARROW ISLAND	WA	-20.82	115.39	14.32	10.52	8.29	7.06	17.00	11.10	7.81	5.48	3.29	0.61	0.13	0.06
5069	PANNAWONICA	WA	-21.64	116.33	11.12	8.33	6.58	5.67	11.76	9.70	8.00	6.91	13.03	9.48	7.15	5.88
6011	CARNARVON AIRPORT	WA	-24.89	113.67	23.76	15.23	10.81	7.66	12.68	6.40	3.29	1.85	3.63	1.42	0.53	0.13
6022	GASCOYNE JUNCTION	WA	-25.05	115.21	13.09	9.47	7.11	5.47	12.93	9.49	7.16	6.18	10.64	7.44	5.40	4.11
6062	CARNARVON POST OFFICE	WA	-24.90	113.65	24.26	14.93	10.26	6.74	12.02	6.05	2.95	1.65	3.86	1.16	0.42	0.09
6072	EMU CREEK STATION	WA	-23.03	115.04	15.03	11.74	9.20	7.69	15.89	12.54	9.94	8.49	14.63	10.80	8.09	6.26
7045	MEEKATHARRA AIRPORT	WA	-26.61	118.54	18.35	13.28	10.42	8.54	18.09	12.77	9.88	7.93	9.54	5.65	3.60	2.33
7057	MOUNT MAGNET	WA	-28.06	117.85	14.51	10.28	8.05	6.31	14.74	10.41	7.69	5.97	8.97	4.97	3.05	1.85
7080	THREE RIVERS	WA	-25.13	119.15	13.14	9.89	7.78	6.28	13.11	9.86	7.64	6.31	9.31	5.86	3.94	2.92
7139	PAYNES FIND	WA	-29.27	117.68	18.69	13.28	9.84	7.75	17.72	12.34	8.66	6.03	9.50	4.66	2.44	1.22
7151	NEWMAN	WA	-23.37	119.73	12.94	10.41	8.59	7.38	15.16	11.63	9.53	8.22	10.19	7.19	5.06	3.47

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
8025	CARNAMAH	WA	-29.69	115.89	20.87	15.22	11.72	9.19	19.61	12.67	8.42	5.97	8.45	3.84	1.63	0.94
8028	NABAWA	WA	-28.50	114.79	24.69	17.59	13.02	9.80	18.72	12.10	7.15	4.49	7.18	2.95	1.28	0.67
8039	DALWALLINU COMPARISON	WA	-30.28	116.66	21.78	15.98	12.16	9.44	19.14	11.84	7.56	5.08	6.46	2.48	1.22	0.46
8050	GERALDTON PORT	WA	-28.78	114.60	20.65	11.93	7.28	4.24	11.89	5.26	2.52	1.09	2.85	0.83	0.13	0.07
8051	GERALDTON AIRPORT	WA	-28.80	114.70	25.29	17.39	10.85	7.23	15.74	8.62	4.83	2.62	5.30	1.89	0.95	0.44
8091	MOORA	WA	-30.64	116.01	17.13	11.87	8.08	6.00	13.95	7.87	4.58	2.66	4.32	1.63	0.63	0.26
8093	MORAWA	WA	-29.21	116.01	19.94	14.52	11.23	8.86	19.29	13.25	9.19	6.76	9.65	4.90	2.32	1.39
8095	MULLEWA	WA	-28.54	115.51	15.91	11.38	8.80	7.07	15.27	10.43	7.23	5.33	7.52	3.63	1.87	1.05
8137	WONGAN HILLS	WA	-30.89	116.72	23.54	16.63	12.05	9.05	18.49	10.98	6.39	3.88	5.85	2.32	0.88	0.39
8138	WONGAN HILLS RES.STATION	WA	-30.84	116.73	20.31	14.36	10.17	7.79	15.91	8.62	4.78	2.98	4.28	1.29	0.29	0.12
8151	WALEBING	WA	-30.67	116.14	23.36	16.84	12.10	9.52	18.59	10.74	6.02	3.60	6.48	2.14	0.86	0.34
8225	ENEABBA	WA	-29.82	115.27	22.03	15.91	11.89	8.94	19.00	11.57	7.69	5.06	9.97	4.20	1.74	0.89
8251	KALBARRI	WA	-27.71	114.17	27.00	19.30	13.59	9.81	18.05	10.35	5.86	3.54	5.81	2.30	0.97	0.43
9021	PERTH AIRPORT	WA	-31.93	115.98	22.05	14.76	9.94	6.73	13.05	6.32	3.08	1.63	2.65	0.79	0.27	0.08
9034	PERTH REGIONAL OFFICE	WA	-31.96	115.87	20.23	12.98	7.61	4.60	9.71	4.19	1.67	0.83	1.43	0.26	0.07	0.01
9037	BADGINGARRA RESEARCH STN	WA	-30.34	115.54	18.76	13.74	9.86	7.50	15.00	9.19	5.62	3.45	5.74	2.21	0.93	0.45
9038	ROTTNEST ISLAND LIGHTHOUSE	WA	-32.01	115.50	11.17	5.20	2.30	1.20	3.83	0.90	0.17	0.03	0.23	0.00	0.00	0.00
9053	PEARCE RAAF	WA	-31.67	116.02	14.24	9.61	6.48	4.64	9.64	5.02	2.59	1.35	2.97	1.00	0.27	0.11
9064	KWINANA BP REFINERY	WA	-32.23	115.76	16.98	10.21	5.37	3.10	6.46	2.88	1.08	0.37	0.75	0.13	0.02	0.00
9111	KARNET	WA	-32.44	116.07	19.29	12.76	8.48	5.71	8.81	3.95	1.88	0.98	1.05	0.17	0.02	0.00
9114	LANCELIN	WA	-31.02	115.33	21.74	13.10	7.19	3.93	10.60	4.86	1.93	0.83	2.10	0.40	0.10	0.00
9131	JURIEN BAY	WA	-30.31	115.03	23.08	14.39	8.29	4.79	11.71	5.21	2.37	0.87	2.18	0.42	0.16	0.03
9500	ALBANY	WA	-35.03	117.88	3.25	0.50	0.06	0.02	0.94	0.07	0.00	0.00	0.12	0.00	0.00	0.00
9510	BRIDGETOWN COMPARISON	WA	-33.96	116.14	20.50	13.03	7.85	4.63	8.81	3.81	1.49	0.61	0.96	0.17	0.04	0.01
9518	CAPE LEEUWIN	WA	-34.37	115.14	2.77	0.53	0.07	0.02	0.57	0.01	0.01	0.00	0.02	0.00	0.00	0.00
9519	CAPE NATURALISTE	WA	-33.54	115.02	8.06	3.88	2.00	1.12	1.48	0.38	0.12	0.00	0.02	0.00	0.00	0.00
9534	DONNYBROOK	WA	-33.57	115.82	20.00	13.18	8.81	5.74	9.31	4.12	1.74	0.88	0.85	0.17	0.02	0.01
9538	DWELLINGUP	WA	-32.71	116.06	18.40	11.66	7.70	4.86	7.88	3.18	1.24	0.64	0.52	0.08	0.00	0.00
9541	ESPERANCE POST OFFICE	WA	-33.85	121.88	17.48	3.89	0.68	0.19	7.89	0.84	0.10	0.00	1.84	0.08	0.02	0.00
9573	MANJIMUP	WA	-34.25	116.15	15.98	7.88	3.78	1.82	4.80	1.42	0.54	0.14	0.38	0.04	0.00	0.00
9581	MOUNT BARKER	WA	-34.63	117.64	14.83	5.72	1.78	0.74	5.18	1.31	0.27	0.11	0.52	0.06	0.00	0.00
9592	PEMBERTON	WA	-34.45	116.04	14.16	6.54	3.00	1.36	3.88	0.96	0.36	0.14	0.36	0.02	0.00	0.00
9631	ESPERANCE DOWNS RESEARCH	WA	-33.60	121.78	23.69	9.80	4.20	2.09	10.74	2.83	0.54	0.26	2.20	0.11	0.03	0.03
9642	WOKALUP	WA	-33.13	115.88	18.14	12.23	8.34	5.69	8.60	3.71	2.06	1.23	0.71	0.17	0.00	0.00
9741	ALBANY AIRPORT	WA	-34.94	117.80	10.95	3.19	0.62	0.26	3.52	0.26	0.07	0.00	0.74	0.05	0.00	0.00

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
9754	METTLER	WA	-34.60	118.55	12.45	3.48	0.79	0.24	4.17	0.48	0.07	0.00	0.83	0.03	0.00	0.00
9789	ESPERANCE	WA	-33.83	121.89	21.71	6.79	1.82	0.63	9.47	1.34	0.18	0.00	2.47	0.13	0.00	0.00
9842	JARRAHWOOD	WA	-33.80	115.67	18.94	11.59	6.81	4.06	6.50	2.50	1.03	0.47	0.47	0.09	0.00	0.00
10007	BENCUBBIN	WA	-30.81	117.86	23.08	16.00	11.76	9.30	18.14	10.44	6.30	4.08	6.20	2.20	0.76	0.28
10035	CUNDERDIN	WA	-31.65	117.23	23.96	16.93	11.73	8.91	18.80	10.45	5.61	3.54	5.86	1.82	0.55	0.29
10058	GOOMALLING	WA	-31.30	116.83	14.65	10.03	7.25	5.68	11.78	6.65	3.65	2.30	3.98	1.48	0.48	0.10
10073	KELLERBERRIN	WA	-31.62	117.72	24.26	16.94	11.75	9.00	18.86	10.29	5.39	3.19	5.73	1.78	0.48	0.19
10092	MERREDIN	WA	-31.48	118.28	24.15	16.80	11.61	8.88	18.39	9.39	5.27	3.27	5.34	1.49	0.54	0.17
10093	MERREDIN RESEARCH STATION	WA	-31.50	118.22	24.00	16.55	11.79	9.11	17.07	9.18	5.14	3.14	4.52	1.31	0.34	0.14
10111	NORTHAM	WA	-31.65	116.66	22.80	16.35	11.96	9.08	18.44	10.98	6.29	3.87	6.28	1.94	0.83	0.28
10144	YORK POST OFFICE	WA	-31.88	116.76	22.38	16.33	11.87	8.93	17.34	10.03	5.67	3.11	4.89	1.59	0.72	0.28
10515	BEVERLEY	WA	-32.11	116.92	22.64	16.44	12.10	9.15	18.15	10.77	5.85	3.36	5.82	1.97	0.54	0.26
10524	BROOKTON	WA	-32.37	117.01	21.66	15.17	10.39	7.44	14.73	7.51	3.34	1.88	3.61	0.95	0.22	0.10
10536	CORRIGIN	WA	-32.33	117.87	23.49	16.10	11.00	7.51	14.95	7.31	3.47	1.66	3.15	0.63	0.17	0.08
10568	HYDEN	WA	-32.44	118.90	24.43	16.95	12.11	8.81	18.32	9.76	4.97	2.65	6.32	1.89	0.46	0.08
10579	KATANNING COMPARISON	WA	-33.69	117.56	22.83	13.41	8.09	4.75	10.69	4.01	1.30	0.52	1.27	0.25	0.08	0.03
10582	KOJONUP	WA	-33.84	117.15	18.72	9.83	5.21	2.90	7.66	2.34	0.86	0.41	0.72	0.21	0.07	0.00
10592	LAKE GRACE COMPARISON	WA	-33.10	118.46	25.33	15.67	9.94	6.31	13.84	5.67	2.37	0.96	2.49	0.53	0.10	0.02
10612	NAREMBEEN	WA	-32.07	118.40	22.36	15.19	10.83	8.29	16.12	8.31	4.50	2.40	4.31	1.21	0.33	0.07
10614	NARROGIN	WA	-32.93	117.18	20.73	13.00	8.39	5.19	9.88	4.20	1.59	0.67	1.07	0.23	0.10	0.04
10622	ONGERUP	WA	-33.96	118.49	23.46	11.39	5.12	2.10	9.80	2.51	0.66	0.29	1.20	0.15	0.00	0.00
10626	PINGELLY	WA	-32.53	117.08	23.43	15.49	10.54	6.73	12.92	5.84	2.43	1.24	2.32	0.54	0.16	0.08
10633	RAVENSTHORPE	WA	-33.58	120.05	25.93	12.60	5.49	2.40	11.60	3.31	0.91	0.31	2.31	0.36	0.04	0.00
10647	WAGIN	WA	-33.31	117.34	22.81	14.16	8.68	5.57	11.54	4.32	1.46	0.65	1.78	0.38	0.14	0.00
10648	WANDERING COMPARISON	WA	-32.68	116.68	21.69	14.77	10.10	6.86	12.49	6.15	2.75	1.35	1.91	0.50	0.15	0.07
11003	EUCLA	WA	-31.68	128.88	23.44	12.12	4.08	1.34	12.92	4.56	1.14	0.30	4.78	0.96	0.14	0.06
11004	FORREST AERO	WA	-30.84	128.11	32.23	20.27	12.92	8.65	20.65	9.38	4.60	2.58	7.54	2.17	0.58	0.27
11017	BALLADONIA	WA	-32.46	123.87	28.33	16.98	10.62	6.71	17.43	6.83	2.74	1.14	6.12	1.07	0.31	0.07
12022	CASHMERE DOWNS	WA	-28.97	119.57	23.13	16.10	11.37	8.67	19.63	12.43	8.23	5.87	7.20	3.20	1.50	0.90
12038	KALGOORLIE-BOULDER AIRPOR	WA	-30.78	121.45	27.60	18.37	12.38	9.19	19.29	9.40	4.81	2.60	5.91	1.68	0.57	0.24
12039	KALGOORLIE POST OFFICE	WA	-30.75	121.47	27.28	18.85	13.20	9.65	20.78	11.43	5.96	3.61	6.70	2.04	0.76	0.39
12046	LEONORA	WA	-28.88	121.33	24.46	18.00	13.52	10.62	22.60	14.90	10.20	7.28	11.28	5.76	3.02	1.48
12052	MENZIES	WA	-29.69	121.03	24.08	17.46	12.41	9.90	21.36	13.67	8.97	5.59	8.44	3.74	1.56	0.67
12065	NORSEMAN	WA	-32.20	121.78	28.64	17.94	11.94	8.28	16.18	6.52	3.10	1.64	3.66	0.74	0.20	0.08
12071	SALMON GUMS RES.STN.	WA	-32.99	121.62	25.95	14.07	7.99	4.37	13.03	4.37	1.61	0.61	3.12	0.29	0.07	0.03
12074	SOUTHERN CROSS	WA	-31.23	119.33	24.26	16.89	12.27	9.40	19.94	11.57	7.05	4.54	6.50	2.43	0.92	0.42

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
12090	YEELIRRIE	WA	-27.28	120.09	21.00	15.53	11.68	9.68	20.32	13.65	9.56	7.65	10.35	5.88	3.41	2.32
13011	WARBURTON AIRFIELD	WA	-26.13	126.58	9.32	7.34	5.74	4.71	10.16	7.16	5.29	4.05	5.76	3.39	2.05	1.34
13012	WILUNA	WA	-26.59	120.23	18.16	13.64	10.60	8.96	19.30	13.64	10.04	7.86	10.88	6.64	4.22	2.80
13017	GILES METEOROLOGICAL OFFIC	WA	-25.03	128.30	17.14	13.53	10.90	9.20	18.18	13.71	10.51	8.29	7.55	4.16	2.29	1.29
13030	TELFER AERO	WA	-21.71	122.23	12.70	9.70	7.30	6.03	14.70	11.67	9.58	8.24	14.06	10.12	7.76	5.94
14008	CAPE DON	NT	-11.32	131.77	25.78	16.56	13.13	10.84	1.84	0.31	0.22	0.06	0.00	0.00	0.00	0.00
14015	DARWIN AIRPORT	NT	-12.42	130.89	19.74	16.23	13.82	11.91	7.35	1.88	0.62	0.14	0.00	0.00	0.00	0.00
14016	DARWIN POST OFFICE	NT	-12.40	130.80	16.59	13.54	11.71	10.30	21.25	8.52	4.73	2.48	0.02	0.00	0.00	0.00
14042	OENPELLI	NT	-12.33	133.06	9.30	8.07	7.30	6.55	19.55	11.32	7.75	6.16	0.89	0.36	0.09	0.07
14090	MIDDLE POINT	NT	-12.58	131.31	11.78	10.09	8.94	8.13	19.81	11.38	7.53	5.66	0.13	0.00	0.00	0.00
14198	JABIRU AIRPORT	NT	-12.66	132.89	7.22	6.47	5.89	5.58	20.92	13.17	9.50	7.64	1.19	0.44	0.33	0.17
14400	MANINGRIDA	NT	-12.05	134.23	17.31	13.88	12.02	10.50	6.10	1.83	0.76	0.36	0.00	0.00	0.00	0.00
14401	WARRUWI	NT	-11.65	133.38	21.24	14.61	11.32	9.02	6.02	1.93	0.85	0.49	0.00	0.00	0.00	0.00
14402	MILINGIMBI	NT	-12.12	134.91	13.18	9.77	7.95	6.82	5.03	1.74	0.74	0.38	0.00	0.00	0.00	0.00
14504	GALIWINKU	NT	-12.03	135.56	21.47	16.74	14.16	12.29	7.13	2.50	1.03	0.42	0.00	0.00	0.00	0.00
14508	GOVE AIRPORT	NT	-12.27	136.82	16.56	10.85	8.29	6.90	2.98	1.17	0.61	0.37	0.00	0.00	0.00	0.00
14609	NGUKURR	NT	-14.73	134.73	3.84	3.20	2.73	2.44	5.29	3.78	2.87	2.20	2.20	1.24	0.89	0.60
14612	LARRIMAH	NT	-15.57	133.21	13.19	11.36	10.05	8.71	19.24	13.38	10.90	9.17	5.33	2.79	1.60	0.90
14626	DALY WATERS AWS	NT	-16.26	133.38	7.74	6.74	5.90	5.15	10.47	7.74	6.47	5.32	4.06	2.25	1.35	0.78
14703	CENTRE ISLAND	NT	-15.74	136.82	16.06	10.30	8.18	7.09	16.24	8.97	5.70	4.00	0.18	0.09	0.00	0.00
14704	MCARTHUR RIVER MINE	NT	-16.44	136.08	9.16	7.71	7.03	6.29	14.42	10.16	7.92	6.58	6.32	3.42	2.13	1.32
14707	WOLLOGORANG	NT	-17.21	137.95	12.64	10.55	9.36	8.42	17.61	12.64	9.64	7.97	5.03	2.52	1.36	0.73
14825	VICTORIA RIVER DOWNS	NT	-16.40	131.01	12.00	10.43	9.12	7.93	19.43	14.40	11.81	9.88	8.76	5.36	3.21	2.10
14829	LAJAMANU	NT	-18.33	130.64	5.20	4.40	3.80	3.23	6.25	4.80	4.03	3.55	4.38	2.58	1.88	1.28
14840	WAVE HILL	NT	-17.39	131.12	13.44	11.65	10.26	9.00	19.41	15.15	12.74	10.91	12.15	7.71	5.71	4.32
14901	DOUGLAS RIVER	NT	-13.83	131.19	4.00	3.59	3.31	3.08	9.79	6.49	4.59	3.59	0.92	0.31	0.10	0.08
14903	KATHERINE AVIATION MUSEUM	NT	-14.44	132.27	4.10	3.70	3.33	3.05	7.82	5.31	4.36	3.61	0.97	0.36	0.15	0.10
15085	BRUNETTE DOWNS	NT	-18.64	135.95	14.04	11.92	10.28	8.70	16.08	12.42	10.48	8.58	9.40	6.28	4.12	2.90
15087	TENNANT CREEK POST OFFICE	NT	-19.65	134.19	17.07	13.82	11.45	9.92	18.98	15.05	11.95	9.87	10.57	6.25	3.88	2.43
15135	TENNANT CREEK AIRPORT	NT	-19.64	134.18	17.13	13.63	11.11	9.47	18.97	14.79	11.92	9.58	7.55	4.16	2.58	1.58
15511	CURTIN SPRINGS	NT	-25.31	131.76	19.38	14.88	11.95	10.07	20.29	14.60	10.76	8.50	10.74	6.55	4.19	2.62
15528	YUENDUMU	NT	-22.26	131.80	15.10	12.24	10.14	8.76	15.93	12.14	9.48	7.50	5.19	2.81	1.69	1.05
15540	ALICE SPRINGS POST OFFICE	NT	-23.71	133.87	21.61	17.01	13.47	10.76	20.59	14.84	10.59	7.99	7.63	4.08	2.00	1.08
15590	ALICE SPRINGS AIRPORT	NT	-23.80	133.89	21.56	16.35	12.92	10.68	20.21	14.45	10.48	8.02	7.00	3.33	1.65	1.12
15602	JERVOIS	NT	-22.95	136.14	19.79	15.08	12.03	10.08	20.74	14.95	11.51	9.18	12.69	7.90	5.18	3.44

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
16001	WOOMERA AERODROME	SA	-31.16	136.81	24.90	17.78	13.40	10.21	18.57	11.09	7.03	4.52	6.43	2.67	1.28	0.62
16032	NONNING	SA	-32.52	136.49	25.32	17.58	12.45	9.21	16.50	9.32	5.87	3.61	5.00	2.29	0.79	0.47
16044	TARCOOLA	SA	-30.71	134.57	25.46	18.57	13.70	10.49	21.00	13.46	8.78	5.97	10.08	4.54	2.35	1.38
16065	ANDAMOOKA	SA	-30.45	137.17	23.11	17.03	13.32	10.68	20.63	13.63	9.74	7.26	10.05	5.13	2.82	1.66
17005	LEIGH CREEK AERO	SA	-30.47	138.41	20.90	15.62	12.34	9.93	17.17	11.38	7.69	5.31	6.03	2.86	1.62	1.00
17024	MARREE (FARINA)	SA	-30.07	138.27	21.70	15.97	12.10	9.60	19.37	12.53	8.93	6.53	7.93	4.07	2.13	1.43
17031	MARREE COMPARISON	SA	-29.65	138.06	20.71	15.74	12.43	10.22	20.10	14.78	10.96	8.43	12.28	7.25	4.62	2.94
17043	OODNADATTA AIRPORT	SA	-27.56	135.45	18.78	13.52	10.73	8.85	19.28	13.24	9.60	7.10	11.03	5.91	3.54	2.40
17099	ARKAROOLA	SA	-30.31	139.34	25.00	18.72	13.90	10.48	17.93	10.86	6.69	3.90	6.28	2.31	0.86	0.38
18012	CEDUNA AMO	SA	-32.13	133.70	28.84	15.25	6.96	3.53	16.99	6.72	2.66	1.01	6.53	1.59	0.46	0.13
18014	CLEVE	SA	-33.70	136.49	23.32	12.02	5.84	2.74	12.18	4.42	1.80	0.72	2.98	0.70	0.16	0.04
18040	KIMBA	SA	-33.14	136.41	24.98	16.50	10.70	7.30	14.25	7.75	4.18	2.28	3.68	1.43	0.48	0.23
18044	KYANCUTTA	SA	-33.13	135.56	28.75	19.83	13.13	9.12	19.19	10.79	5.69	3.26	7.74	3.09	1.23	0.58
18052	MINNIPA AGRICULTURAL CENTR	SA	-32.84	135.15	25.17	16.72	11.03	7.47	15.78	8.42	4.53	2.67	4.72	1.81	0.61	0.22
18069	ELLISTON	SA	-33.65	134.89	18.96	8.07	3.22	1.22	8.36	2.31	0.71	0.22	1.31	0.04	0.02	0.00
18070	PORT LINCOLN	SA	-34.72	135.86	14.16	3.78	1.42	0.61	4.94	0.67	0.16	0.05	0.93	0.07	0.02	0.00
18079	STREAKY BAY	SA	-32.80	134.21	23.66	14.26	7.94	4.84	11.80	5.68	2.68	1.28	3.12	0.86	0.28	0.06
18103	WHYALLA (NORRIE)	SA	-33.03	137.53	26.89	14.09	6.70	3.66	15.68	5.61	2.11	0.75	5.14	1.34	0.23	0.05
18110	COOK	SA	-30.61	130.41	31.53	21.25	14.93	10.63	23.48	12.65	6.75	3.63	10.38	3.85	1.53	0.58
18115	NEPTUNE ISLAND	SA	-35.34	136.12	1.49	0.18	0.04	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18139	POLDA (GUM VIEW)	SA	-33.51	135.29	25.53	16.11	9.69	6.17	15.28	7.72	3.53	1.97	5.78	1.81	0.58	0.17
19017	HAWKER	SA	-31.88	138.44	21.34	15.73	12.61	9.88	14.56	9.78	6.05	3.83	3.61	1.83	0.93	0.54
19062	YONGALA	SA	-33.03	138.75	20.28	14.12	9.66	6.84	10.06	5.20	2.90	1.72	1.34	0.42	0.22	0.02
19066	PORT AUGUSTA POWER STATIO	SA	-32.53	137.79	27.68	18.50	11.24	7.50	17.94	8.62	4.18	2.06	6.09	2.18	0.82	0.24
20026	YUNTA	SA	-32.58	139.56	23.97	17.19	12.31	8.84	15.72	9.25	4.97	3.19	4.81	2.03	0.78	0.25
21014	CLARE POST OFFICE	SA	-33.84	138.61	18.22	11.22	7.03	4.73	8.30	3.89	1.81	0.86	0.95	0.30	0.08	0.03
21043	PORT PIRIE NYRSTAR COMPARI	SA	-33.17	138.01	24.78	16.38	10.80	7.28	15.08	8.16	4.42	2.54	4.06	1.72	0.72	0.34
21046	SNOWTOWN	SA	-33.78	138.21	25.23	16.70	10.15	6.82	14.76	7.38	3.78	1.96	3.67	1.38	0.48	0.14
22006	KADINA	SA	-33.96	137.70	22.90	14.71	9.42	6.13	12.98	5.96	3.19	1.75	2.98	1.08	0.29	0.06
22008	MAITLAND	SA	-34.37	137.67	21.08	12.58	7.02	4.14	9.60	4.32	1.96	1.02	1.80	0.50	0.08	0.04
22015	PRICE	SA	-34.30	138.00	20.19	8.45	3.64	1.57	11.19	2.90	0.79	0.17	3.55	0.69	0.10	0.00
22018	WAROOKA	SA	-34.99	137.40	16.95	8.52	3.71	1.83	6.17	2.29	0.88	0.26	0.60	0.07	0.00	0.00
22801	CAPE BORDA COMPARISON	SA	-35.75	136.59	5.41	2.43	1.08	0.37	0.57	0.06	0.00	0.00	0.00	0.00	0.00	0.00
22803	CAPE WILLOUGHBY	SA	-35.84	138.13	6.58	2.00	0.28	0.10	1.53	0.20	0.05	0.00	0.08	0.00	0.00	0.00
22807	KINGSCOTE	SA	-35.66	137.64	7.47	1.89	0.44	0.18	1.60	0.09	0.00	0.00	0.09	0.00	0.00	0.00

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
23000	ADELAIDE WEST TERRACE	SA	-34.93	138.59	21.01	11.42	6.08	3.88	9.49	3.82	1.66	0.87	1.77	0.42	0.15	0.07
23013	PARAFIELD AIRPORT	SA	-34.80	138.63	16.49	9.69	5.56	3.62	8.76	3.87	1.72	0.84	2.04	0.54	0.18	0.06
23015	PENFIELD WEAPONS RESEARCH	SA	-34.73	138.65	11.84	7.68	4.61	3.00	6.39	2.79	1.39	0.89	1.24	0.42	0.13	0.03
23020	ROSEWORTHY AGRIC COLLEGE	SA	-34.53	138.69	20.30	12.38	7.38	4.78	11.70	4.85	2.33	1.20	2.70	0.83	0.18	0.10
23034	ADELAIDE AIRPORT	SA	-34.95	138.52	19.54	10.10	5.44	3.06	8.38	3.08	1.23	0.58	1.23	0.15	0.04	0.00
23037	ADELAIDE (PARAFIELD PLANT IN	SA	-34.78	138.62	21.81	14.00	8.39	5.32	11.74	5.52	2.71	1.42	2.48	0.87	0.19	0.03
23083	EDINBURGH RAAF	SA	-34.71	138.62	22.69	13.11	8.06	5.23	12.94	5.46	2.74	1.34	3.46	0.97	0.26	0.09
23090	ADELAIDE (KENT TOWN)	SA	-34.92	138.62	22.00	12.70	7.67	5.13	10.73	4.67	2.27	0.97	2.30	0.53	0.07	0.03
23321	NURIOOTPA COMPARISON	SA	-34.48	139.00	19.73	11.83	7.12	4.07	8.66	3.63	1.76	0.80	1.22	0.24	0.00	0.00
23343	ROSEDALE (TURRETFIELD RESE	SA	-34.55	138.83	22.44	14.07	8.76	5.96	13.18	6.16	3.11	1.56	3.56	1.20	0.33	0.18
23703	BELAIR (KALYRA)	SA	-35.00	138.61	15.61	7.39	3.45	1.58	4.97	1.73	0.55	0.18	0.30	0.12	0.00	0.00
23733	MOUNT BARKER	SA	-35.06	138.85	17.74	9.76	5.10	2.78	6.72	2.86	1.14	0.38	0.68	0.04	0.00	0.00
23747	STRATHALBYN	SA	-35.26	138.89	21.30	11.30	5.36	2.43	10.43	3.80	1.45	0.45	1.93	0.45	0.07	0.02
23751	VICTOR HARBOR COMPARISON	SA	-35.56	138.62	14.92	4.83	1.22	0.50	6.39	1.25	0.22	0.03	1.28	0.17	0.03	0.00
23801	LENSWOOD RESEARCH CENTRE	SA	-34.95	138.81	13.90	6.77	3.29	1.55	3.19	1.39	0.45	0.16	0.03	0.00	0.00	0.00
24016	RENMARK	SA	-34.17	140.75	24.77	16.25	10.82	7.84	15.68	8.18	4.41	2.34	4.59	1.64	0.70	0.34
24511	EUDUNDA	SA	-34.18	139.08	19.31	11.52	7.24	4.36	8.60	3.62	1.86	0.71	1.29	0.29	0.05	0.00
24518	MENINGIE	SA	-35.69	139.34	17.51	7.98	3.39	1.46	7.27	2.29	0.66	0.29	1.00	0.15	0.02	0.00
24521	MURRAY BRIDGE COMPARISON	SA	-35.12	139.26	25.17	13.73	7.24	4.00	13.02	5.39	2.32	0.95	3.39	0.88	0.12	0.07
25507	KEITH	SA	-36.10	140.36	21.76	13.27	8.09	5.42	11.89	5.42	2.67	1.29	3.16	0.96	0.18	0.07
25509	LAMEROO COMPARISON	SA	-35.33	140.52	23.14	14.72	9.34	6.42	13.00	6.46	3.46	1.76	3.62	1.20	0.36	0.14
26005	CAPE NORTHUMBERLAND	SA	-38.06	140.67	9.32	2.96	0.74	0.15	3.55	0.60	0.13	0.00	0.47	0.02	0.00	0.00
26013	KYBYBOLITE RESEARCH CENTR	SA	-36.88	140.93	17.72	10.34	5.79	3.28	7.83	3.14	1.31	0.55	1.45	0.38	0.03	0.00
26019	MOUNT BURR FOREST RESERVE	SA	-37.56	140.42	13.62	6.16	2.46	1.11	5.49	1.73	0.46	0.14	0.92	0.14	0.05	0.00
26020	MOUNT GAMBIER POST OFFICE	SA	-37.83	140.78	13.00	4.98	1.60	0.72	4.23	0.91	0.42	0.19	0.37	0.12	0.05	0.00
26021	MOUNT GAMBIER AERO	SA	-37.75	140.77	14.46	6.03	2.57	1.09	5.71	1.62	0.51	0.18	0.83	0.08	0.02	0.00
26023	NARACOORTE	SA	-36.96	140.74	18.66	10.89	5.68	3.37	9.08	3.63	1.32	0.63	1.53	0.42	0.08	0.00
26026	ROBE COMPARISON	SA	-37.16	139.76	5.19	1.41	0.52	0.23	0.54	0.06	0.00	0.00	0.00	0.00	0.00	0.00
27005	COEN POST OFFICE	QLD	-13.94	143.20	9.49	6.37	4.83	3.85	2.68	1.61	0.88	0.46	0.07	0.00	0.00	0.00
27006	COEN AIRPORT EVAP	QLD	-13.76	143.12	27.44	18.91	14.32	11.68	10.18	5.91	3.56	2.21	0.06	0.00	0.00	0.00
27022	THURSDAY ISLAND MO	QLD	-10.59	142.21	27.76	16.45	11.76	8.95	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27042	WEIPA EASTERN AVE	QLD	-12.63	141.88	16.59	13.68	11.71	10.03	12.68	6.65	4.35	3.09	0.00	0.00	0.00	0.00
28004	PALMERVILLE	QLD	-16.00	144.08	8.96	6.95	5.88	5.21	8.75	5.47	4.16	3.42	0.62	0.26	0.11	0.04
28008	LOCKHART RIVER AIRPORT	QLD	-12.79	143.31	21.43	14.21	11.50	9.24	3.14	1.40	0.57	0.31	0.02	0.00	0.00	0.00
29004	BURKETOWN POST OFFICE	QLD	-17.74	139.55	19.73	14.46	11.57	9.44	22.80	14.36	9.96	7.15	2.74	0.89	0.33	0.12

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	**Station Name**	**State**	**Lat-itude**	**Long-itude**	**1-day**	**2-day**	**3-day**	**4-day**	**1-day**	**2-day**	**3-day**	**4-day**	**1-day**	**2-day**	**3-day**	**4-day**
29009	CLONCURRY AERO	QLD	-20.67	140.51	16.97	12.80	10.46	8.91	18.23	14.17	11.34	9.46	10.11	5.80	3.94	2.46
29012	CROYDON TOWNSHIP	QLD	-18.20	142.24	15.56	12.96	11.40	9.89	20.24	14.80	11.58	9.64	5.24	2.62	1.56	0.89
29025	JULIA CREEK POST OFFICE	QLD	-20.66	141.75	16.97	13.58	10.94	9.11	18.64	13.94	11.50	9.28	10.81	7.08	4.56	2.94
29038	KOWANYAMA AIRPORT	QLD	-15.48	141.75	13.00	10.76	9.73	8.95	15.85	9.10	6.73	5.34	0.54	0.10	0.02	0.02
29039	MORNINGTON ISLAND	QLD	-16.66	139.18	19.43	13.43	10.77	8.91	7.34	3.00	1.40	0.60	0.00	0.00	0.00	0.00
29041	NORMANTON POST OFFICE	QLD	-17.67	141.07	15.86	13.34	11.57	10.27	25.34	17.43	13.48	10.45	3.61	1.32	0.55	0.30
29090	TOORAK RESEARCH STATION	QLD	-21.03	141.80	12.26	8.92	7.33	6.13	13.74	10.36	8.28	7.00	8.82	5.03	3.08	2.05
29127	MOUNT ISA AERO	QLD	-20.68	139.49	17.73	13.70	11.30	9.45	19.35	14.80	11.85	9.58	7.65	4.20	2.48	1.48
29141	CLONCURRY AIRPORT	QLD	-20.67	140.51	7.10	5.34	4.31	3.62	8.55	6.79	5.41	4.59	5.28	3.28	2.21	1.62
30018	GEORGETOWN POST OFFICE	QLD	-18.29	143.55	18.16	13.82	11.42	9.94	19.29	12.78	9.52	7.58	2.35	1.05	0.54	0.35
30024	HUGHENDEN POST OFFICE	QLD	-20.84	144.20	17.91	13.69	10.94	8.97	18.49	13.94	10.71	8.63	4.20	2.20	1.26	0.54
30045	RICHMOND POST OFFICE	QLD	-20.73	143.14	17.82	13.88	11.18	9.32	18.89	14.18	11.56	9.68	9.33	5.85	3.66	2.53
31010	CAIRNS POST OFFICE	QLD	-16.93	145.78	23.11	15.38	11.78	9.73	3.02	0.98	0.51	0.27	0.08	0.03	0.02	0.00
31011	CAIRNS AERO	QLD	-16.87	145.75	24.42	16.20	12.68	10.25	1.95	0.72	0.22	0.09	0.05	0.00	0.00	0.00
31016	COOKTOWN POST OFFICE	QLD	-15.46	145.25	18.47	12.07	9.27	7.70	2.97	1.17	0.47	0.20	0.03	0.00	0.00	0.00
31017	COOKTOWN MISSION STRIP	QLD	-15.45	145.19	6.46	4.20	3.32	2.81	1.64	0.78	0.42	0.19	0.05	0.03	0.00	0.00
31029	HERBERTON WHITE ST	QLD	-17.39	145.39	16.56	10.12	6.74	4.24	0.68	0.21	0.12	0.03	0.00	0.00	0.00	0.00
31034	KAIRI RESEARCH STATION	QLD	-17.22	145.57	13.14	7.88	5.10	3.29	0.76	0.24	0.07	0.02	0.00	0.00	0.00	0.00
31037	LOW ISLES LIGHTHOUSE	QLD	-16.38	145.56	20.43	13.95	11.30	9.80	3.48	1.28	0.73	0.53	0.00	0.00	0.00	0.00
31066	MAREEBA QWRC	QLD	-17.00	145.43	15.63	9.66	7.31	5.91	3.74	1.71	0.83	0.40	0.06	0.00	0.00	0.00
31108	WALKAMIN DPI	QLD	-17.13	145.43	21.44	14.77	10.64	7.85	2.74	1.10	0.31	0.13	0.00	0.00	0.00	0.00
32004	CARDWELL MARINE PDE	QLD	-18.26	146.02	23.30	15.52	12.16	9.96	2.94	1.16	0.50	0.26	0.08	0.04	0.00	0.00
32005	CAPE CLEVELAND LIGHTHOUSE	QLD	-19.18	147.02	19.57	13.53	10.13	7.97	0.87	0.20	0.10	0.03	0.00	0.00	0.00	0.00
32025	INNISFAIL	QLD	-17.52	146.03	17.44	11.26	8.30	6.56	1.30	0.60	0.24	0.10	0.06	0.02	0.00	0.00
32037	SOUTH JOHNSTONE EXP STN	QLD	-17.61	146.00	19.50	13.50	10.93	8.90	2.69	1.19	0.67	0.36	0.07	0.00	0.00	0.00
32040	TOWNSVILLE AERO	QLD	-19.25	146.77	22.21	14.15	10.84	8.82	2.25	0.72	0.24	0.09	0.12	0.01	0.00	0.00
32078	INGHAM COMPOSITE	QLD	-18.65	146.18	20.28	14.38	11.59	9.95	6.51	3.59	1.79	1.05	0.31	0.10	0.08	0.03
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.58	147.41	19.33	12.29	9.38	7.58	4.68	1.73	0.88	0.53	0.18	0.09	0.04	0.02
33002	AYR DPI RESEARCH STN	QLD	-19.62	147.38	18.71	12.62	9.85	8.00	3.45	1.04	0.38	0.20	0.18	0.07	0.00	0.00
33013	COLLINSVILLE POST OFFICE	QLD	-20.55	147.85	18.42	13.06	10.70	9.18	12.94	7.26	4.72	3.02	0.54	0.20	0.08	0.04
33045	MACKAY AERO	QLD	-21.17	149.18	6.67	4.16	2.91	2.18	0.40	0.12	0.02	0.00	0.00	0.00	0.00	0.00
33046	MACKAY POST OFFICE	QLD	-21.15	149.18	17.47	11.02	7.98	5.93	1.25	0.28	0.12	0.07	0.00	0.00	0.00	0.00
33047	TE KOWAI EXP STN	QLD	-21.16	149.12	19.32	12.46	9.17	7.06	2.69	1.00	0.47	0.25	0.07	0.00	0.00	0.00
33058	PINE ISLET LIGHTHOUSE	QLD	-21.67	150.22	16.93	11.24	7.55	5.76	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33065	ST LAWRENCE POST OFFICE	QLD	-22.35	149.54	21.92	13.82	10.48	8.58	3.20	1.00	0.30	0.12	0.18	0.04	0.02	0.00

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
33119	MACKAY M.O	QLD	-21.12	149.22	15.13	10.19	7.15	5.17	0.50	0.15	0.02	0.02	0.00	0.00	0.00	0.00
34002	CHARTERS TOWERS POST OFFI	QLD	-20.08	146.26	19.55	14.01	11.29	9.49	15.25	9.63	6.54	4.57	1.80	0.76	0.41	0.13
35019	CLERMONT SIRIUS ST	QLD	-22.82	147.64	18.44	14.60	12.07	10.18	16.00	10.84	7.73	5.56	1.80	0.69	0.33	0.13
35027	EMERALD POST OFFICE	QLD	-23.53	148.16	19.62	14.29	11.64	9.72	16.13	10.76	7.62	5.38	2.61	1.21	0.62	0.26
35065	SPRINGSURE DAME ST	QLD	-24.12	148.09	16.71	12.45	10.19	8.45	12.57	7.31	4.57	3.07	1.43	0.40	0.14	0.07
35069	TAMBO POST OFFICE	QLD	-24.88	146.26	18.48	13.66	11.34	9.54	15.54	10.90	7.60	5.76	2.30	0.92	0.46	0.24
35070	TAROOM POST OFFICE	QLD	-25.64	149.80	20.70	15.16	12.44	10.02	13.90	8.46	5.82	3.88	1.38	0.56	0.20	0.04
35149	BRIGALOW RESEARCH STN	QLD	-24.84	149.80	19.41	14.23	10.95	9.13	12.00	6.82	4.15	2.74	0.85	0.26	0.05	0.03
36007	BARCALDINE POST OFFICE	QLD	-23.55	145.29	16.80	12.49	10.02	8.91	18.42	13.31	10.42	7.82	4.80	2.22	1.16	0.60
36026	ISISFORD POST OFFICE	QLD	-24.26	144.44	14.54	10.70	8.76	7.38	16.60	12.46	9.56	7.48	7.96	4.14	2.50	1.56
36030	LONGREACH POST OFFICE	QLD	-23.45	144.25	16.58	12.12	9.80	8.38	17.53	13.21	10.72	8.75	10.13	6.00	3.89	2.66
36031	LONGREACH AERO	QLD	-23.44	144.28	15.90	11.95	9.66	8.41	18.56	14.12	11.44	9.12	9.29	4.83	3.20	2.12
36143	BLACKALL TOWNSHIP	QLD	-24.42	145.47	17.05	12.84	10.72	9.30	18.60	13.33	9.95	7.93	4.72	2.35	1.53	0.98
37010	CAMOOWEAL TOWNSHIP	QLD	-19.92	138.12	16.62	13.40	11.16	9.34	19.28	14.85	12.40	10.18	11.56	7.25	4.74	3.35
37043	URANDANGI	QLD	-21.61	138.31	18.34	14.32	11.34	9.40	19.72	15.74	12.92	10.64	14.56	9.78	6.88	4.66
37051	WINTON POST OFFICE	QLD	-22.39	143.04	15.72	12.06	9.56	8.20	18.64	14.16	11.52	9.58	10.72	6.48	4.04	2.88
38002	BIRDSVILLE POLICE STATION	QLD	-25.90	139.35	19.02	14.09	11.49	9.77	21.11	15.55	11.98	9.47	15.06	9.36	6.26	4.38
38003	BOULIA AIRPORT	QLD	-22.91	139.90	18.06	13.51	11.08	9.02	19.24	14.68	11.65	9.65	13.61	8.85	5.77	4.09
38024	WINDORAH POST OFFICE	QLD	-25.42	142.66	15.52	11.52	9.25	7.73	17.50	12.80	9.84	7.95	10.66	6.43	4.34	3.05
39004	BARALABA POST OFFICE	QLD	-24.18	149.81	20.00	15.17	12.68	10.51	17.29	10.85	7.22	4.80	1.37	0.54	0.20	0.05
39006	BILOELA DPI	QLD	-24.38	150.52	20.93	15.47	12.47	10.13	12.40	6.87	4.07	2.20	0.50	0.17	0.07	0.03
39015	BUNDABERG POST OFFICE	QLD	-24.87	152.35	20.48	11.95	8.13	5.96	1.35	0.36	0.11	0.10	0.01	0.00	0.00	0.00
39023	CAPE CAPRICORN LIGHTHOUSE	QLD	-23.48	151.23	3.93	1.10	0.40	0.13	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39039	GAYNDAH POST OFFICE	QLD	-25.63	151.61	23.72	17.12	13.27	10.75	11.95	6.64	3.71	2.24	1.12	0.39	0.15	0.07
39059	LADY ELLIOT ISLAND	QLD	-24.11	152.72	9.42	5.08	3.60	2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39083	ROCKHAMPTON AERO	QLD	-23.38	150.48	24.22	17.13	13.03	10.09	8.90	4.51	2.07	1.15	0.28	0.06	0.03	0.01
39085	SANDY CAPE LIGHTHOUSE	QLD	-24.73	153.21	12.24	5.84	3.78	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39104	MONTO TOWNSHIP	QLD	-24.86	151.12	16.78	11.93	9.18	7.20	7.18	3.67	1.84	0.96	0.20	0.09	0.00	0.00
39122	HERON ISLAND RES STN	QLD	-23.44	151.91	7.50	4.20	3.00	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39123	GLADSTONE RADAR	QLD	-23.86	151.26	22.65	14.80	10.80	8.24	3.04	0.98	0.29	0.08	0.06	0.00	0.00	0.00
39128	BUNDABERG AERO	QLD	-24.89	152.32	10.81	5.81	3.79	2.75	0.79	0.04	0.02	0.00	0.00	0.00	0.00	0.00
40004	AMBERLEY AMO	QLD	-27.63	152.71	25.98	16.91	11.47	8.36	7.50	2.64	1.05	0.47	0.52	0.11	0.02	0.00
40043	CAPE MORETON LIGHTHOUSE	QLD	-27.03	153.47	1.20	0.26	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40062	CROHAMHURST	QLD	-26.81	152.87	14.00	6.77	3.51	1.94	2.23	0.46	0.14	0.06	0.06	0.00	0.00	0.00
40068	DOUBLE ISLAND POINT LIGHTHO	QLD	-25.93	153.19	6.06	2.56	1.38	0.84	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
40082	UNIVERSITY OF QUEENSLAND G	QLD	-27.54	152.34	26.14	17.52	12.00	8.67	9.64	3.64	1.62	0.81	0.86	0.21	0.02	0.02
40093	GYMPIE	QLD	-26.18	152.64	22.83	15.33	10.64	7.71	7.12	2.69	1.19	0.69	0.29	0.02	0.00	0.00
40100	IMBIL FORESTRY	QLD	-26.46	152.66	20.09	11.69	7.60	4.63	5.03	1.49	0.57	0.20	0.14	0.03	0.00	0.00
40112	KINGAROY PRINCE STREET	QLD	-26.55	151.85	19.49	11.95	7.74	5.09	2.84	1.00	0.33	0.12	0.05	0.00	0.00	0.00
40126	MARYBOROUGH	QLD	-25.52	152.72	22.52	14.14	9.20	6.72	2.34	0.58	0.22	0.04	0.02	0.00	0.00	0.00
40190	SOUTHPORT RIDGEWAY AVE	QLD	-27.98	153.41	16.94	5.94	2.97	1.50	1.24	0.12	0.03	0.03	0.03	0.03	0.00	0.00
40211	ARCHERFIELD AIRPORT	QLD	-27.57	153.01	11.10	6.37	3.81	2.47	1.74	0.34	0.07	0.01	0.07	0.01	0.00	0.00
40214	BRISBANE REGIONAL OFFICE	QLD	-27.48	153.03	21.07	10.57	6.24	3.91	2.84	0.49	0.10	0.04	0.14	0.00	0.00	0.00
40223	BRISBANE AERO	QLD	-27.42	153.11	17.12	7.30	4.12	2.70	1.16	0.08	0.02	0.02	0.00	0.00	0.00	0.00
40264	TEWANTIN POST OFFICE	QLD	-26.39	153.04	14.86	7.07	3.77	2.33	1.72	0.40	0.12	0.06	0.04	0.00	0.00	0.00
40265	REDLANDS HRS	QLD	-27.53	153.25	9.60	3.57	2.00	1.07	0.43	0.02	0.00	0.00	0.00	0.00	0.00	0.00
40282	NAMBOUR DPI	QLD	-26.64	152.94	19.57	9.90	5.33	3.05	3.48	0.90	0.24	0.12	0.12	0.02	0.00	0.00
40428	BRIAN PASTURES	QLD	-25.66	151.75	23.44	17.08	13.38	10.62	10.03	4.77	2.41	1.46	0.54	0.18	0.05	0.05
40436	GATTON QDPI RESEARCH STN	QLD	-27.55	152.33	26.32	17.79	12.66	8.92	9.89	4.03	1.74	0.89	1.00	0.24	0.08	0.03
40451	TOOLARA FORESTRY	QLD	-26.00	152.83	18.47	10.40	6.43	4.27	2.53	1.00	0.27	0.13	0.03	0.03	0.00	0.00
41023	DALBY POST OFFICE	QLD	-27.18	151.26	21.40	15.39	11.70	9.03	9.91	5.29	3.02	1.77	0.78	0.28	0.14	0.07
41038	GOONDIWINDI POST OFFICE	QLD	-28.55	150.31	19.13	14.09	11.22	9.43	13.78	8.58	5.86	3.99	2.31	1.10	0.55	0.26
41044	HERMITAGE	QLD	-28.21	152.10	18.45	11.58	7.27	5.03	3.03	1.09	0.45	0.24	0.15	0.00	0.00	0.00
41095	STANTHORPE LESLIE PARADE	QLD	-28.66	151.93	10.32	5.42	2.62	1.50	0.66	0.26	0.14	0.00	0.00	0.00	0.00	0.00
41100	TEXAS POST OFFICE	QLD	-28.85	151.17	18.08	13.08	10.08	7.79	11.11	6.21	3.63	2.34	1.45	0.47	0.13	0.03
41103	TOOWOOMBA	QLD	-27.58	151.93	13.88	6.73	3.46	1.88	1.88	0.61	0.20	0.07	0.00	0.00	0.00	0.00
41175	APPLETHORPE	QLD	-28.62	151.95	7.39	3.12	1.66	0.95	0.54	0.05	0.02	0.00	0.00	0.00	0.00	0.00
41359	OAKEY AERO	QLD	-27.40	151.74	21.06	13.94	9.21	6.41	5.56	2.15	0.82	0.41	0.09	0.03	0.00	0.00
42023	MILES POST OFFICE	QLD	-26.66	150.18	18.72	14.00	10.81	8.89	11.77	6.68	4.15	2.57	1.02	0.40	0.11	0.02
43015	INJUNE POST OFFICE	QLD	-25.84	148.57	19.25	14.10	11.10	8.93	11.80	6.80	4.30	2.88	1.20	0.40	0.10	0.03
43020	MITCHELL POST OFFICE	QLD	-26.49	147.98	18.82	14.36	11.82	9.56	14.69	9.28	6.41	4.33	2.05	0.97	0.36	0.18
43030	ROMA POST OFFICE	QLD	-26.57	148.79	19.46	14.91	11.57	9.43	17.29	11.00	7.46	5.17	2.80	1.14	0.63	0.29
43034	ST GEORGE POST OFFICE	QLD	-28.04	148.58	19.89	15.00	11.63	9.49	16.03	10.60	7.31	4.89	2.54	1.31	0.66	0.23
43035	SURAT	QLD	-27.16	149.07	19.27	14.11	11.36	9.56	15.07	9.44	6.18	4.53	2.16	1.09	0.33	0.11
44010	BOLLON MARY ST	QLD	-28.03	147.48	19.60	15.04	11.68	9.68	17.36	11.84	8.28	6.34	5.80	2.98	1.68	0.76
44021	CHARLEVILLE AERO	QLD	-26.41	146.26	19.45	14.68	11.55	9.52	15.85	10.49	7.66	5.88	3.06	1.68	0.75	0.34
44022	CHARLEVILLE POST OFFICE	QLD	-26.40	146.24	18.54	13.75	11.46	9.35	16.90	12.00	9.30	7.33	5.86	3.21	1.95	1.33
44026	CUNNAMULLA POST OFFICE	QLD	-28.07	145.68	19.64	15.28	11.66	9.78	17.90	11.96	8.62	6.48	6.18	3.26	1.84	1.06
45015	QUILPIE AIRPORT	QLD	-26.61	144.26	18.18	13.94	11.18	9.26	18.58	13.26	10.24	8.18	7.94	4.54	2.74	1.78
45017	THARGOMINDAH POST OFFICE	QLD	-28.00	143.82	19.40	14.70	11.64	9.30	19.26	13.77	9.89	7.81	9.19	5.17	3.13	1.94

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
46037	TIBOOBURRA POST OFFICE	NSW	-29.43	142.01	21.54	16.12	12.36	9.98	19.90	13.61	9.46	7.01	8.32	4.14	2.43	1.47
46042	WHITE CLIFFS POST OFFICE	NSW	-30.85	143.09	21.44	16.29	13.02	10.27	19.64	13.02	9.09	6.49	8.56	4.22	2.29	1.20
46043	WILCANNIA(REID ST)	NSW	-31.56	143.37	22.98	17.32	13.66	10.54	19.40	12.72	8.84	5.92	7.78	3.68	2.26	1.24
47007	BROKEN HILL (PATTON STREET)	NSW	-31.98	141.47	21.10	15.26	10.30	7.64	12.64	7.28	4.42	2.68	3.16	1.26	0.52	0.24
47016	LAKE VICTORIA STORAGE	NSW	-34.04	141.27	21.38	13.86	9.29	6.90	12.95	6.10	3.45	2.05	3.50	1.02	0.31	0.17
47019	MENINDEE POST OFFICE	NSW	-32.39	142.42	21.13	14.65	9.98	7.65	16.52	9.31	5.60	3.44	5.88	2.44	1.13	0.50
47048	BROKEN HILL AIRPORT AWS	NSW	-32.00	141.47	9.30	6.34	4.54	3.54	6.02	3.44	2.14	1.26	1.44	0.64	0.32	0.12
48013	BOURKE POST OFFICE	NSW	-30.09	145.94	20.61	15.36	12.16	10.13	19.06	13.27	9.34	6.89	9.05	4.77	2.81	1.65
48015	BREWARRINA HOSPITAL	NSW	-29.96	146.87	18.43	13.69	10.93	8.60	16.29	10.90	7.71	5.76	5.95	2.90	1.69	1.00
48027	COBAR MO	NSW	-31.48	145.83	21.27	15.51	12.00	9.53	14.18	9.02	6.04	4.02	3.64	1.49	0.71	0.33
48030	COBAR POST OFFICE	NSW	-31.50	145.80	19.71	14.76	11.50	9.11	16.44	10.94	7.37	5.13	6.18	2.90	1.54	0.86
48031	COLLARENEBRI (ALBERT ST)	NSW	-29.54	148.58	18.45	13.07	10.36	8.29	13.93	8.74	6.21	4.67	3.88	1.52	0.88	0.33
49002	BALRANALD (RSL)	NSW	-34.64	143.56	21.24	14.05	9.31	6.33	12.98	6.50	3.64	2.07	4.02	1.52	0.57	0.24
49019	IVANHOE POST OFFICE	NSW	-32.90	144.30	22.44	16.31	12.50	9.50	17.83	10.79	6.83	4.48	6.44	3.38	1.65	0.85
50014	CONDOBOLIN RETIREMENT VILL	NSW	-33.08	147.15	20.76	14.90	10.97	8.59	11.14	6.79	4.21	2.66	2.69	1.03	0.55	0.14
50031	PEAK HILL POST OFFICE	NSW	-32.72	148.19	19.93	14.29	11.02	8.60	10.74	6.88	4.45	3.05	2.00	0.69	0.26	0.07
50052	CONDOBOLIN AG RESEARCH ST	NSW	-33.07	147.23	19.00	13.31	9.86	7.57	11.67	6.69	4.38	3.02	3.21	1.19	0.55	0.26
51010	COONAMBLE COMPARISON	NSW	-30.98	148.38	19.45	13.86	10.69	8.57	13.26	8.07	5.60	3.74	2.81	1.26	0.48	0.21
51039	NYNGAN AIRPORT	NSW	-31.55	147.20	20.63	15.33	12.00	9.63	14.79	9.38	6.69	4.54	3.92	1.67	0.79	0.35
51049	TRANGIE RESEARCH STATION A	NSW	-31.99	147.95	20.42	13.95	10.26	8.05	11.68	6.92	4.63	3.08	2.26	0.74	0.39	0.08
52020	MUNGINDI POST OFFICE	NSW	-28.98	148.99	16.62	12.29	9.88	7.93	14.26	8.98	6.26	4.62	4.05	1.83	0.74	0.33
52026	WALGETT COUNCIL DEPOT	NSW	-30.02	148.12	19.35	14.65	11.51	9.61	17.30	11.41	7.69	5.46	5.60	2.58	1.46	0.83
53002	BARADINE FORESTRY	NSW	-30.95	149.07	16.02	10.83	8.48	6.62	9.64	5.21	3.26	2.10	1.31	0.48	0.21	0.10
53030	NARRABRI WEST POST OFFICE	NSW	-30.34	149.76	19.23	14.28	11.05	9.28	12.78	8.10	5.78	4.00	1.58	0.70	0.28	0.10
53048	MOREE COMPARISON	NSW	-29.48	149.84	19.45	14.21	10.76	9.06	12.70	7.00	4.18	2.61	1.39	0.48	0.15	0.00
54003	BARRABA POST OFFICE	NSW	-30.38	150.61	18.27	12.93	9.78	7.59	6.41	3.39	1.93	1.27	0.39	0.05	0.00	0.00
54104	PINDARI DAM	NSW	-29.39	151.24	18.64	12.94	9.19	7.08	5.28	2.39	1.31	0.78	0.08	0.00	0.00	0.00
55023	GUNNEDAH POOL	NSW	-30.98	150.25	17.61	12.74	10.23	8.39	11.42	7.11	4.69	3.42	2.44	1.14	0.59	0.26
55024	GUNNEDAH RESOURCE CENTRE	NSW	-31.03	150.27	19.49	13.53	10.24	7.76	7.86	4.20	2.68	1.90	0.81	0.17	0.02	0.02
55049	QUIRINDI POST OFFICE	NSW	-31.51	150.68	18.48	12.88	9.43	7.45	8.29	4.74	3.02	1.79	0.74	0.14	0.05	0.00
55054	TAMWORTH AIRPORT	NSW	-31.09	150.85	18.43	12.31	9.11	6.46	6.11	3.43	1.86	1.11	0.40	0.06	0.00	0.00
55136	WOOLBROOK (DANGLEMAH ROA	NSW	-30.97	151.35	9.35	5.51	3.14	2.03	0.73	0.16	0.08	0.03	0.00	0.00	0.00	0.00
56002	ARMIDALE (RADIO STATION 2AD	NSW	-30.52	151.67	8.64	4.90	2.74	1.46	0.46	0.08	0.03	0.00	0.00	0.00	0.00	0.00
56011	GLEN INNES POST OFFICE	NSW	-29.74	151.74	6.98	3.47	1.89	1.04	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00
56013	GLEN INNES AG RESEARCH STN	NSW	-29.70	151.69	3.95	1.73	0.78	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Station No	Station Name	State	Lat-itude	Long-itude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
56017	INVERELL COMPARISON	NSW	-29.78	151.11	16.59	10.95	7.78	5.87	4.12	2.09	1.15	0.75	0.24	0.09	0.03	0.00
56018	INVERELL RESEARCH CENTRE	NSW	-29.78	151.08	13.21	8.07	5.55	3.76	1.71	0.55	0.19	0.05	0.00	0.00	0.00	0.00
56032	TENTERFIELD (FEDERATION PAI	NSW	-29.05	152.02	11.02	5.29	2.62	1.31	0.81	0.14	0.05	0.05	0.00	0.00	0.00	0.00
57095	TABULAM (MUIRNE)	NSW	-28.76	152.45	13.78	6.51	3.11	1.51	1.68	0.46	0.11	0.00	0.00	0.00	0.00	0.00
58009	BYRON BAY (CAPE BYRON LIGHT	NSW	-28.64	153.64	8.13	2.09	0.69	0.25	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58012	YAMBA PILOT STATION	NSW	-29.43	153.36	4.41	0.68	0.19	0.06	0.73	0.05	0.02	0.02	0.06	0.00	0.00	0.00
58037	LISMORE (CENTRE STREET)	NSW	-28.81	153.26	25.28	14.24	8.35	4.93	5.89	1.30	0.46	0.20	0.24	0.09	0.04	0.00
58063	CASINO AIRPORT	NSW	-28.88	153.05	25.86	16.40	10.38	6.83	9.43	3.19	1.17	0.43	0.81	0.10	0.02	0.00
58130	GRAFTON OLYMPIC POOL	NSW	-29.68	152.93	27.00	15.41	8.71	5.54	7.15	1.85	0.61	0.27	0.66	0.07	0.05	0.00
58131	ALSTONVILLE TROPICAL FRUIT F	NSW	-28.85	153.46	11.97	3.82	1.69	0.87	1.21	0.28	0.08	0.03	0.03	0.00	0.00	0.00
58158	MURWILLUMBAH (BRAY PARK)	NSW	-28.34	153.38	24.40	12.60	6.86	4.40	3.74	0.60	0.23	0.03	0.20	0.00	0.00	0.00
59017	KEMPSEY (WIDE STREET)	NSW	-31.08	152.82	20.40	9.02	4.38	2.29	2.69	0.45	0.05	0.00	0.21	0.02	0.02	0.00
59030	SOUTH WEST ROCKS (SMOKY C	NSW	-30.92	153.09	5.36	1.44	0.60	0.24	0.36	0.04	0.02	0.00	0.02	0.02	0.00	0.00
59040	COFFS HARBOUR MO	NSW	-30.31	153.12	9.11	2.14	0.50	0.20	1.17	0.13	0.03	0.02	0.25	0.02	0.02	0.00
60026	PORT MACQUARIE (BELLEVUE G	NSW	-31.44	152.91	2.50	0.35	0.09	0.04	0.35	0.04	0.00	0.00	0.09	0.02	0.00	0.00
60030	TAREE (ROBERTSON ST)	NSW	-31.90	152.45	24.85	12.13	6.36	3.85	7.21	1.51	0.44	0.08	0.64	0.03	0.00	0.00
60085	YARRAS (MOUNT SEAVIEW)	NSW	-31.39	152.25	24.16	12.34	6.79	3.95	6.34	1.74	0.61	0.24	0.61	0.05	0.00	0.00
61051	MURRURUNDI POST OFFICE	NSW	-31.76	150.84	17.81	11.38	8.10	5.57	5.24	2.57	1.05	0.55	0.12	0.00	0.00	0.00
61054	NELSON BAY (NELSON HEAD)	NSW	-32.71	152.16	2.18	0.49	0.13	0.00	0.21	0.00	0.00	0.00	0.03	0.00	0.00	0.00
61055	NEWCASTLE NOBBYS SIGNAL ST	NSW	-32.92	151.80	11.34	2.08	0.32	0.12	2.68	0.22	0.08	0.04	0.16	0.00	0.00	0.00
61078	WILLIAMTOWN RAAF	NSW	-32.79	151.84	19.92	7.77	3.29	1.35	6.32	1.28	0.34	0.12	0.86	0.06	0.02	0.00
61086	JERRYS PLAINS POST OFFICE	NSW	-32.50	150.91	26.28	15.92	9.94	6.80	12.62	5.58	2.68	1.30	2.26	0.66	0.10	0.02
61087	GOSFORD (NARARA RESEARCH	NSW	-33.39	151.33	11.21	4.07	1.67	0.64	3.48	0.60	0.07	0.00	0.55	0.02	0.00	0.00
61089	SCONE SCS	NSW	-32.06	150.93	22.52	14.05	9.21	6.48	9.36	4.64	2.00	1.14	0.93	0.24	0.10	0.02
61242	CESSNOCK (NULKABA)	NSW	-32.81	151.35	26.53	14.74	8.88	5.09	11.68	4.47	1.74	0.71	2.03	0.29	0.00	0.00
61250	PATERSON (TOCAL AWS)	NSW	-32.63	151.59	23.79	12.49	6.33	3.62	9.33	3.49	1.33	0.38	1.28	0.15	0.03	0.00
61260	CESSNOCK AIRPORT AWS	NSW	-32.79	151.34	10.56	5.41	2.92	1.56	3.92	1.36	0.56	0.18	0.62	0.08	0.00	0.00
61273	NORAH HEAD LIGHTHOUSE	NSW	-33.28	151.58	7.82	1.03	0.15	0.03	2.26	0.09	0.00	0.00	0.24	0.00	0.00	0.00
61288	LOSTOCK DAM	NSW	-32.33	151.46	21.74	12.03	7.13	4.18	7.37	3.05	1.29	0.63	0.55	0.08	0.05	0.00
62013	GULGONG POST OFFICE	NSW	-32.36	149.53	17.86	11.78	8.84	5.97	7.32	3.84	2.19	1.32	0.59	0.16	0.11	0.08
62021	MUDGEE (GEORGE STREET)	NSW	-32.60	149.60	17.12	11.55	8.24	5.52	6.33	3.24	1.67	1.03	0.30	0.00	0.00	0.00
63004	BATHURST GAOL	NSW	-33.42	149.55	14.01	8.97	5.87	3.97	3.78	1.93	0.97	0.49	0.17	0.08	0.02	0.02
63005	BATHURST AGRICULTURAL STAT	NSW	-33.43	149.56	11.39	6.83	4.71	3.27	2.24	0.98	0.49	0.17	0.02	0.00	0.00	0.00
63023	COWRA RESEARCH CENTRE (EV	NSW	-33.81	148.71	15.69	10.93	7.95	5.69	7.00	3.67	2.29	1.45	0.57	0.17	0.07	0.05
63039	KATOOMBA (MURRI ST)	NSW	-33.71	150.31	4.46	1.90	0.66	0.20	0.30	0.02	0.00	0.00	0.00	0.00	0.00	0.00

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63063	OBERON (SPRINGBANK)	NSW	-33.68	149.84	2.88	1.43	0.64	0.36	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63224	LITHGOW (BIRDWOOD ST)	NSW	-33.49	150.15	8.38	4.60	2.35	1.40	1.08	0.35	0.15	0.00	0.00	0.00	0.00	0.00
63231	ORANGE AIRPORT COMPARISON	NSW	-33.38	149.12	6.46	3.26	2.08	1.28	0.41	0.05	0.00	0.00	0.00	0.00	0.00	0.00
63254	ORANGE AGRICULTURAL INSTIT	NSW	-33.32	149.08	7.29	3.77	2.39	1.45	0.45	0.16	0.06	0.00	0.00	0.00	0.00	0.00
64008	COONABARABRAN (NAMOI STRE	NSW	-31.27	149.27	17.90	12.80	9.24	7.18	6.74	3.72	2.28	1.58	0.44	0.08	0.02	0.00
64009	DUNEDOO POST OFFICE	NSW	-32.02	149.40	19.86	13.12	9.50	6.93	9.67	5.60	3.21	1.71	1.07	0.45	0.12	0.05
65012	DUBBO (DARLING STREET)	NSW	-32.24	148.61	21.14	14.86	10.56	7.97	10.46	6.14	3.63	2.24	1.36	0.58	0.22	0.08
65016	FORBES (CAMP STREET)	NSW	-33.39	148.01	19.69	14.00	10.32	8.09	11.50	6.94	4.69	3.11	2.39	0.99	0.48	0.17
65026	PARKES (MACARTHUR STREET)	NSW	-33.14	148.16	19.10	13.10	9.84	7.34	8.92	5.36	3.40	2.10	1.48	0.40	0.12	0.06
65034	WELLINGTON (AGROWPLOW)	NSW	-32.56	148.95	18.95	13.02	9.57	7.31	9.19	5.43	3.31	2.12	1.12	0.38	0.14	0.07
65035	WELLINGTON RESEARCH CENTI	NSW	-32.51	148.97	17.41	11.54	8.77	6.15	7.41	4.08	2.21	1.28	0.79	0.18	0.05	0.05
65091	COWRA AIRPORT COMPARISON	NSW	-33.85	148.65	18.37	12.95	9.63	7.24	9.80	5.41	3.59	2.20	1.68	0.61	0.29	0.10
66037	SYDNEY AIRPORT AMO	NSW	-33.94	151.17	16.22	4.07	1.16	0.26	4.32	0.44	0.09	0.03	0.71	0.03	0.01	0.00
66062	SYDNEY (OBSERVATORY HILL)	NSW	-33.86	151.21	11.75	2.43	0.38	0.07	2.85	0.18	0.03	0.01	0.26	0.01	0.00	0.00
66124	PARRAMATTA NORTH (MASONS	NSW	-33.79	151.02	23.25	9.55	4.28	2.15	7.83	1.70	0.50	0.10	1.13	0.10	0.03	0.00
66131	RIVERVIEW OBSERVATORY	NSW	-33.83	151.16	9.16	2.67	0.93	0.29	1.91	0.31	0.07	0.00	0.24	0.00	0.00	0.00
66137	BANKSTOWN AIRPORT AWS	NSW	-33.92	150.99	22.77	7.64	3.41	1.44	7.03	1.08	0.36	0.05	1.00	0.08	0.00	0.00
67019	PROSPECT DAM	NSW	-33.82	150.91	23.50	10.19	4.81	2.21	7.52	1.86	0.57	0.07	0.88	0.07	0.00	0.00
67033	RICHMOND RAAF	NSW	-33.60	150.78	20.65	11.02	6.09	3.83	8.85	2.70	1.07	0.30	1.56	0.28	0.06	0.00
67035	LIVERPOOL(WHITLAM CENTRE)	NSW	-33.93	150.91	24.03	9.53	4.39	2.05	8.21	1.55	0.50	0.08	1.08	0.13	0.05	0.00
68034	JERVIS BAY (POINT PERPENDIC	NSW	-35.09	150.80	6.02	0.83	0.11	0.06	0.89	0.02	0.02	0.00	0.02	0.00	0.00	0.00
68076	NOWRA RAN AIR STATION	NSW	-34.94	150.55	15.64	4.48	1.39	0.39	4.25	0.61	0.11	0.05	0.77	0.11	0.00	0.00
68102	BOWRAL (PARRY DRIVE)	NSW	-34.49	150.40	10.05	4.12	1.71	0.85	1.63	0.51	0.12	0.05	0.02	0.00	0.00	0.00
68188	WOLLONGONG UNIVERSITY	NSW	-34.40	150.88	10.89	2.65	0.62	0.27	2.51	0.11	0.03	0.03	0.30	0.00	0.00	0.00
68192	CAMDEN AIRPORT AWS	NSW	-34.04	150.69	21.57	10.31	5.77	3.31	8.57	2.26	0.94	0.14	1.69	0.20	0.00	0.00
69017	MONTAGUE ISLAND LIGHTHOUS	NSW	-36.25	150.23	1.74	0.13	0.03	0.00	0.16	0.00	0.00	0.00	0.03	0.00	0.00	0.00
69018	MORUYA HEADS PILOT STATION	NSW	-35.91	150.15	5.62	0.78	0.06	0.00	1.76	0.16	0.00	0.00	0.30	0.00	0.00	0.00
69022	NAROOMA RVCP	NSW	-36.21	150.14	1.40	0.24	0.02	0.00	0.36	0.00	0.00	0.00	0.02	0.00	0.00	0.00
69049	NERRIGA COMPOSITE	NSW	-35.12	150.08	13.31	5.94	2.92	1.58	3.19	1.11	0.28	0.06	0.00	0.00	0.00	0.00
70005	BOMBALA (THERRY STREET)	NSW	-36.91	149.24	9.93	4.48	1.98	1.12	1.86	0.57	0.10	0.05	0.02	0.00	0.00	0.00
70014	CANBERRA AIRPORT	NSW	-35.30	149.20	12.35	7.18	4.40	2.66	2.88	1.31	0.54	0.19	0.06	0.01	0.00	0.00
70080	TARALGA POST OFFICE	NSW	-34.40	149.82	8.80	4.66	2.40	1.22	1.36	0.54	0.16	0.04	0.00	0.00	0.00	0.00
70091	YASS (LINTON HOSTEL)	NSW	-34.83	148.91	14.78	9.63	6.34	4.15	4.80	2.73	1.34	0.63	0.27	0.05	0.00	0.00
70263	GOULBURN TAFE	NSW	-34.75	149.70	12.08	6.67	3.67	2.06	3.19	1.44	0.47	0.19	0.08	0.00	0.00	0.00
70278	COOMA VISITORS CENTRE	NSW	-36.23	149.12	11.00	6.21	3.56	2.24	1.62	0.56	0.06	0.06	0.00	0.00	0.00	0.00

ID and Location					Tmax>=30C				Tmax>=35C				Tmax>=40C			
Station No	Station Name	State	Latitude	Longitude	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day	1-day	2-day	3-day	4-day
71003	CHARLOTTE PASS (KOSCIUSKO	NSW	-36.43	148.33	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71032	THREDBO AWS	NSW	-36.49	148.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71041	THREDBO VILLAGE	NSW	-36.50	148.30	0.42	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71072	PERISHER VALLEY SKI CENTRE	NSW	-36.40	148.41	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72023	HUME RESERVOIR	NSW	-36.10	147.03	15.64	10.43	7.55	5.36	7.21	3.26	1.74	0.86	0.79	0.21	0.02	0.00
72043	TUMBARUMBA POST OFFICE	NSW	-35.78	148.01	9.62	5.71	3.64	2.33	1.90	0.79	0.29	0.07	0.00	0.00	0.00	0.00
72060	KHANCOBAN SMHEA	NSW	-36.23	148.14	13.41	8.66	5.81	4.16	4.09	1.94	0.81	0.34	0.22	0.03	0.00	0.00
72091	CABRAMURRA SMHEA	NSW	-35.94	148.38	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72150	WAGGA WAGGA AMO	NSW	-35.16	147.46	17.60	11.68	8.42	6.11	8.75	4.43	2.45	1.46	1.29	0.51	0.12	0.06
72151	WAGGA WAGGA (KOORINGAL)	NSW	-35.13	147.37	18.90	13.41	9.51	7.43	12.29	6.89	4.42	2.92	3.10	1.27	0.59	0.33
73007	BURRINJUCK DAM	NSW	-35.00	148.60	14.83	9.67	6.69	4.40	5.71	2.79	1.50	0.81	0.31	0.05	0.00	0.00
73009	COOTAMUNDRA POST OFFICE	NSW	-34.64	148.02	17.89	12.61	9.13	6.58	8.16	4.26	2.50	1.61	0.87	0.29	0.08	0.03
73014	GRENFELL (QUONDONG RD)	NSW	-33.90	148.17	15.62	10.93	8.21	5.83	7.88	4.17	2.48	1.60	0.93	0.29	0.12	0.05
73032	QUANDIALLA POST OFFICE	NSW	-34.01	147.79	19.26	13.48	10.05	7.67	10.26	6.31	4.02	2.88	2.26	0.98	0.36	0.19
73038	TEMORA RESEARCH STATION	NSW	-34.41	147.52	17.85	12.21	8.90	6.26	9.08	4.51	2.56	1.72	1.28	0.54	0.15	0.03
73054	WYALONG POST OFFICE	NSW	-33.93	147.24	20.83	14.05	10.38	7.79	10.79	6.52	3.95	2.62	2.14	0.88	0.43	0.14
73127	WAGGA WAGGA AGRICULTURAL	NSW	-35.05	147.35	10.08	6.74	4.81	3.52	5.61	2.82	1.60	1.03	0.92	0.31	0.06	0.03
74034	COROWA AIRPORT	NSW	-35.99	146.36	17.41	12.05	8.70	6.65	9.86	5.03	2.92	1.73	1.95	0.59	0.11	0.03
74106	TOCUMWAL AIRPORT	NSW	-35.82	145.60	21.64	14.19	10.03	7.31	12.03	6.19	3.44	1.97	2.83	1.14	0.47	0.08
74114	WAGGA WAGGA RESEARCH CE	NSW	-35.13	147.31	16.51	10.58	7.47	5.27	7.27	3.55	1.82	1.05	0.80	0.27	0.05	0.04
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.53	144.95	21.31	14.69	10.41	7.41	13.50	7.32	4.26	2.48	4.18	1.69	0.66	0.30
74148	NARRANDERA AIRPORT	NSW	-34.71	146.51	5.89	3.86	2.83	2.14	3.14	1.69	1.11	0.75	0.72	0.19	0.08	0.03
74221	NARRANDERA GOLF CLUB	NSW	-34.73	146.56	20.43	13.76	10.00	7.16	12.22	6.65	3.95	2.46	2.86	1.16	0.54	0.19
75031	HAY (MILLER STREET)	NSW	-34.52	144.85	22.78	15.58	11.40	8.44	14.36	7.74	4.58	2.92	4.00	1.48	0.78	0.20
75032	HILLSTON AIRPORT	NSW	-33.49	145.52	22.66	16.20	12.00	9.30	14.32	8.14	5.22	3.20	4.00	1.68	0.80	0.30
75039	LAKE CARGELLIGO AIRPORT	NSW	-33.28	146.37	19.71	13.69	10.33	8.00	12.62	7.50	4.62	2.90	3.67	1.62	0.71	0.33
75041	GRIFFITH AIRPORT AWS	NSW	-34.25	146.07	16.24	10.84	7.65	5.24	9.78	5.16	3.05	2.16	2.59	0.89	0.46	0.11
76031	MILDURA AIRPORT	VIC	-34.24	142.09	24.18	15.82	10.59	7.34	14.38	7.03	4.03	2.21	3.59	1.15	0.39	0.16
76047	OUYEN (POST OFFICE)	VIC	-35.07	142.32	24.16	16.28	10.76	7.80	14.50	7.86	4.18	2.28	4.30	1.64	0.78	0.28
76064	WALPEUP RESEARCH	VIC	-35.12	142.00	23.24	14.86	9.98	7.02	13.29	7.24	3.90	2.00	4.24	1.52	0.48	0.21
76077	MILDURA POST OFFICE	VIC	-34.18	142.20	24.70	16.67	11.45	7.97	16.35	9.27	5.38	3.25	5.90	2.50	1.10	0.62
77042	SWAN HILL POST OFFICE	VIC	-35.34	143.55	22.11	14.50	9.67	6.86	11.64	5.69	3.03	1.75	2.67	0.89	0.17	0.06
78031	NHILL	VIC	-36.33	141.64	19.94	12.15	7.16	4.49	10.08	4.45	2.10	1.08	2.43	0.68	0.18	0.07
78072	DONALD	VIC	-36.37	142.97	18.03	12.06	7.64	4.91	7.42	3.76	1.91	0.76	1.33	0.21	0.00	0.00
78077	WARRACKNABEAL MUSEUM	VIC	-36.26	142.41	22.05	13.39	8.82	5.89	11.55	5.61	2.95	1.37	3.16	0.95	0.24	0.03

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79023	HORSHAM POLKEMMET RD	VIC	-36.66	142.07	20.18	12.20	7.98	4.80	9.60	4.72	2.34	1.04	2.20	0.54	0.14	0.06
79028	LONGERENONG	VIC	-36.67	142.30	19.52	11.76	7.48	4.50	9.71	4.60	2.17	1.02	2.26	0.55	0.12	0.02
80015	ECHUCA AERODROME	VIC	-36.17	144.76	20.96	13.70	8.96	6.08	10.28	4.82	2.52	1.36	2.12	0.68	0.10	0.04
80023	KERANG	VIC	-35.72	143.92	21.82	14.49	9.67	6.64	11.69	5.80	3.09	1.64	3.18	1.13	0.29	0.07
80091	KYABRAM DPI	VIC	-36.34	145.06	18.76	11.36	7.40	4.81	7.93	3.36	1.36	0.71	1.21	0.29	0.05	0.00
81003	BENDIGO PRISON	VIC	-36.75	144.28	16.62	10.21	6.18	3.65	5.53	2.79	1.12	0.50	0.50	0.12	0.03	0.00
81049	TATURA INST SUSTAINABLE AG	VIC	-36.44	145.27	17.79	10.64	6.52	4.17	6.62	2.50	1.12	0.38	0.64	0.07	0.02	0.00
81084	LEMNOS (CAMPBELLS SOUP)	VIC	-36.36	145.46	18.63	11.20	7.13	4.40	7.37	3.27	1.37	0.53	1.17	0.17	0.00	0.00
82002	BENALLA (SHADFORTH STREET)	VIC	-36.55	145.97	17.53	11.84	8.35	5.86	7.29	3.61	1.92	1.00	0.71	0.16	0.02	0.00
82011	CORRYONG (PARISH LANE)	VIC	-36.20	147.90	14.88	10.15	7.67	5.42	5.76	2.97	1.67	0.91	0.33	0.06	0.00	0.00
82039	RUTHERGLEN RESEARCH	VIC	-36.10	146.51	16.00	10.78	7.89	5.87	7.86	4.03	2.15	1.19	1.20	0.35	0.08	0.02
82042	STRATHBOGIE	VIC	-36.85	145.73	11.82	6.94	3.91	2.33	3.03	0.97	0.33	0.09	0.03	0.00	0.00	0.00
82053	WANGARATTA	VIC	-36.37	146.30	17.62	11.62	8.24	5.86	8.00	4.00	2.28	1.21	1.00	0.31	0.00	0.00
82076	DARTMOUTH RESERVOIR	VIC	-36.54	147.50	13.41	8.59	5.53	3.69	3.84	1.56	0.81	0.41	0.09	0.00	0.00	0.00
83025	OMEO COMPARISON	VIC	-37.10	147.60	9.58	4.66	2.48	1.22	1.26	0.32	0.14	0.04	0.02	0.02	0.00	0.00
84016	GABO ISLAND LIGHTHOUSE	VIC	-37.57	149.92	1.12	0.08	0.02	0.00	0.20	0.02	0.00	0.00	0.02	0.00	0.00	0.00
84030	ORBOST (COMPARISON)	VIC	-37.69	148.46	16.34	6.42	2.06	0.74	5.50	1.08	0.22	0.06	0.78	0.06	0.02	0.00
84070	POINT HICKS (LIGHTHOUSE)	VIC	-37.80	149.27	8.39	2.00	0.34	0.07	1.46	0.15	0.00	0.00	0.07	0.00	0.00	0.00
84083	LAKES ENTRANCE	VIC	-37.87	148.00	10.50	2.73	0.63	0.13	3.30	0.40	0.03	0.03	0.50	0.00	0.00	0.00
85072	EAST SALE AIRPORT	VIC	-38.12	147.13	13.73	4.08	1.15	0.35	4.29	0.79	0.18	0.03	0.45	0.02	0.00	0.00
85096	WILSONS PROMONTORY LIGHTH	VIC	-39.13	146.42	4.22	1.40	0.20	0.06	1.02	0.10	0.04	0.02	0.06	0.00	0.00	0.00
85106	OLSENS BRIDGE (MORWELL RIV	VIC	-38.49	146.32	9.38	3.47	1.26	0.56	2.50	0.62	0.15	0.00	0.12	0.00	0.00	0.00
85279	BAIRNSDALE AIRPORT	VIC	-37.88	147.57	6.19	1.88	0.63	0.23	2.42	0.42	0.11	0.00	0.38	0.03	0.00	0.00
86017	CAPE SCHANCK LIGHTHOUSE	VIC	-38.49	144.89	6.97	2.00	0.49	0.14	1.86	0.34	0.09	0.00	0.03	0.00	0.00	0.00
86038	ESSENDON AIRPORT	VIC	-37.73	144.91	9.51	3.90	1.56	0.60	3.47	1.15	0.37	0.13	0.47	0.12	0.03	0.00
86071	MELBOURNE REGIONAL OFFICE	VIC	-37.81	144.97	17.79	7.41	2.78	1.10	6.88	2.10	0.62	0.21	1.05	0.18	0.05	0.01
86077	MOORABBIN AIRPORT	VIC	-37.98	145.10	16.03	6.67	2.28	0.81	6.06	1.86	0.44	0.06	0.75	0.11	0.00	0.00
86104	SCORESBY RESEARCH INSTITUT	VIC	-37.87	145.26	14.74	7.26	2.74	1.31	4.76	1.52	0.38	0.12	0.43	0.05	0.00	0.00
86127	WONTHAGGI	VIC	-38.61	145.60	11.95	4.10	1.21	0.56	3.33	0.59	0.21	0.03	0.28	0.00	0.00	0.00
86142	TOOLANGI (MOUNT ST LEONARD	VIC	-37.57	145.50	6.24	2.17	0.83	0.22	0.59	0.15	0.00	0.00	0.02	0.00	0.00	0.00
86282	MELBOURNE AIRPORT	VIC	-37.67	144.83	17.46	7.92	3.05	1.43	6.65	2.16	0.51	0.11	0.97	0.14	0.00	0.00
87021	DURDIDWARRAH	VIC	-37.82	144.21	10.89	4.23	1.77	0.77	2.54	0.77	0.20	0.00	0.06	0.00	0.00	0.00
87031	LAVERTON RAAF	VIC	-37.86	144.76	16.16	6.27	2.17	0.88	6.61	1.86	0.52	0.14	1.09	0.16	0.02	0.00
87036	MACEDON FORESTRY	VIC	-37.42	144.56	9.10	3.93	1.59	0.72	2.07	0.55	0.07	0.00	0.00	0.00	0.00	0.00
88023	LAKE EILDON	VIC	-37.23	145.91	16.05	9.84	6.00	3.95	4.95	2.11	0.81	0.43	0.32	0.03	0.00	0.00

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88043	MARYBOROUGH	VIC	-37.06	143.73	17.62	10.93	6.40	3.71	6.79	3.26	1.38	0.57	0.86	0.14	0.02	0.02
88068	RUBICON SEC	VIC	-37.34	145.85	3.46	1.60	0.74	0.34	0.14	0.03	0.00	0.00	0.00	0.00	0.00	0.00
88109	MANGALORE AIRPORT	VIC	-36.89	145.18	18.06	10.40	6.27	3.81	7.50	3.00	1.38	0.56	1.23	0.19	0.00	0.00
88110	CASTLEMAINE PRISON	VIC	-37.08	144.24	15.76	9.20	5.34	3.17	5.27	2.32	0.85	0.41	0.46	0.05	0.00	0.00
89002	BALLARAT AERODROME	VIC	-37.51	143.79	11.72	5.96	2.62	1.30	3.06	1.06	0.26	0.10	0.22	0.02	0.02	0.00
89018	LISMORE (POST OFFICE)	VIC	-37.95	143.34	14.28	7.08	3.00	1.31	4.97	2.11	0.58	0.17	0.61	0.06	0.03	0.00
89085	ARARAT PRISON	VIC	-37.28	142.98	15.21	8.05	4.34	2.11	5.29	1.89	0.58	0.13	0.37	0.05	0.00	0.00
90014	CAPE NELSON LIGHTHOUSE CO	VIC	-38.43	141.54	6.76	1.62	0.38	0.05	2.31	0.21	0.00	0.00	0.14	0.00	0.00	0.00
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.86	143.51	7.27	1.88	0.49	0.13	2.12	0.37	0.05	0.02	0.24	0.02	0.00	0.00
90048	HEYWOOD FORESTRY	VIC	-38.14	141.63	13.26	4.81	1.64	0.64	5.21	1.43	0.31	0.07	0.76	0.12	0.00	0.00
90103	HAMILTON RESEARCH STATION	VIC	-37.83	142.06	13.56	6.65	3.09	1.26	4.76	1.71	0.35	0.12	0.68	0.06	0.00	0.00
90135	CASTERTON SHOWGROUNDS	VIC	-37.59	141.41	16.92	8.78	4.38	2.18	7.22	2.56	0.96	0.40	1.22	0.24	0.08	0.00
91009	BURNIE (ROUND HILL)	TAS	-41.07	145.94	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91049	LAUNCESTON (PUMPING STATIC	TAS	-41.50	147.20	2.80	0.91	0.37	0.20	0.25	0.04	0.01	0.00	0.00	0.00	0.00	0.00
91057	LOW HEAD (COMPARISON)	TAS	-41.06	146.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91080	QUOIBA	TAS	-41.21	146.35	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91091	SHEFFIELD	TAS	-41.38	146.33	0.88	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91092	SMITHTON (GRANT STREET)	TAS	-40.85	145.11	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91104	LAUNCESTON AIRPORT COMPAF	TAS	-41.54	147.20	2.38	0.74	0.31	0.10	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91107	WYNYARD AIRPORT	TAS	-41.00	145.73	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91112	WYNYARD (JACKSON STREET)	TAS	-40.99	145.73	0.26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91119	ERRIBA (CRADLE MOUNTAIN RO	TAS	-41.45	146.11	0.41	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91186	FORTHSIDE RESEARCH STATIOI	TAS	-41.20	146.27	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91219	SCOTTSDALE (WEST MINSTONE	TAS	-41.17	147.49	2.36	0.61	0.11	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91223	MARRAWAH	TAS	-40.91	144.71	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92003	BICHENO (COUNCIL DEPOT)	TAS	-41.87	148.30	1.43	0.12	0.00	0.00	0.38	0.02	0.00	0.00	0.00	0.00	0.00	0.00
92027	ORFORD (AUBIN COURT)	TAS	-42.55	147.88	3.13	0.33	0.00	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92033	ST HELENS POST OFFICE	TAS	-41.32	148.25	4.72	0.98	0.14	0.09	0.81	0.12	0.00	0.00	0.00	0.00	0.00	0.00
92038	SWANSEA POST OFFICE	TAS	-42.12	148.08	4.24	0.48	0.04	0.00	1.04	0.06	0.00	0.00	0.02	0.00	0.00	0.00
92045	EDDYSTONE POINT	TAS	-40.99	148.35	0.80	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92094	SCAMANDER	TAS	-41.46	148.26	2.76	0.27	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93014	OATLANDS POST OFFICE	TAS	-42.30	147.37	2.58	0.67	0.14	0.08	0.36	0.03	0.00	0.00	0.00	0.00	0.00	0.00
94008	HOBART AIRPORT	TAS	-42.83	147.50	5.61	1.02	0.18	0.04	1.27	0.08	0.00	0.00	0.04	0.00	0.00	0.00
94010	CAPE BRUNY LIGHTHOUSE	TAS	-43.49	147.15	1.80	0.12	0.00	0.00	0.26	0.02	0.00	0.00	0.00	0.00	0.00	0.00
94027	HASTINGS CHALET	TAS	-43.41	146.87	3.10	0.33	0.03	0.00	0.50	0.07	0.00	0.00	0.00	0.00	0.00	0.00

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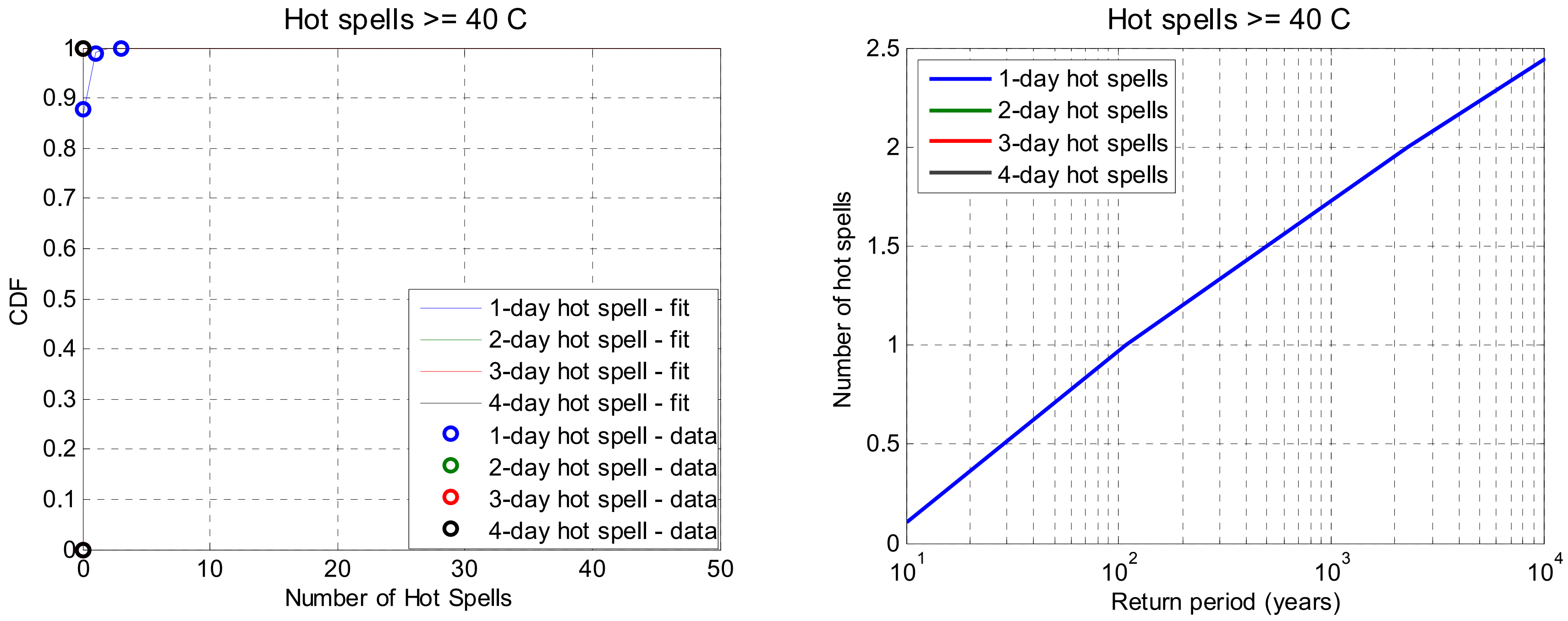
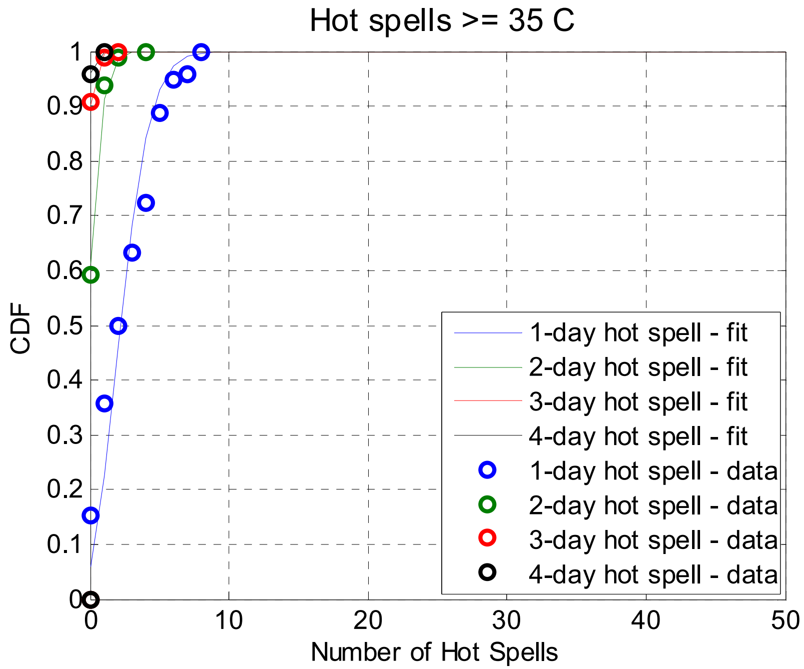
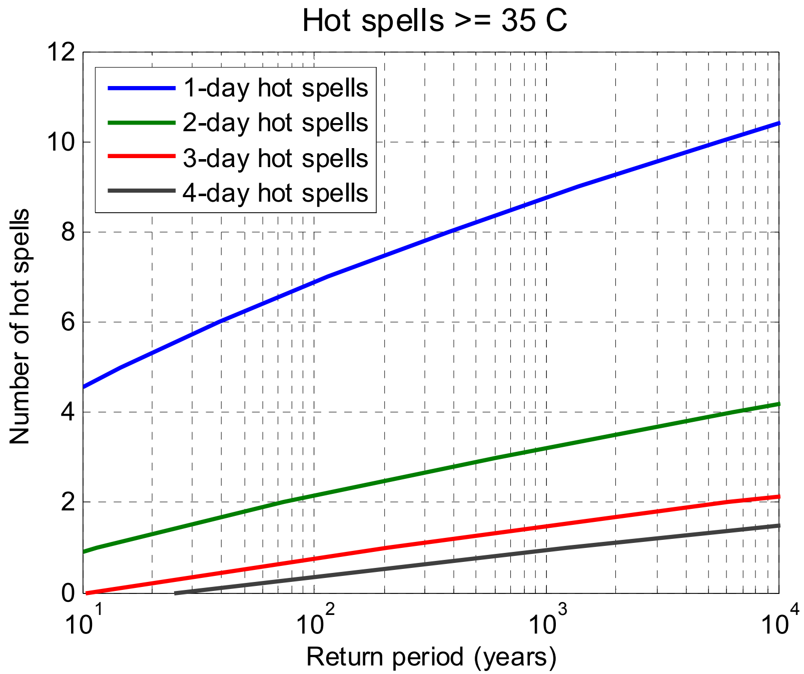
94029	HOBART (ELLERSLIE ROAD)	TAS	-42.89	147.33	4.74	0.76	0.12	0.02	0.96	0.06	0.01	0.00	0.05	0.01	0.00	0.00
94041	MAATSUYKER ISLAND LIGHTHOU	TAS	-43.66	146.27	0.82	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94069	GROVE (COMPARISON)	TAS	-42.98	147.08	5.69	1.38	0.25	0.09	1.20	0.15	0.00	0.00	0.04	0.00	0.00	0.00
94087	MOUNT WELLINGTON	TAS	-42.90	147.24	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94137	GEEVESTON (CEMETERY ROAD)	TAS	-43.16	146.92	3.08	0.67	0.08	0.03	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95003	BUSHY PARK (BUSHY PARK EST	TAS	-42.71	146.90	7.34	2.54	0.84	0.32	1.48	0.14	0.04	0.00	0.00	0.00	0.00	0.00
96003	BUTLERS GORGE	TAS	-42.28	146.28	1.19	0.33	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96015	LAKE ST CLAIR (HEC)	TAS	-42.10	146.22	0.77	0.13	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97014	WARATAH (MOUNT ROAD)	TAS	-41.44	145.53	0.34	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97034	QUEENSTOWN (7XS)	TAS	-42.10	145.54	4.34	1.28	0.31	0.17	0.45	0.07	0.00	0.00	0.00	0.00	0.00	0.00
97053	STRATHGORDON VILLAGE	TAS	-42.77	146.05	2.38	0.43	0.11	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98001	CURRIE POST OFFICE	TAS	-39.93	143.85	2.60	0.40	0.05	0.00	0.40	0.03	0.00	0.00	0.00	0.00	0.00	0.00
99005	FLINDERS ISLAND AIRPORT	TAS	-40.09	148.00	4.09	0.76	0.16	0.00	0.69	0.11	0.00	0.00	0.00	0.00	0.00	0.00
200283	WILLIS ISLAND	QLD	-16.29	149.97	18.00	11.43	8.29	6.67	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200284	COCOS ISLAND AIRPORT	WA	-12.19	96.83	21.24	11.87	7.80	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200288	NORFOLK ISLAND AERO	NSW	-29.04	167.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200440	LORD HOWE ISLAND	NSW	-31.55	159.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200790	CHRISTMAS ISLAND AERO	WA	-10.45	105.69	1.57	0.63	0.31	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300000	DAVIS	ANT	-68.58	77.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300001	MAWSON	ANT	-67.60	62.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300004	MACQUARIE ISLAND	ANT	-54.50	158.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300005	HEARD ISLAND (ATLAS COVE)	ANT	-53.02	73.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

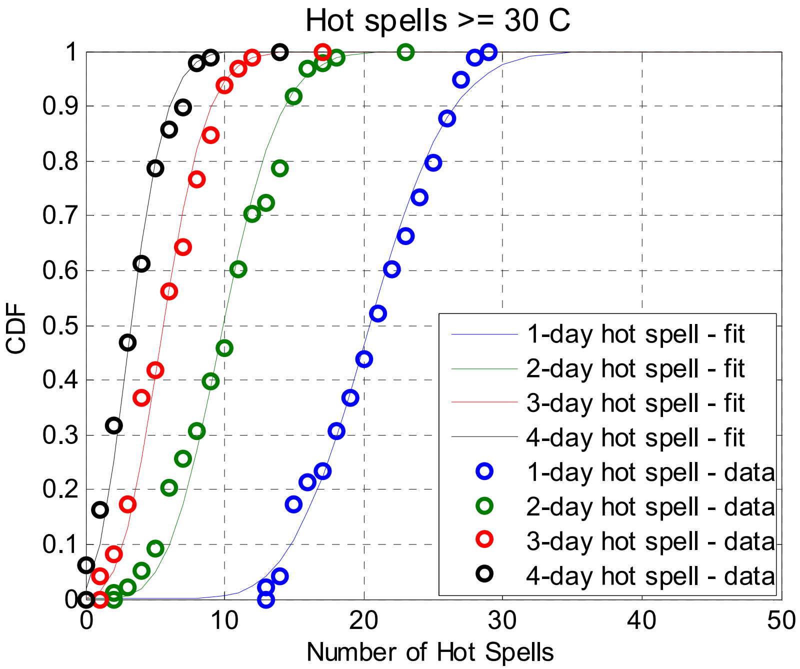
APPENDIX C – PROBABILISTIC MODEL FITTING AND RETURN PERIOD FOR YEARLY TOTAL NUMBER OF HOT SPELLS IN SOUTH EAST QUEENSLAND

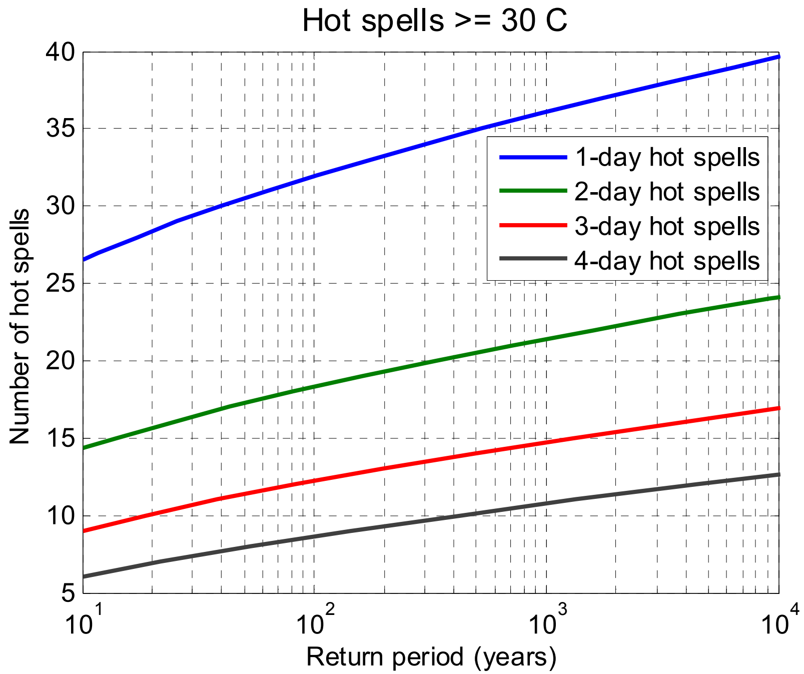
BRISBANE REGIONAL OFFICE - 40214



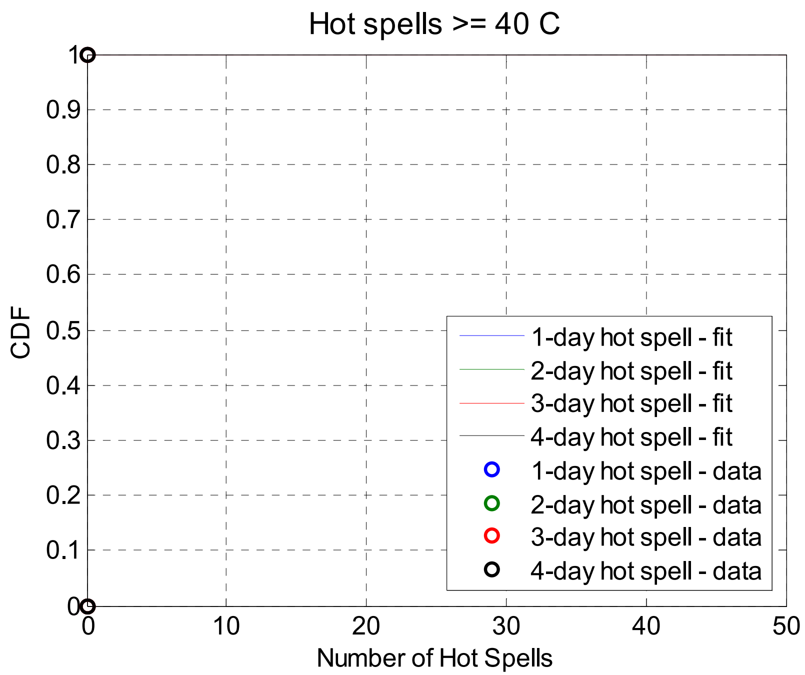

Hot spells >= 35 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data
0
10
20
30
40
50
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

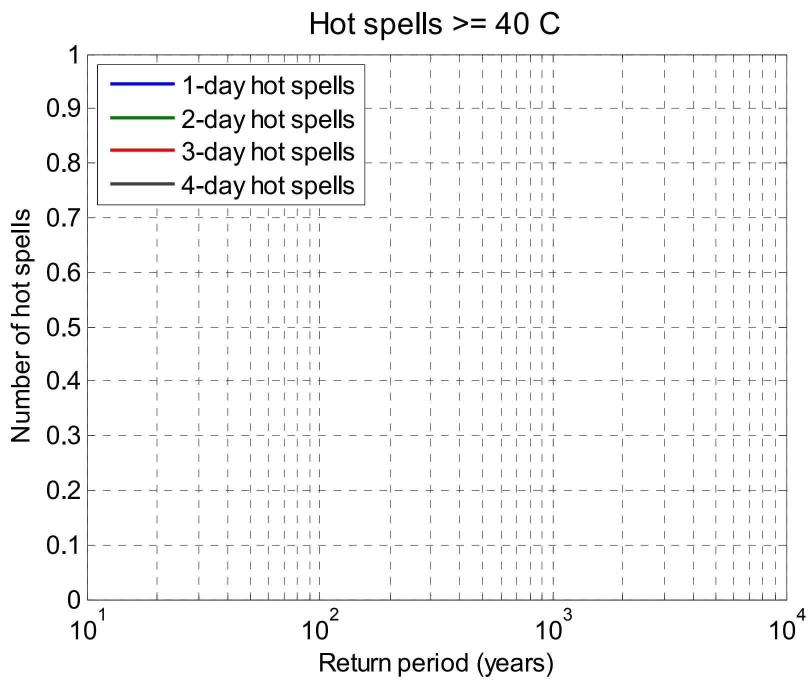

Hot spells >= 35 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells
0
2
4
6
8
10
12
10^1
10^2
10^3
10^4

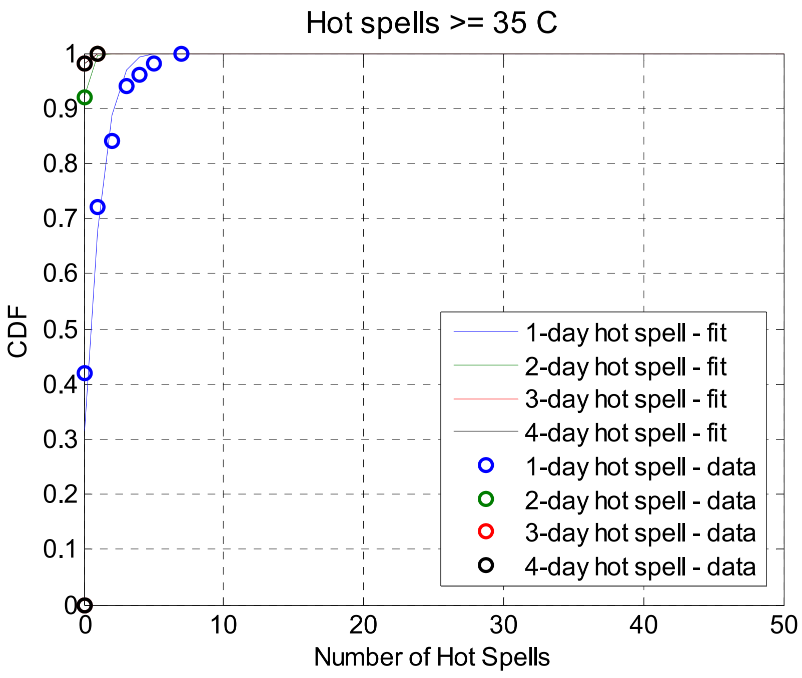

Hot spells >= 30 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

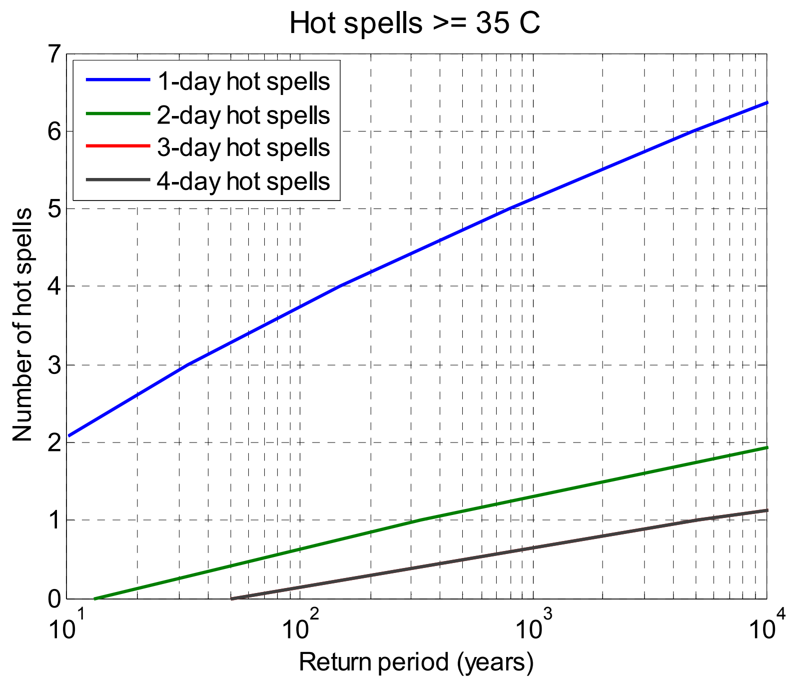

Hot spells >= 30 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

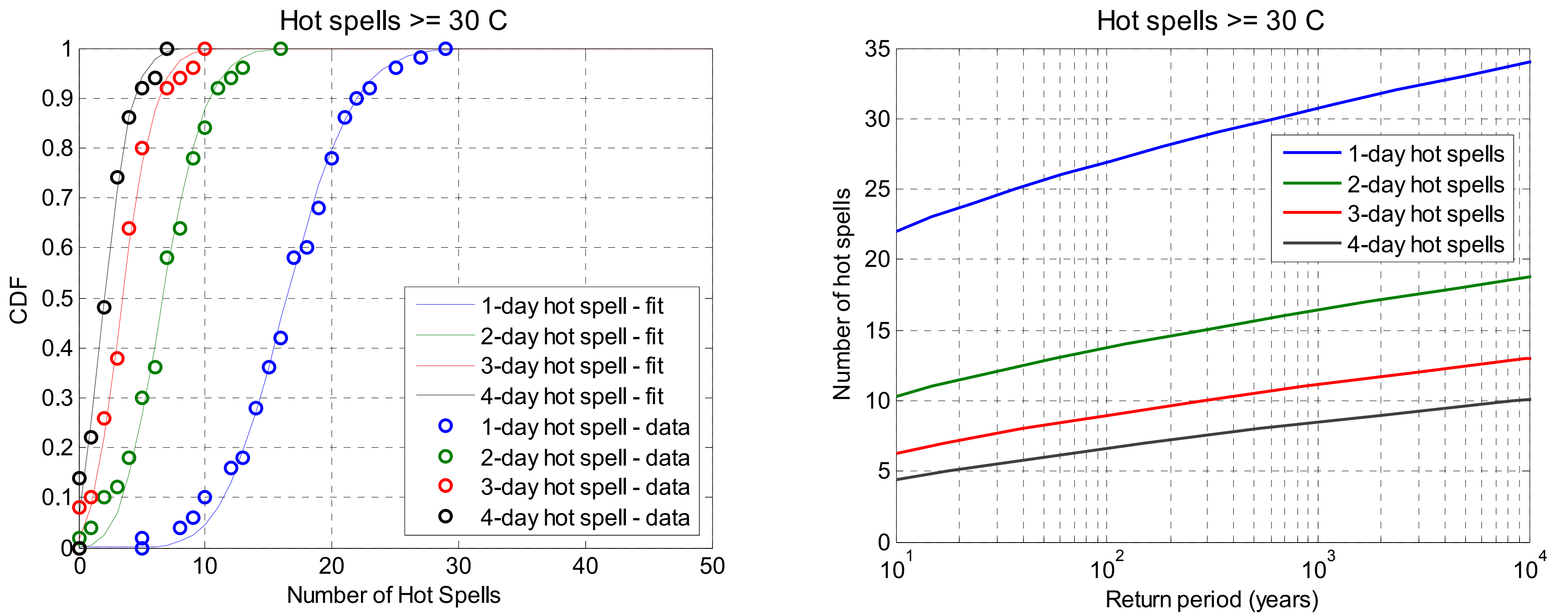
BRISBANE AERO – 40223



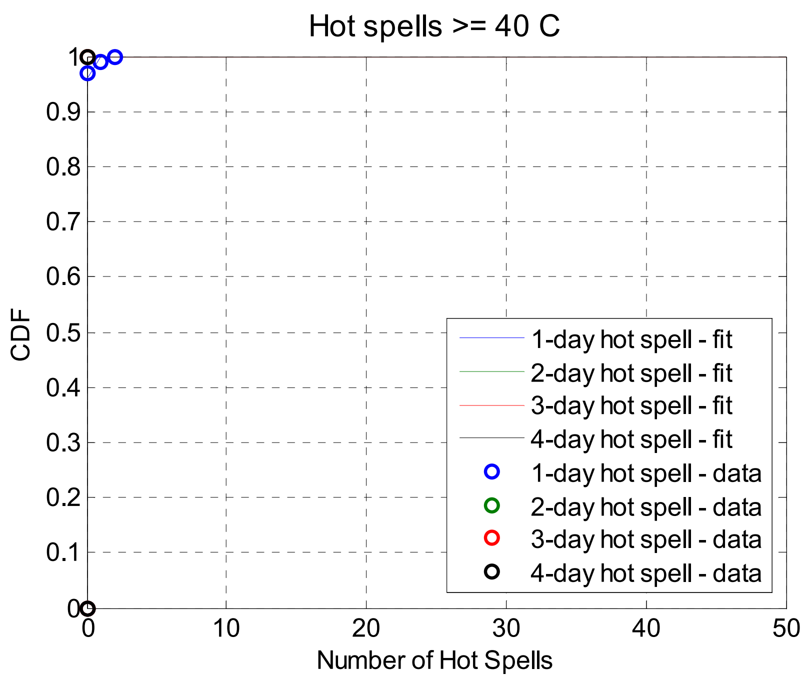


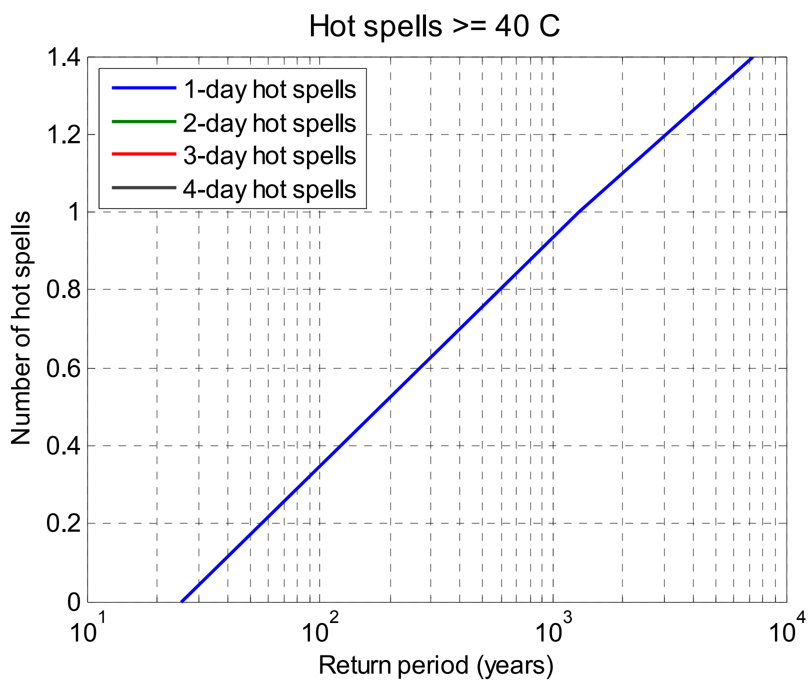

Hot spells >= 35 C
CDF
Number of Hot Spells
0
10
20
30
40
50
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

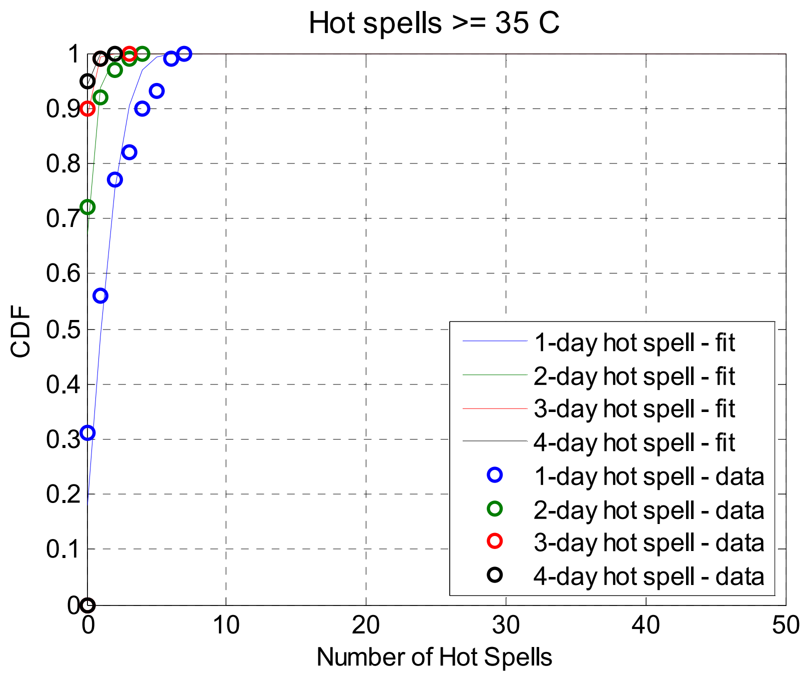

Hot spells >= 35 C
Number of hot spells
Return period (years)
10^1
10^2
10^3
10^4
0
1
2
3
4
5
6
7
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

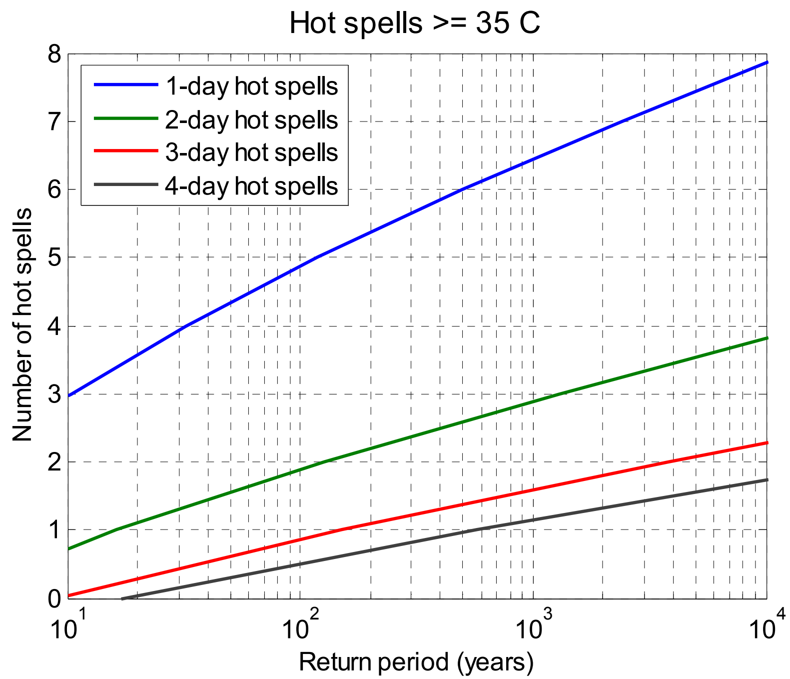

Hot spells >= 30 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data
Hot spells >= 30 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

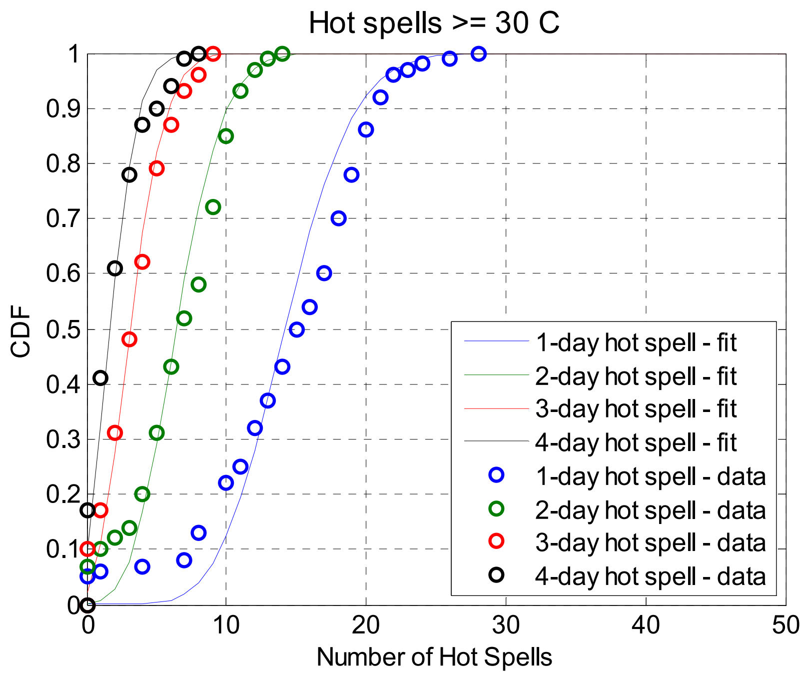
TEWANTIN POST OFFICE – 40264

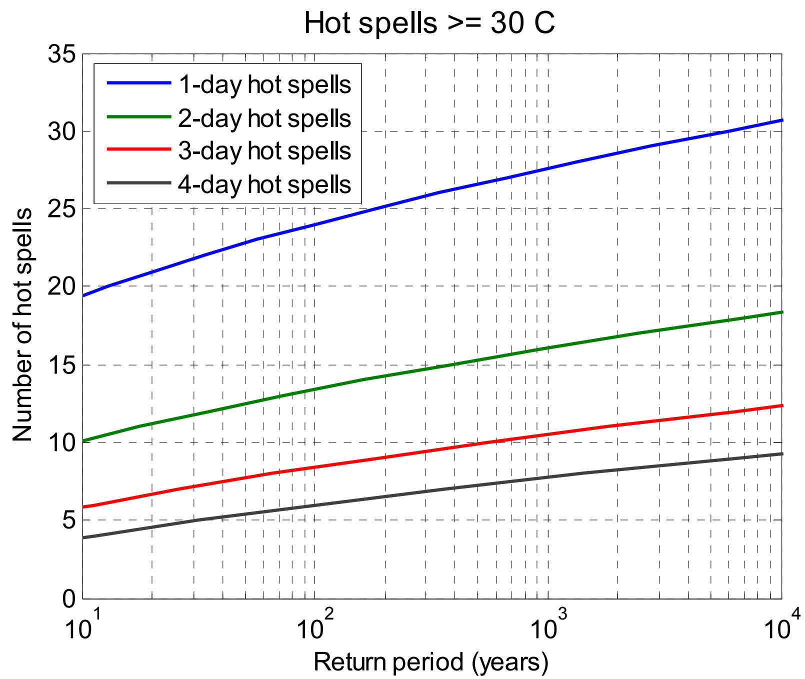




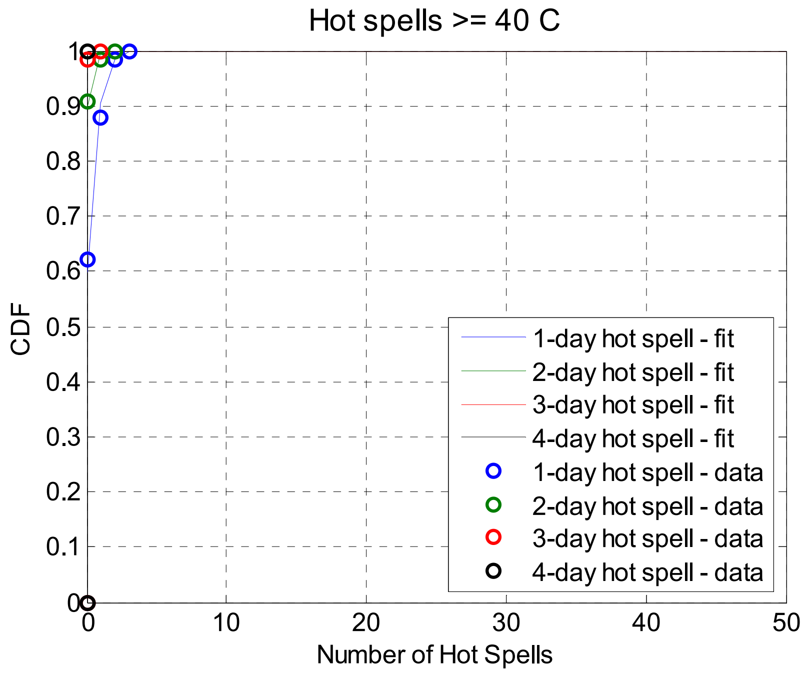

Hot spells >= 35 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

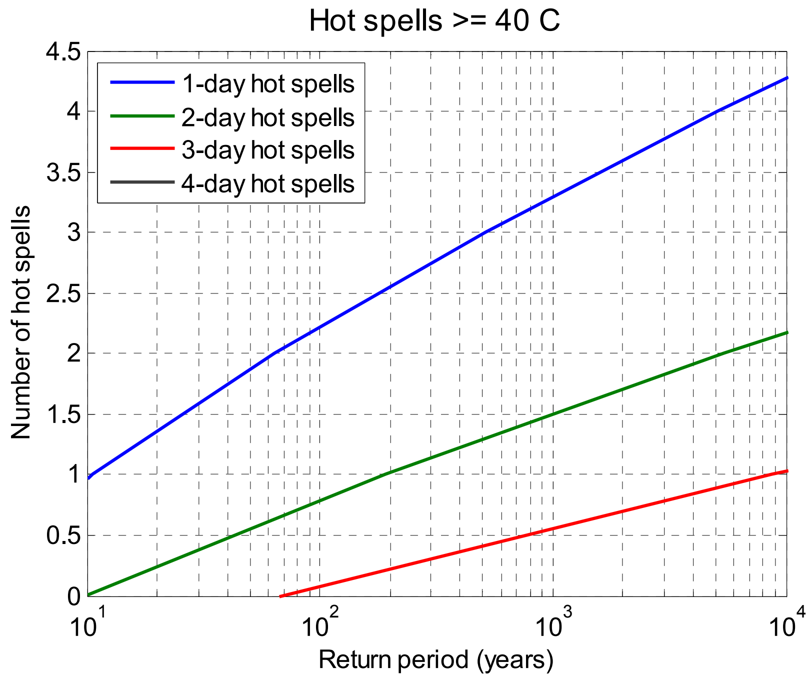

Hot spells >= 35 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

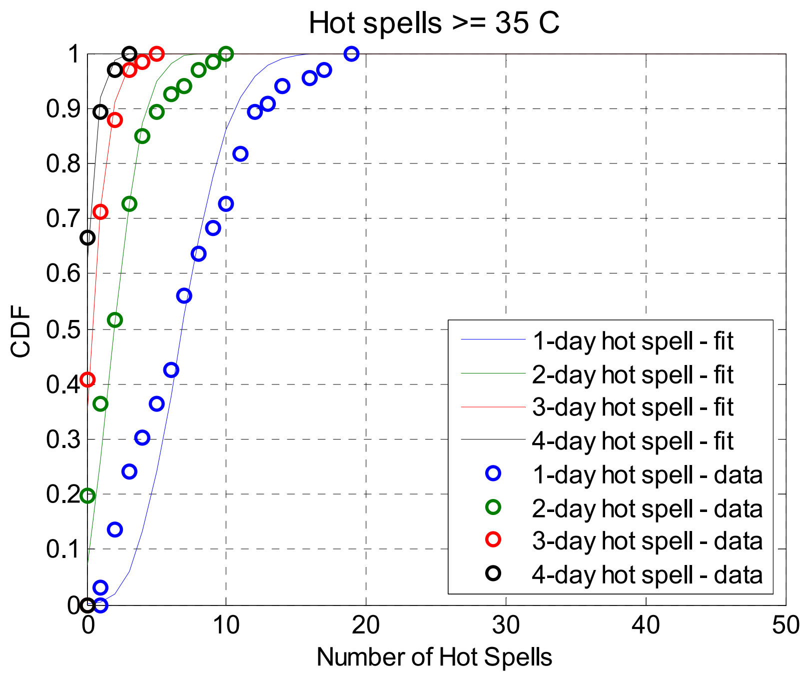

Hot spells >= 30 C
CDF
Number of Hot Spells
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

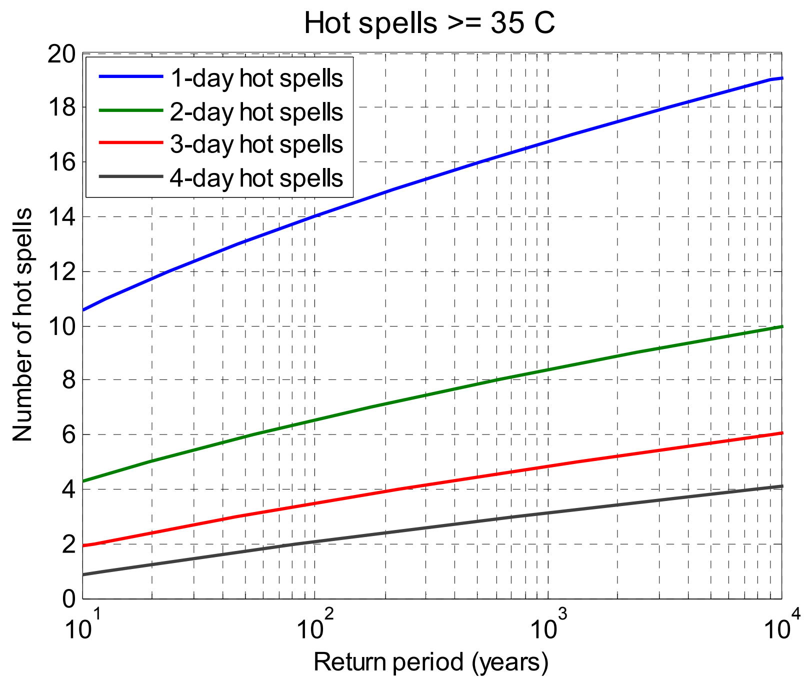

Hot spells >= 30 C
Number of hot spells
Return period (years)
0
5
10
15
20
25
30
35
10^1
10^2
10^3
10^4
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

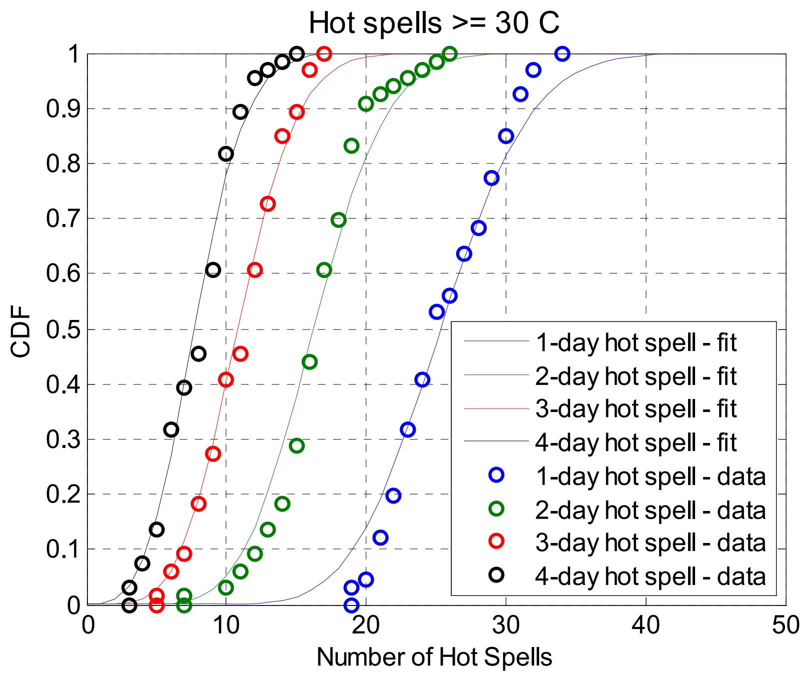
AMBERLEY AMO – 40004

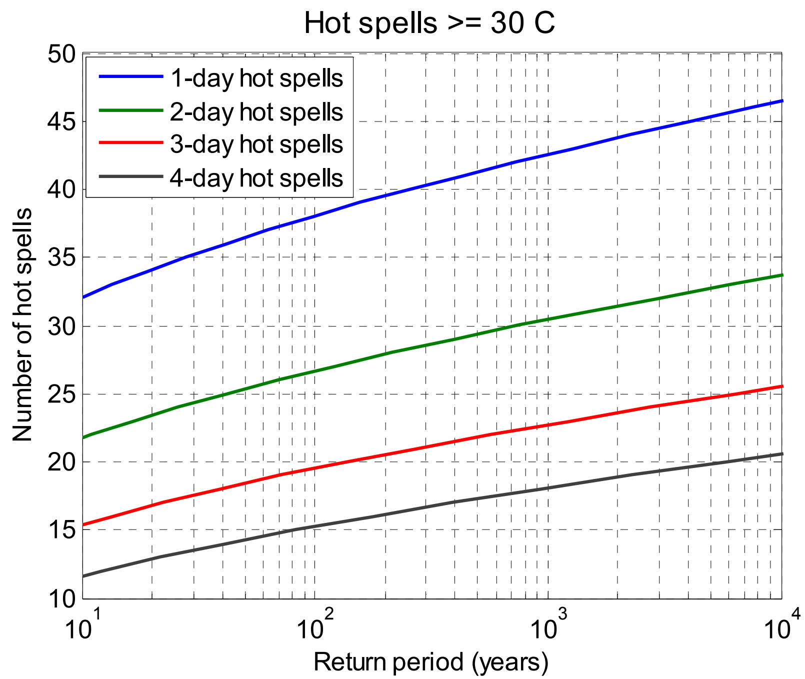




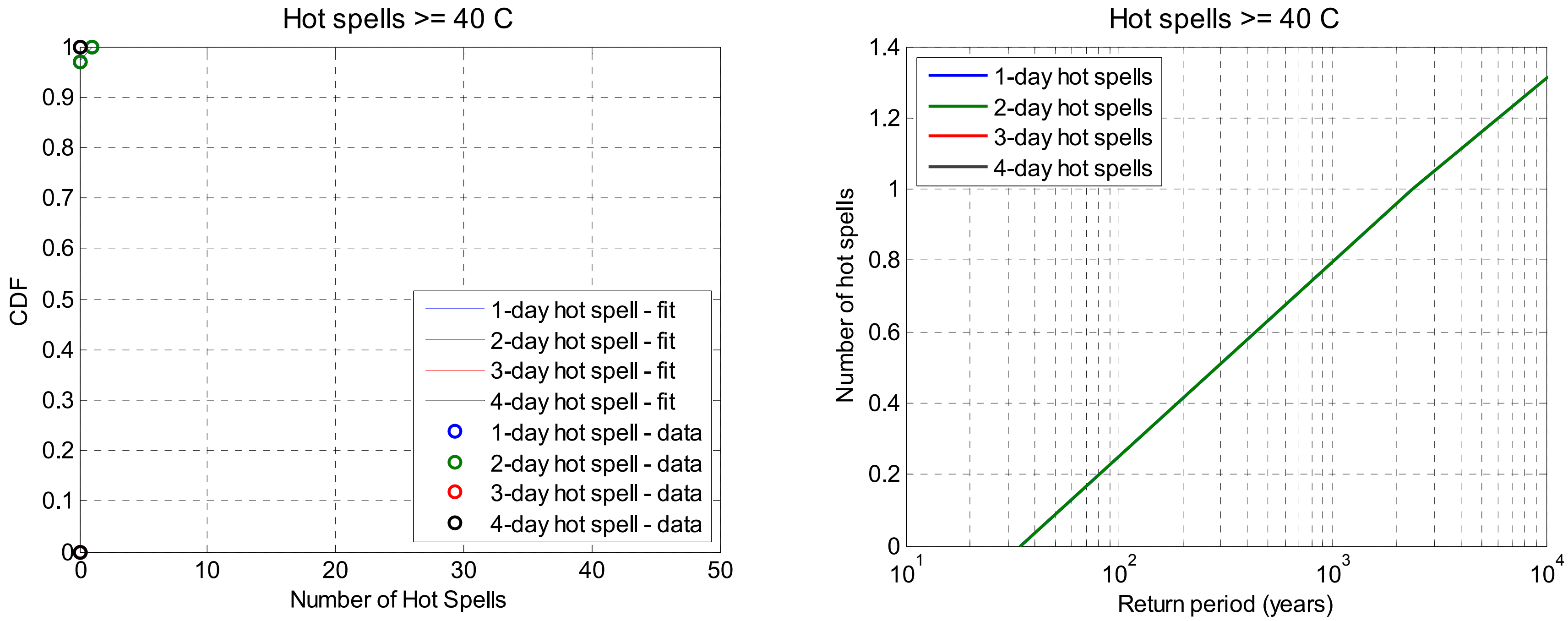

Hot spells >= 35 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

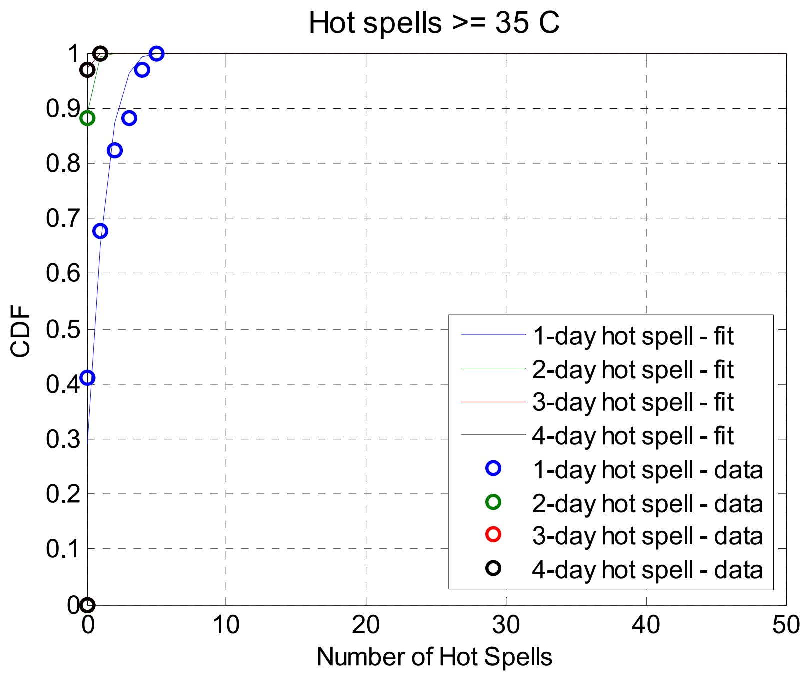

Hot spells >= 35 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

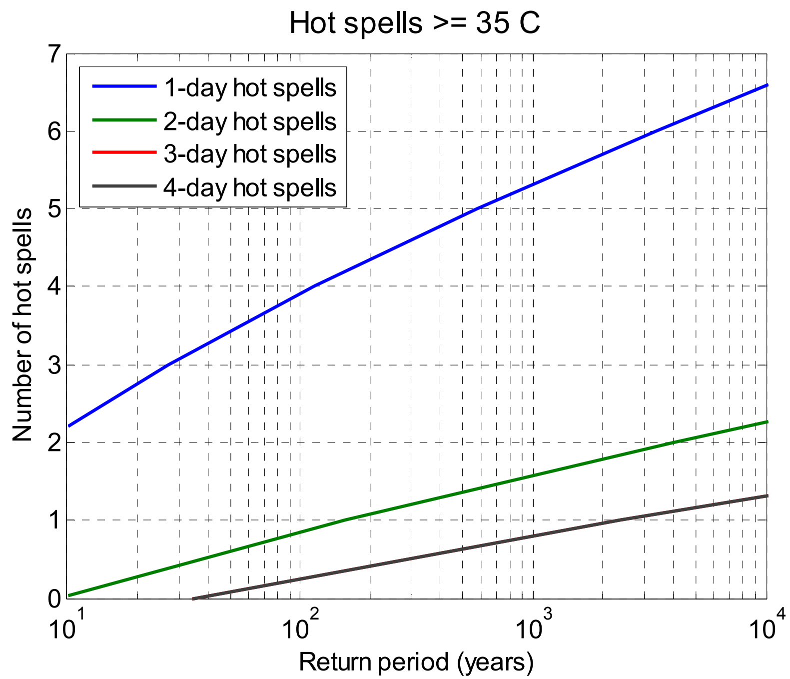

Hot spells >= 30 C
CDF
Number of Hot Spells
0
10
20
30
40
50
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

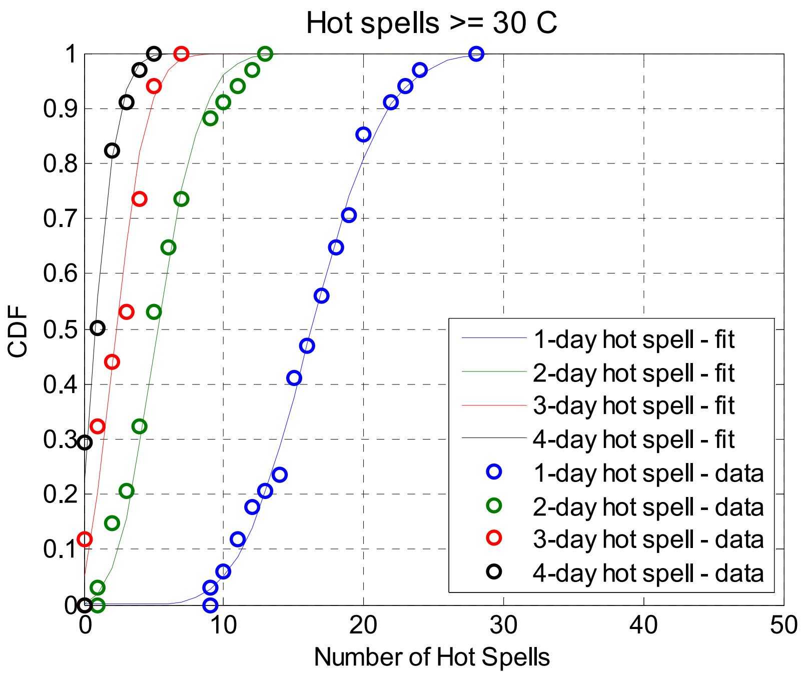

Hot spells >= 30 C
Number of hot spells
Return period (years)
10
15
20
25
30
35
40
45
50
10^1
10^2
10^3
10^4
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

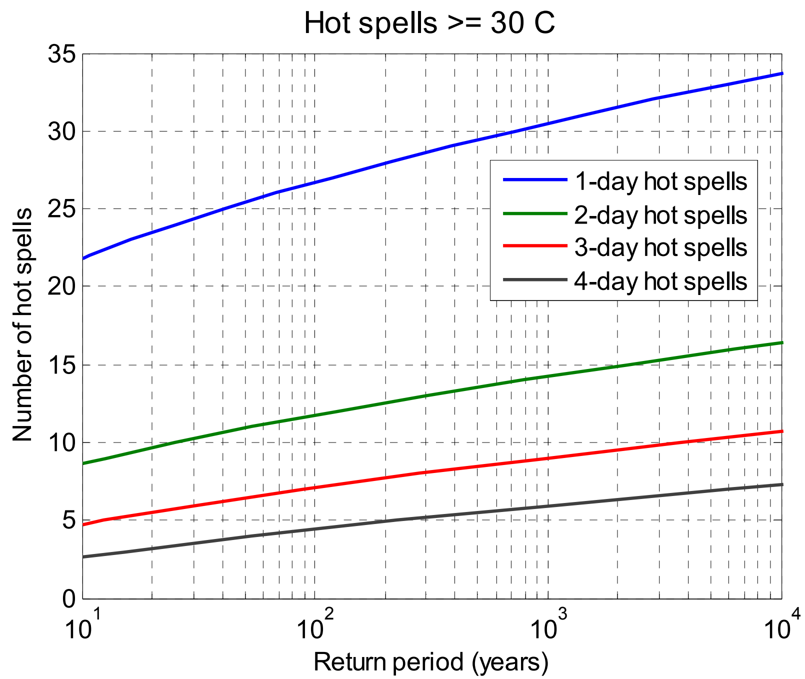
SOUTHPORT RIDGEWAY AVE – 40190



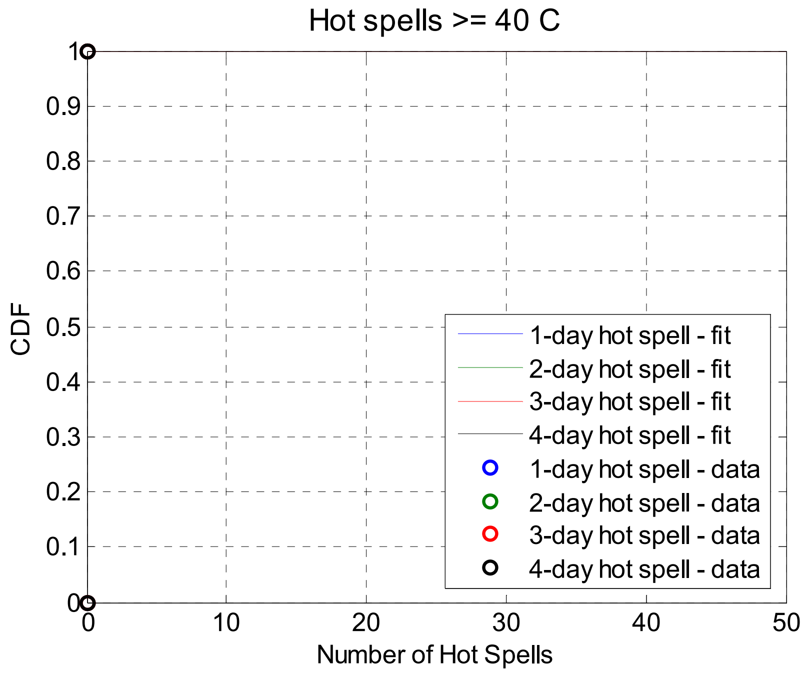

Hot spells >= 35 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

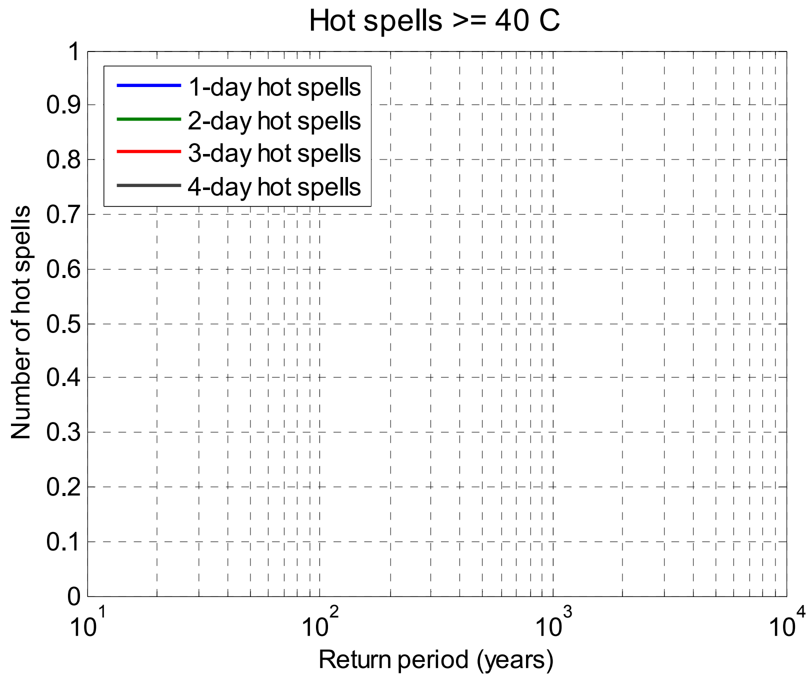

Hot spells >= 35 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

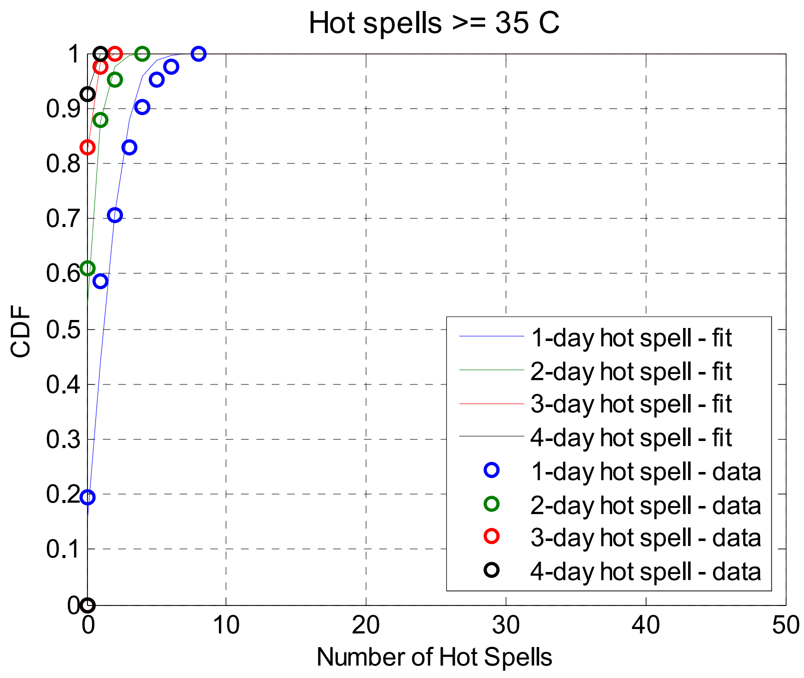

Hot spells >= 30 C
CDF
Number of Hot Spells
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data

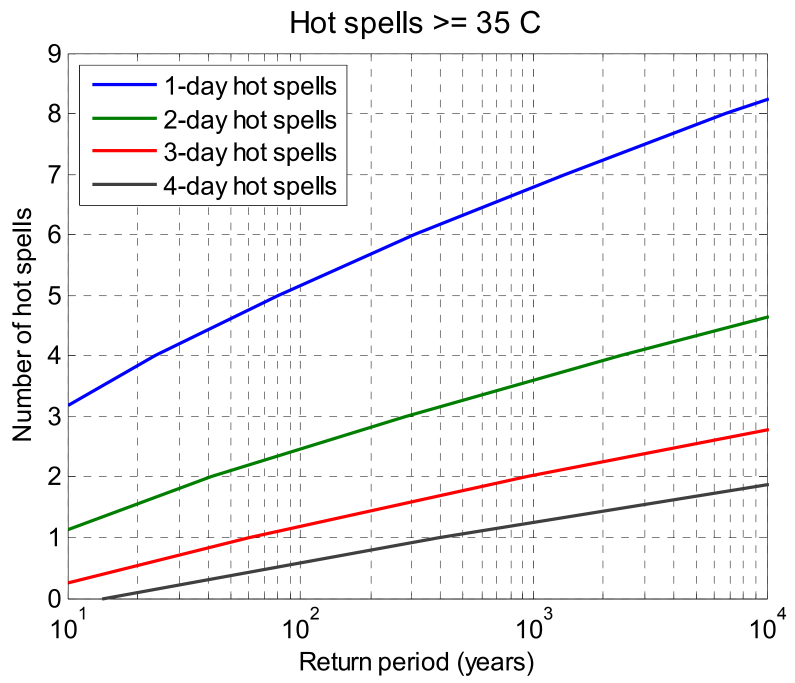

Hot spells >= 30 C
Number of hot spells
Return period (years)
0
5
10
15
20
25
30
35
10^1
10^2
10^3
10^4
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells

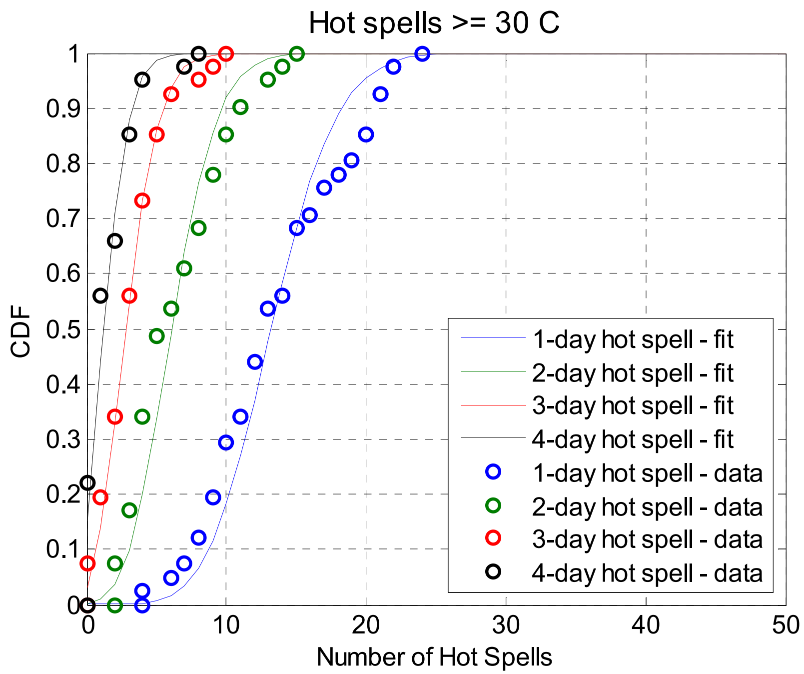
TOOWOOMBA – 41103

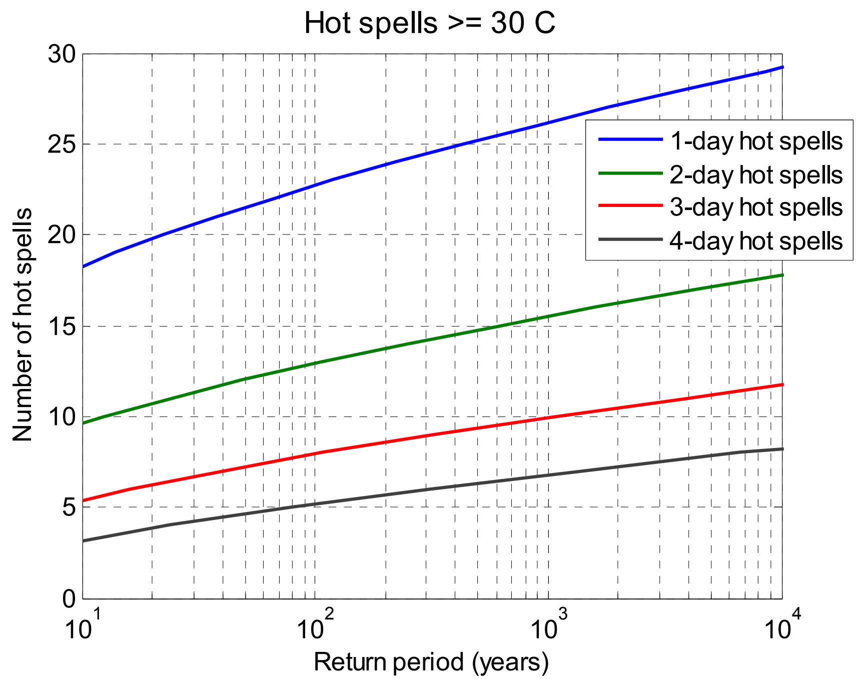





Hot spells >= 35 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data


Hot spells >= 35 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells


Hot spells >= 30 C
CDF
Number of Hot Spells
1-day hot spell - fit
2-day hot spell - fit
3-day hot spell - fit
4-day hot spell - fit
1-day hot spell - data
2-day hot spell - data
3-day hot spell - data
4-day hot spell - data
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50


Hot spells >= 30 C
Number of hot spells
Return period (years)
1-day hot spells
2-day hot spells
3-day hot spells
4-day hot spells
0
5
10
15
20
25
30
10^1
10^2
10^3
10^4

APPENDIX D – CONTOUR FREQUENCY MAPS OF THE YEARLY NUMBER OF HOT DAYS

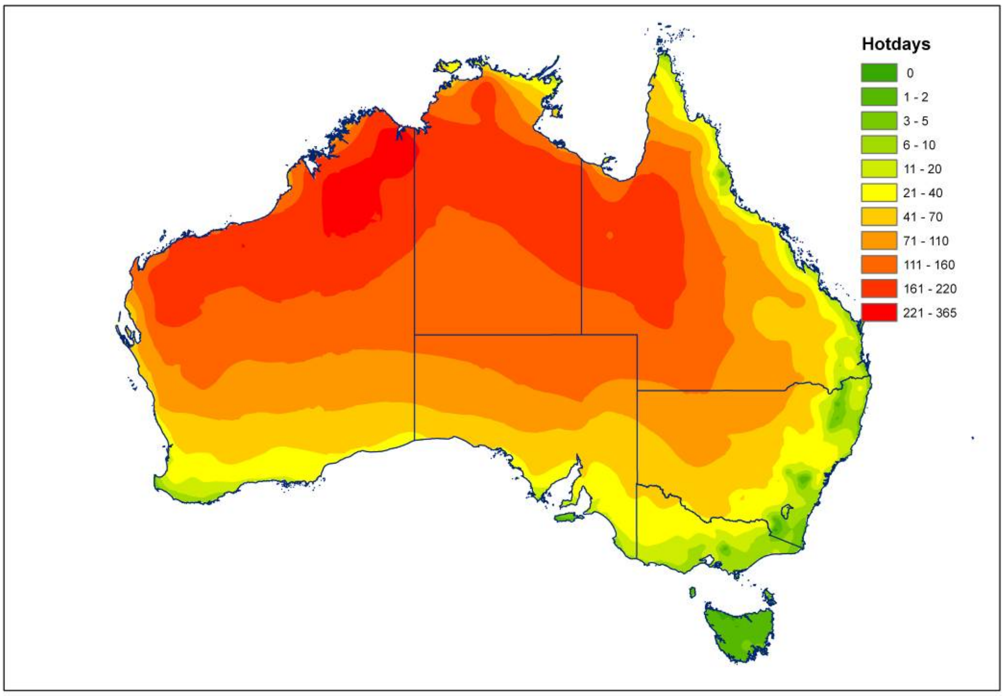


Figure D.1 – Contour map of the yearly number of hot days with maximum temperature threshold of 35°C at 10-year return period

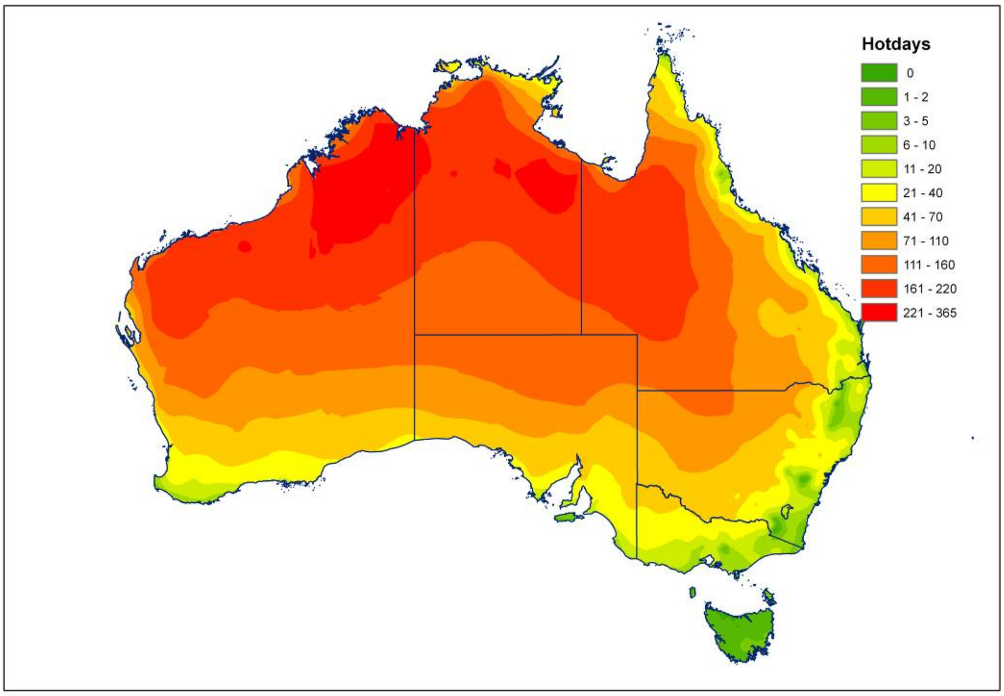


Figure D.2 – Contour map of the yearly number of hot days with maximum temperature threshold of 35°C at 20-year return period

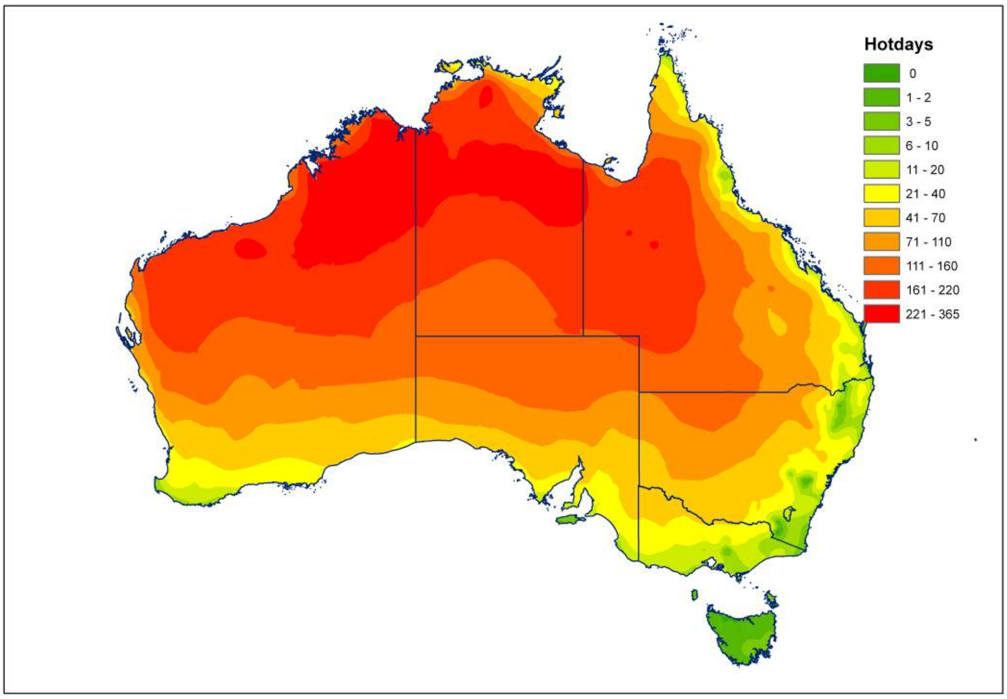


Figure D.3 – Contour map of the yearly number of hot days with maximum temperature threshold of 35°C at 50-year return period

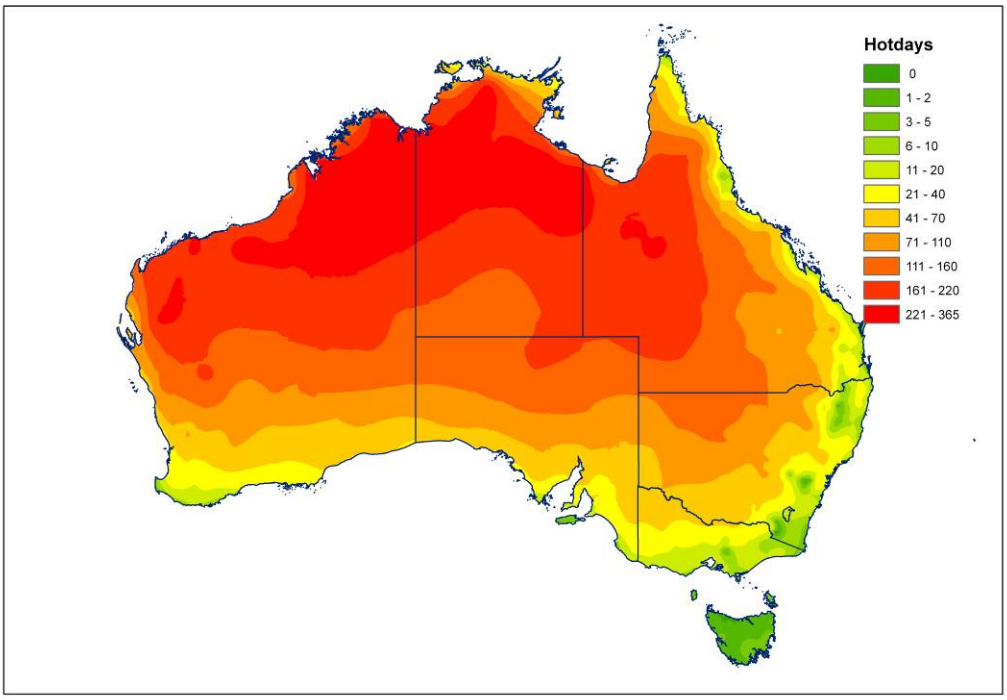


Figure D.4 – Contour map of the yearly number of hot days with maximum temperature threshold of 35°C at 100-year return period

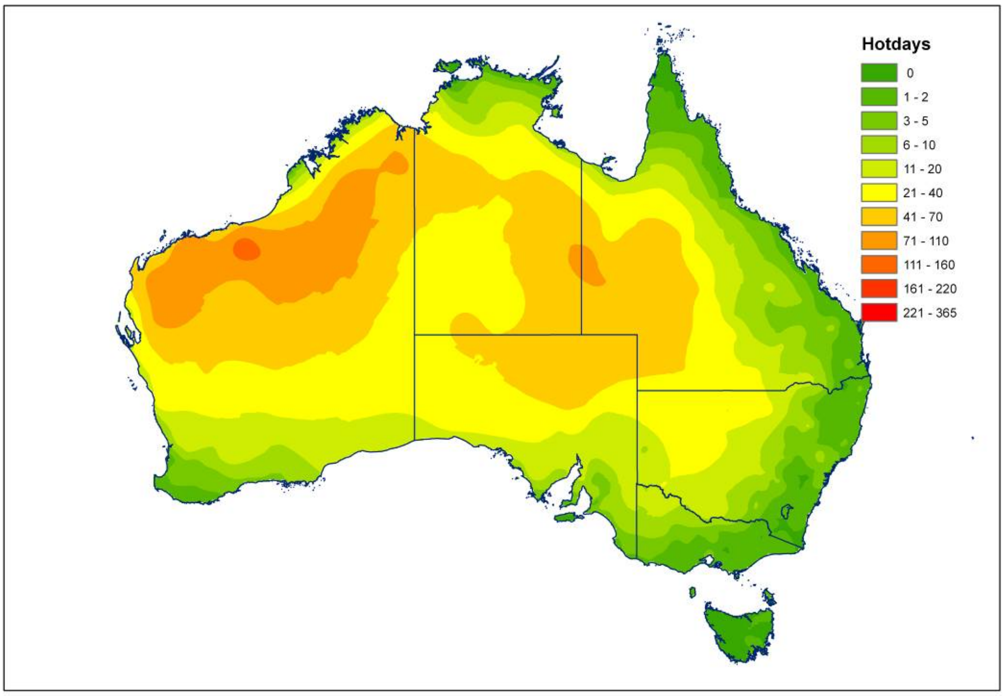


Figure D.5 – Contour map of the yearly number of hot days with maximum temperature threshold of 40°C at 10-year return period

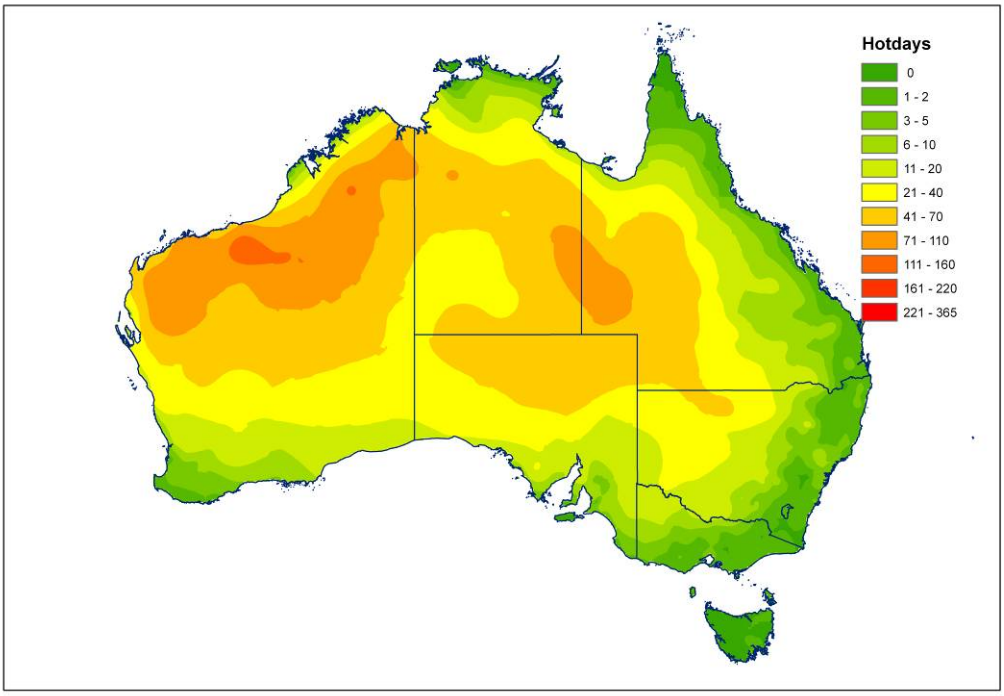


Figure D.6 – Contour map of the yearly number of hot days with maximum temperature threshold of 40°C at 20-year return period

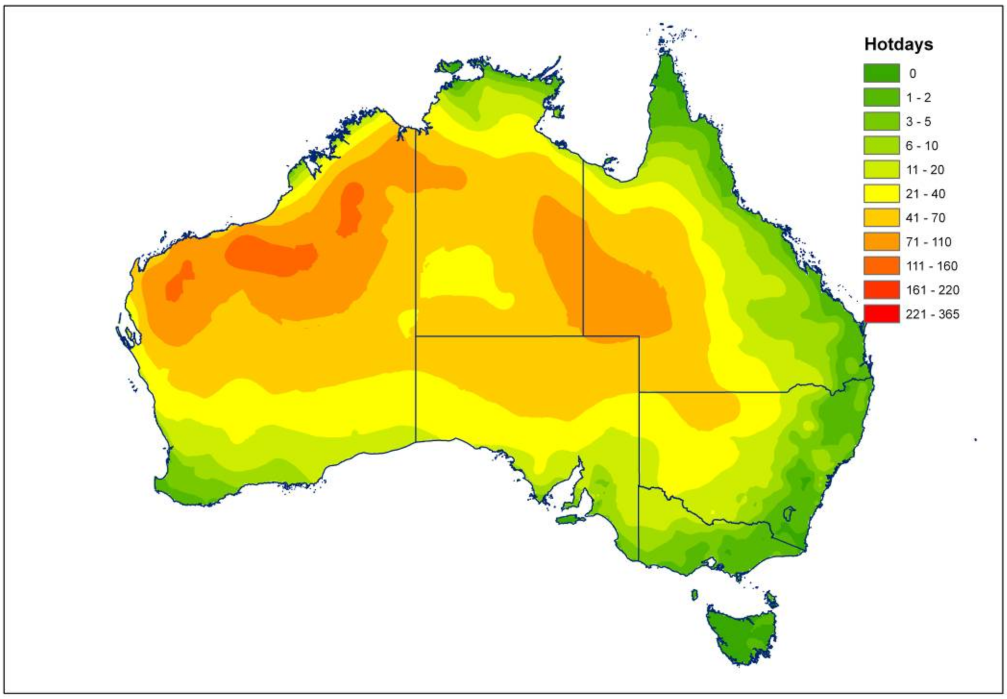


Figure D.7 – Contour map of the yearly number of hot days with maximum temperature threshold of 40°C at 50-year return period

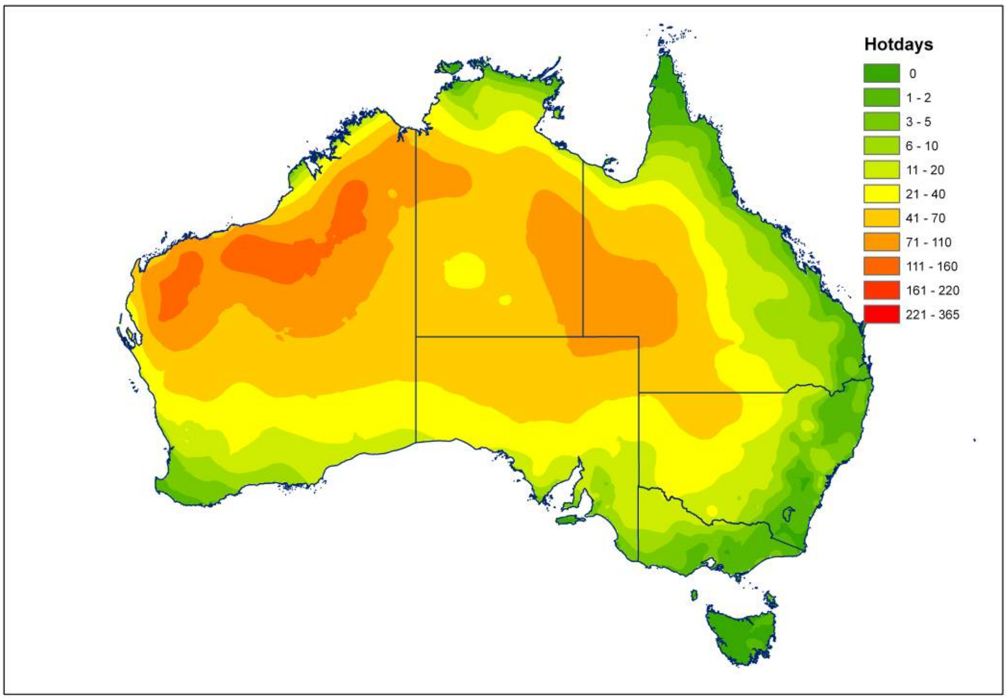


Figure D.8 – Contour map of the yearly number of hot days with maximum temperature threshold of 40°C at 100-year return period

APPENDIX E – CONTOUR FREQUENCY MAPS OF THE YEARLY TOTAL NUMBER OF HOT SPELLS

E.1 Hot Spells lasting 1 day or more with Tmax ≥ 35°C

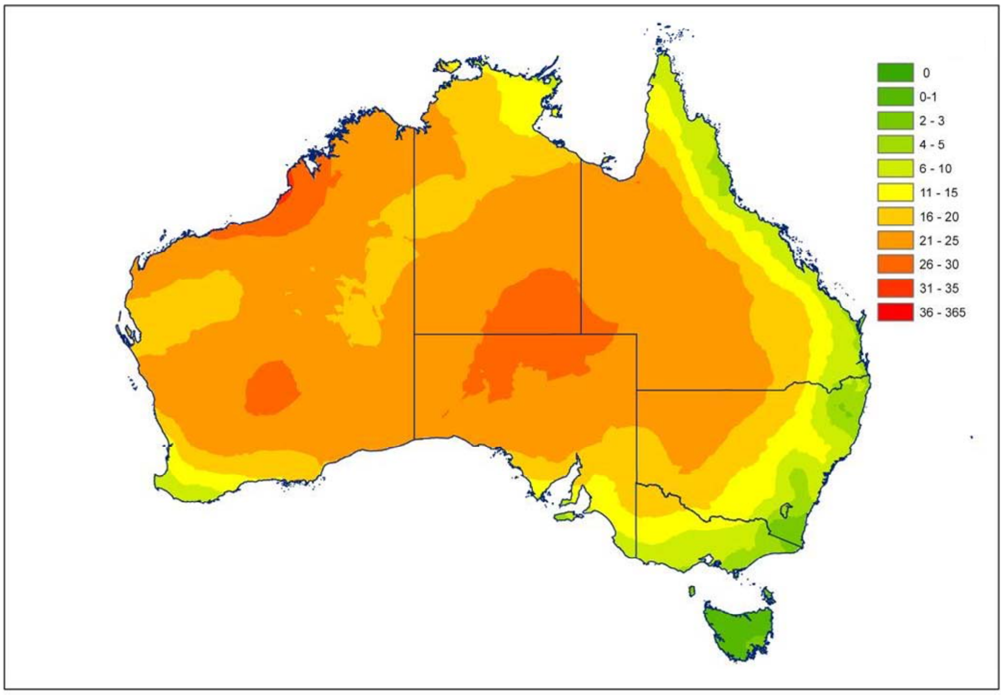


Figure E.1.1 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 35°C at 10-year return period

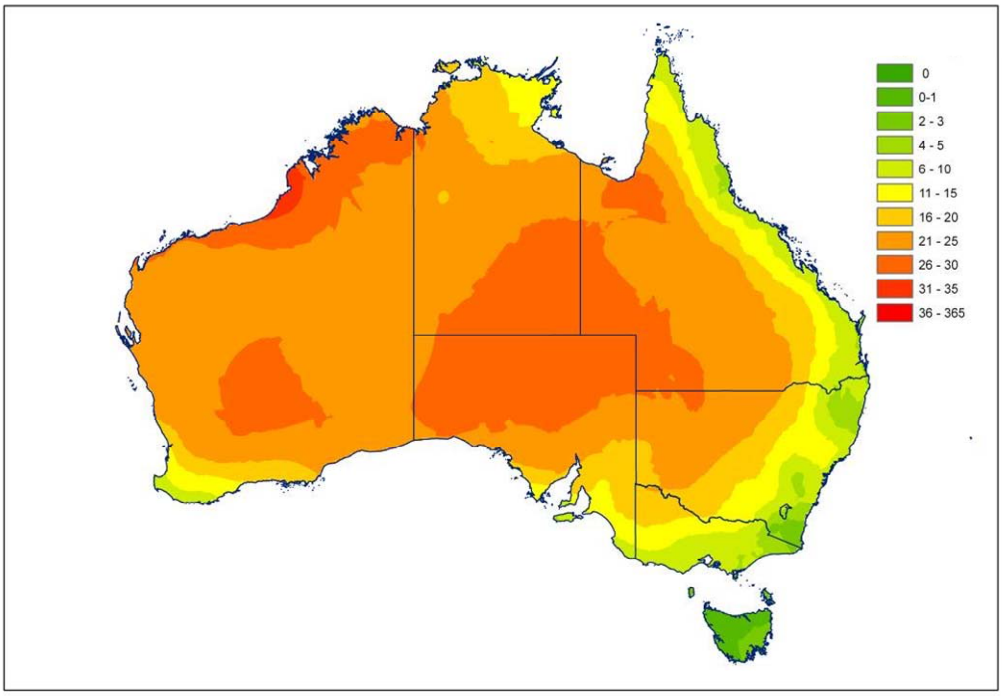


Figure E.1.2 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 35°C at 20-year return period

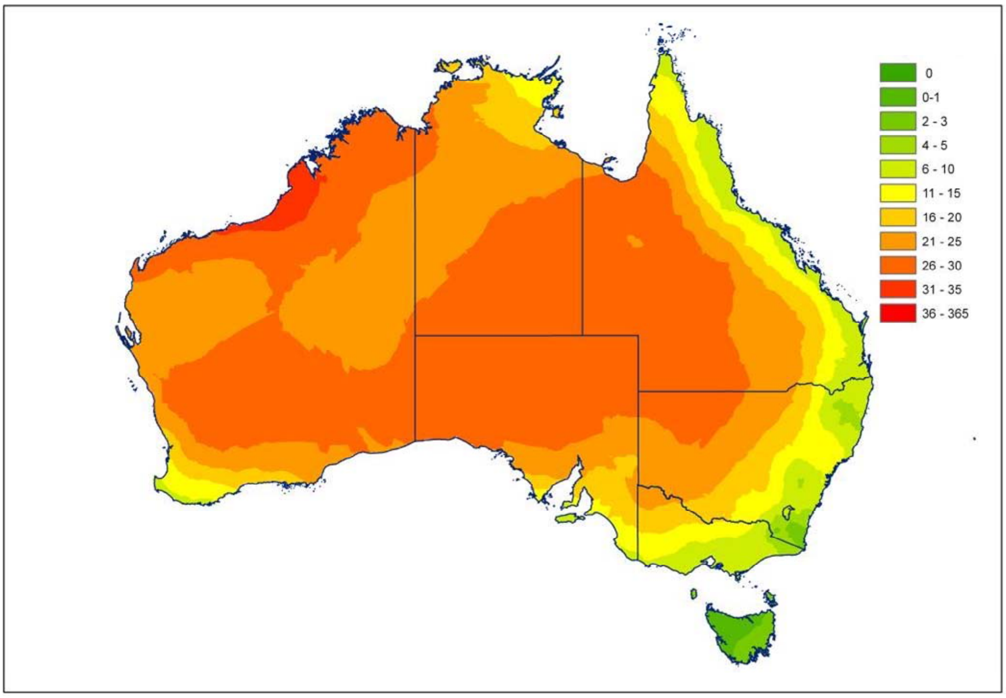


Figure E.1.3 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 35°C at 50-year return period

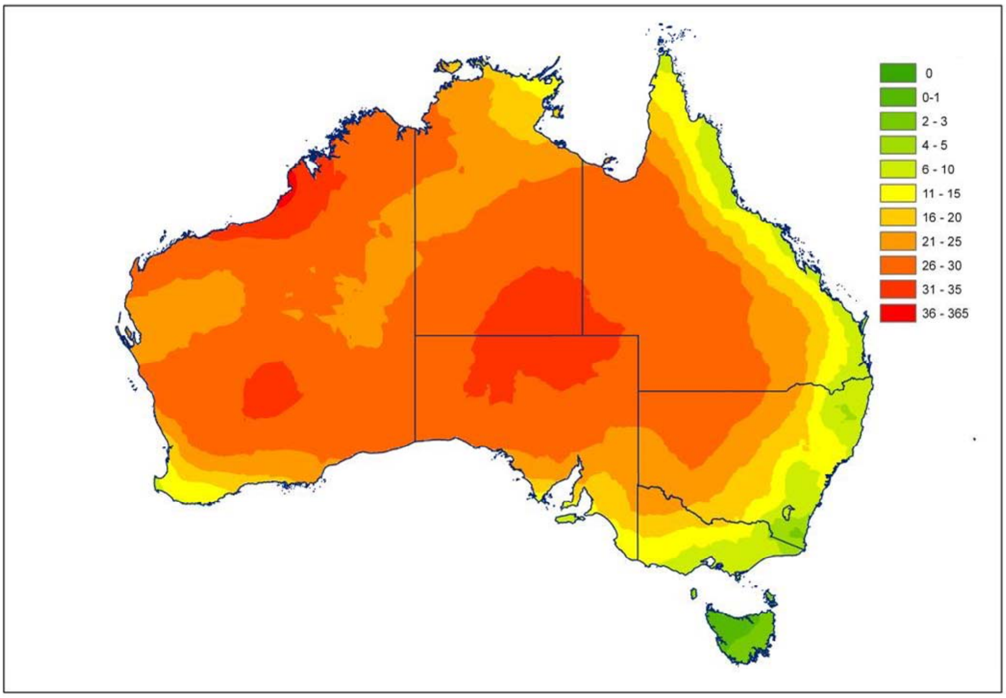


Figure E.1.4 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 35°C at 100-year return period

E.2 Hot spells lasting 2 days or more with Tmax ≥ 35°C

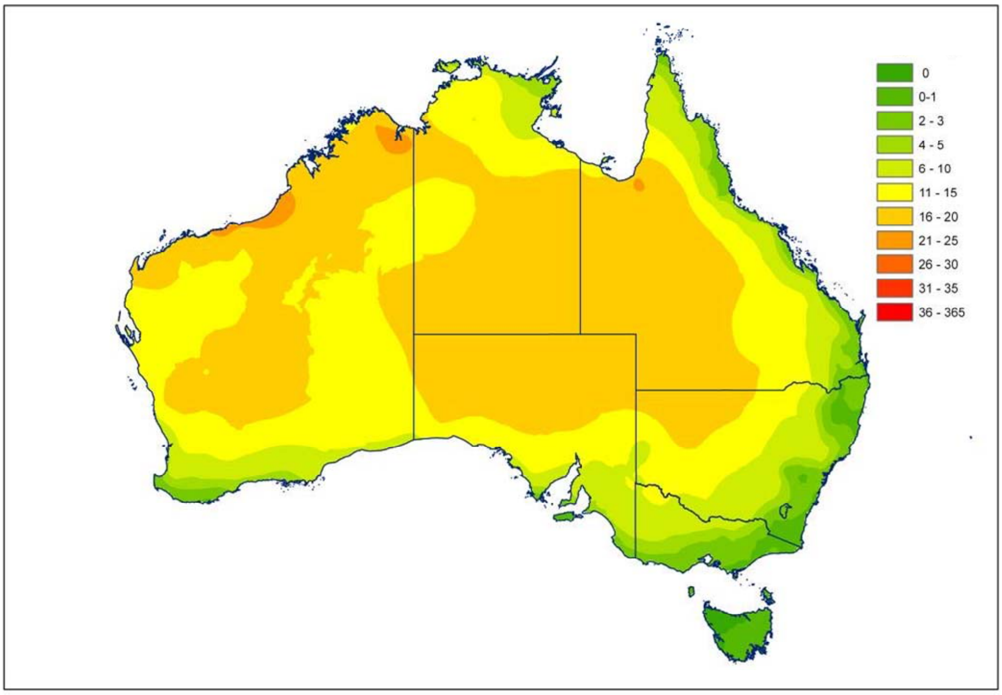


Figure E.2.1 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 35°C at 10-year return period

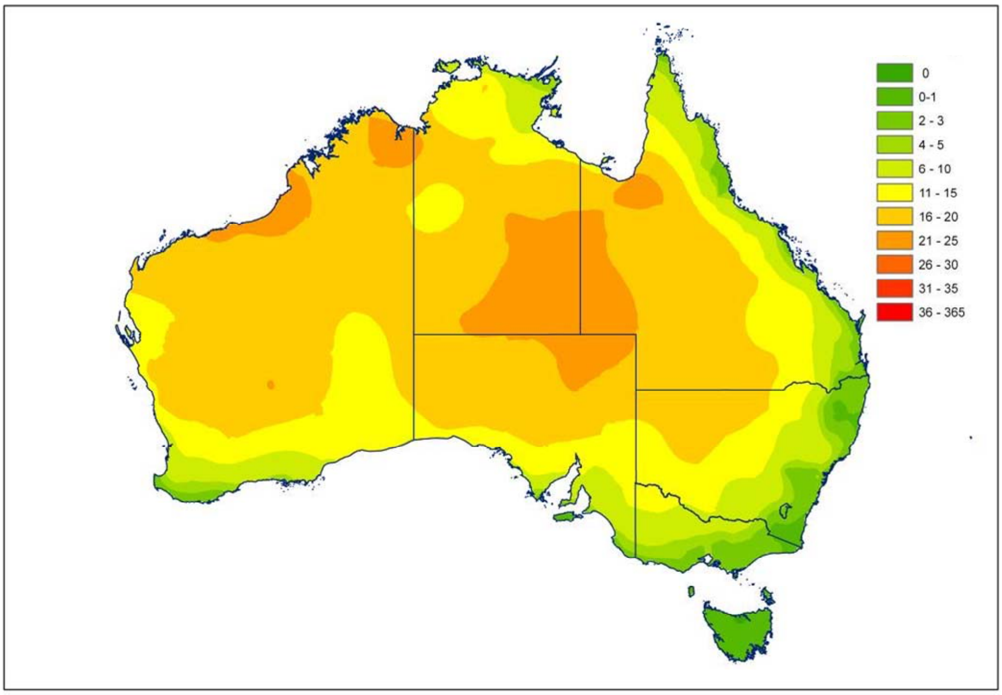


Figure E.2.2 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 35°C at 20-year return period

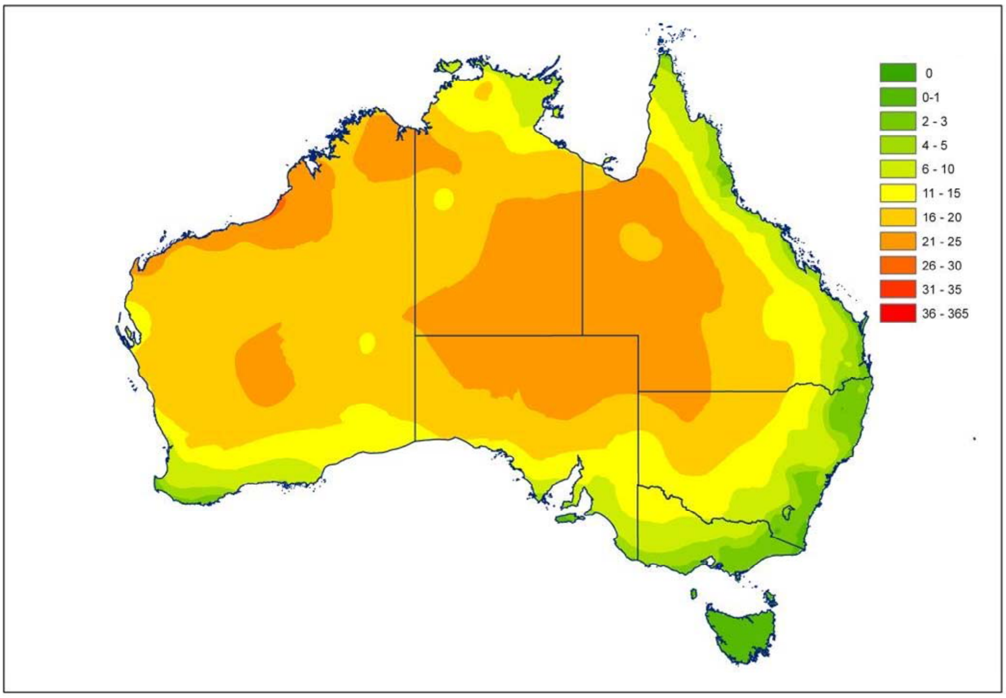


Figure E.2.3 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 35°C at 50-year return period

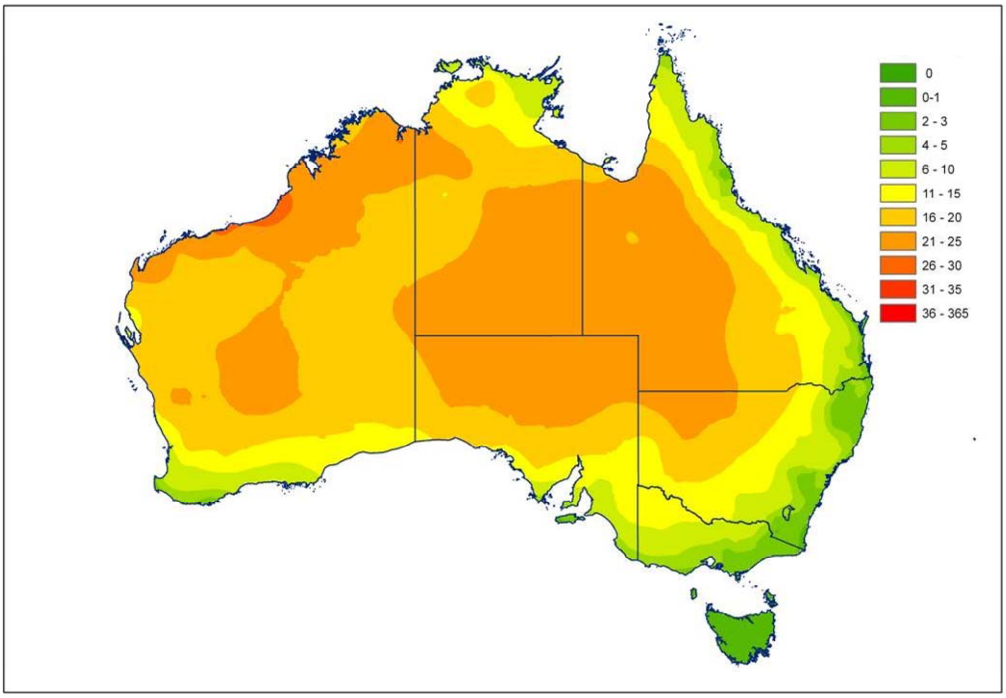


Figure E.2.4 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 35°C at 100-year return period

E.3 Hot Spells lasting 1 day or more with Tmax ≥ 40°C

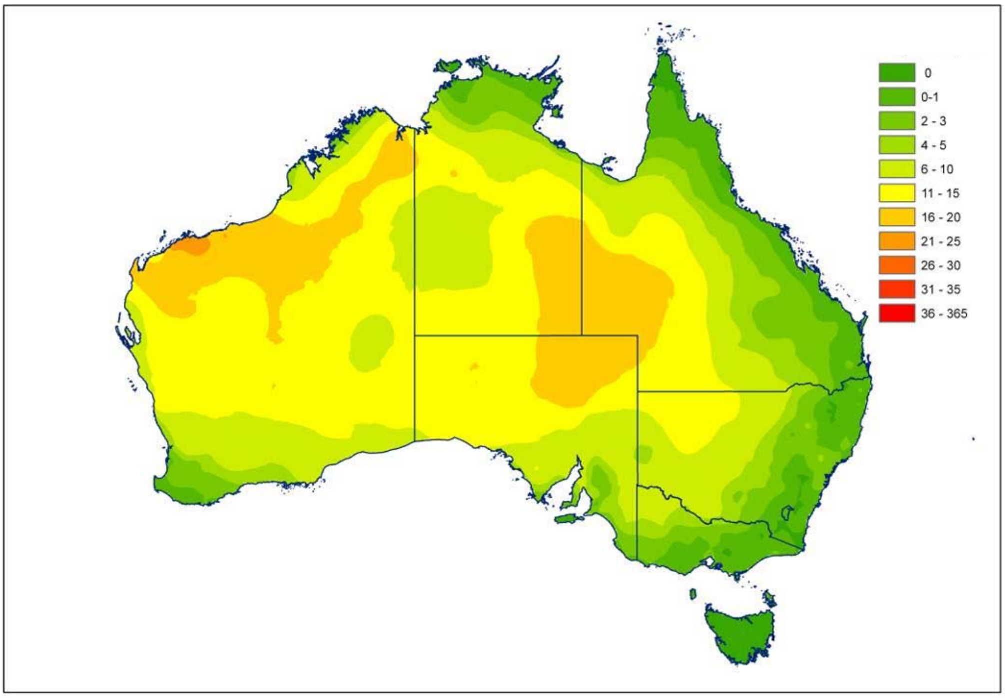


Figure E.3.1 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 40°C at 10-year return period

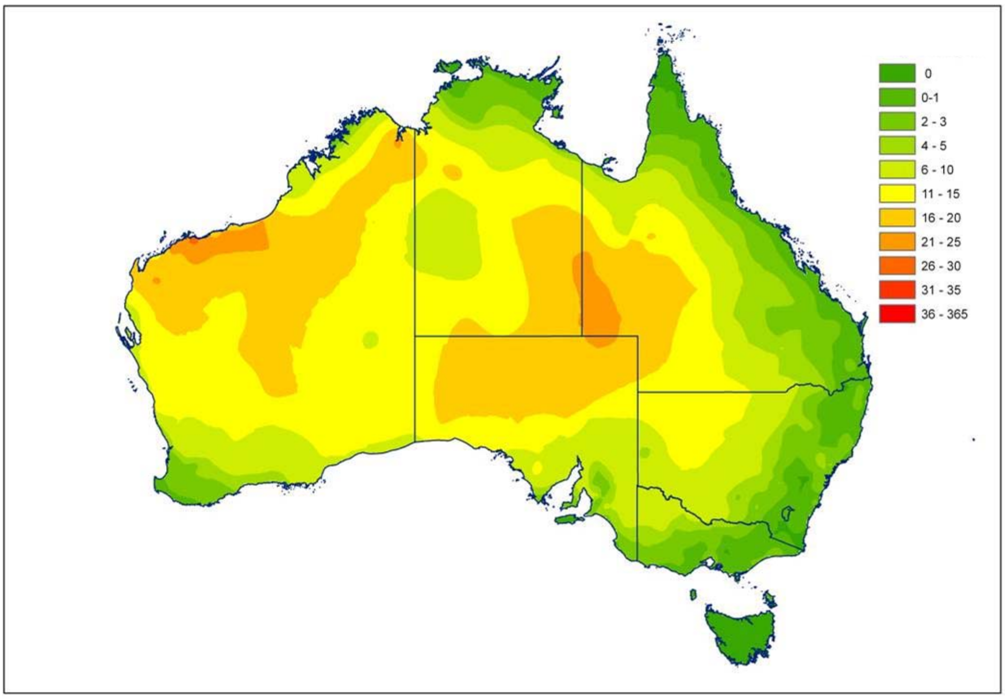


Figure E.3.2 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 40°C at 20-year return period

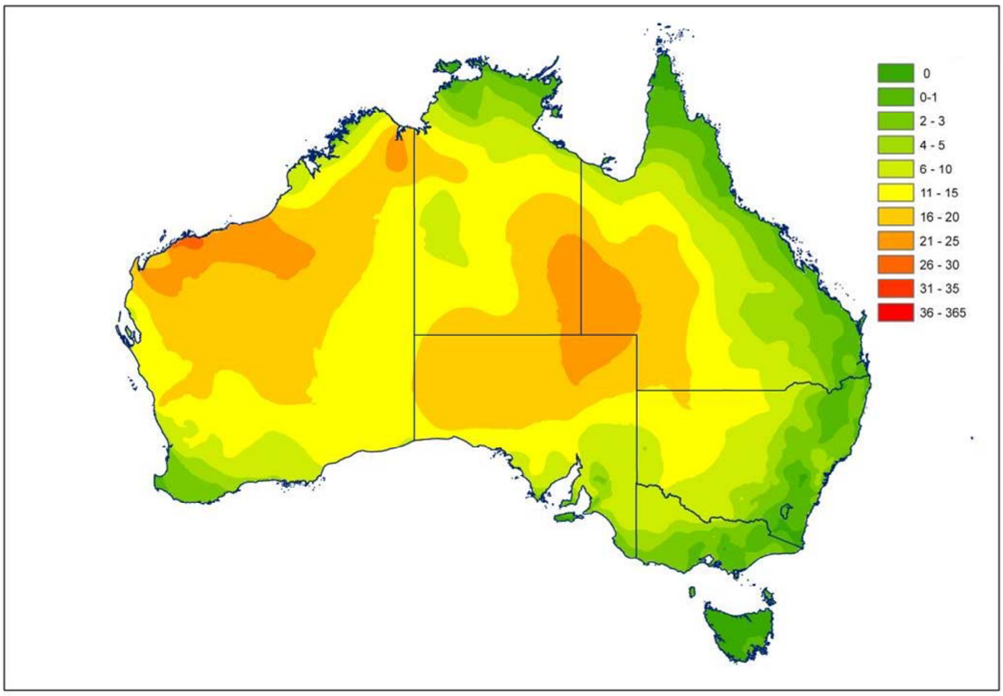


Figure E.3.3 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 40°C at 50-year return period

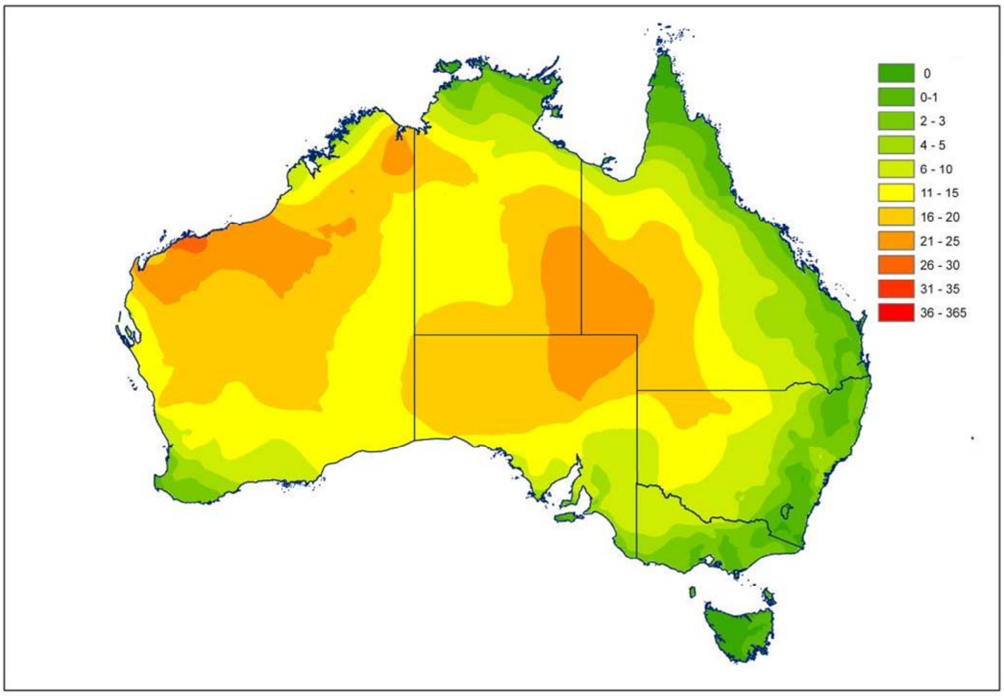


Figure E.3.4 – Contour map of yearly total number of hot spells that last 1 day or more with maximum temperature threshold of 40°C at 100-year return period

E.4 Hot spells lasting 2 days or more with Tmax ≥ 40°C

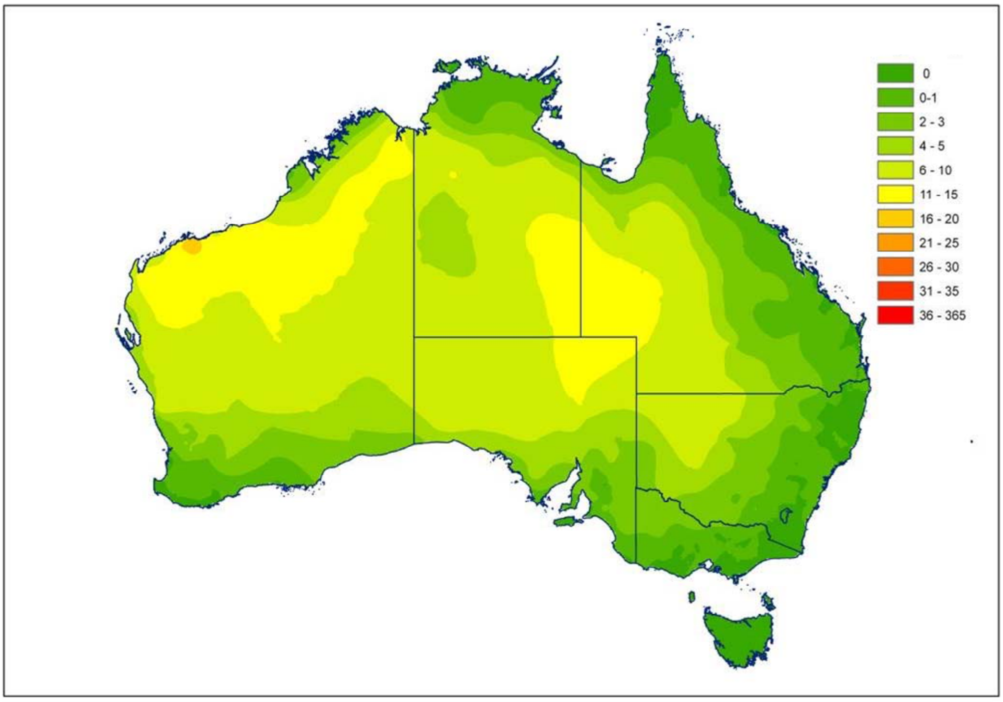


Figure E.4.1 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 40°C at 10-year return period

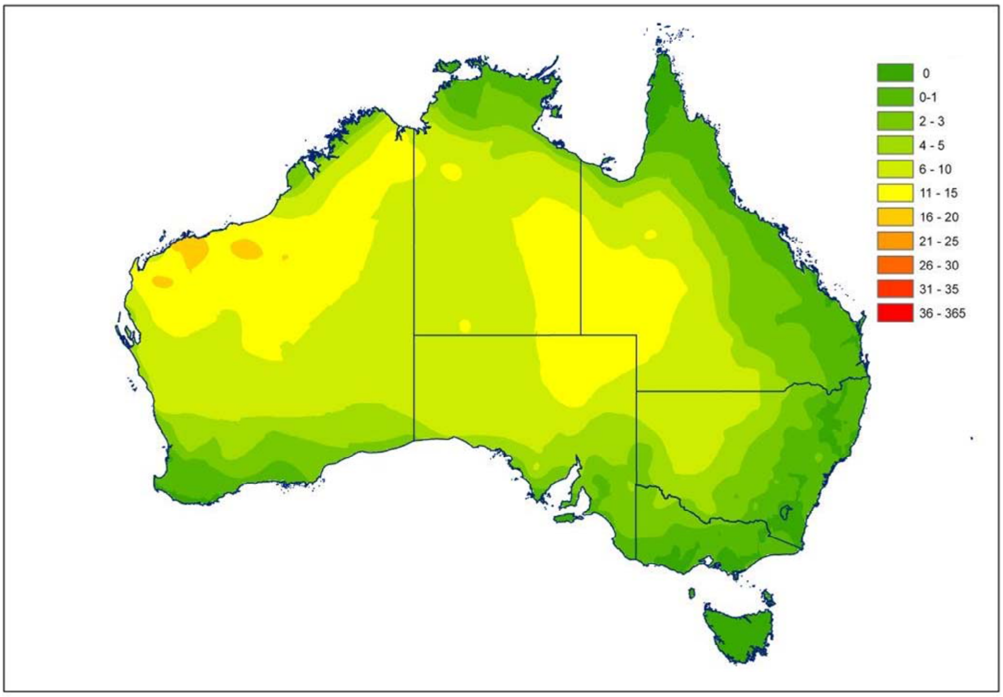


Figure E.4.2 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 40°C at 20-year return period

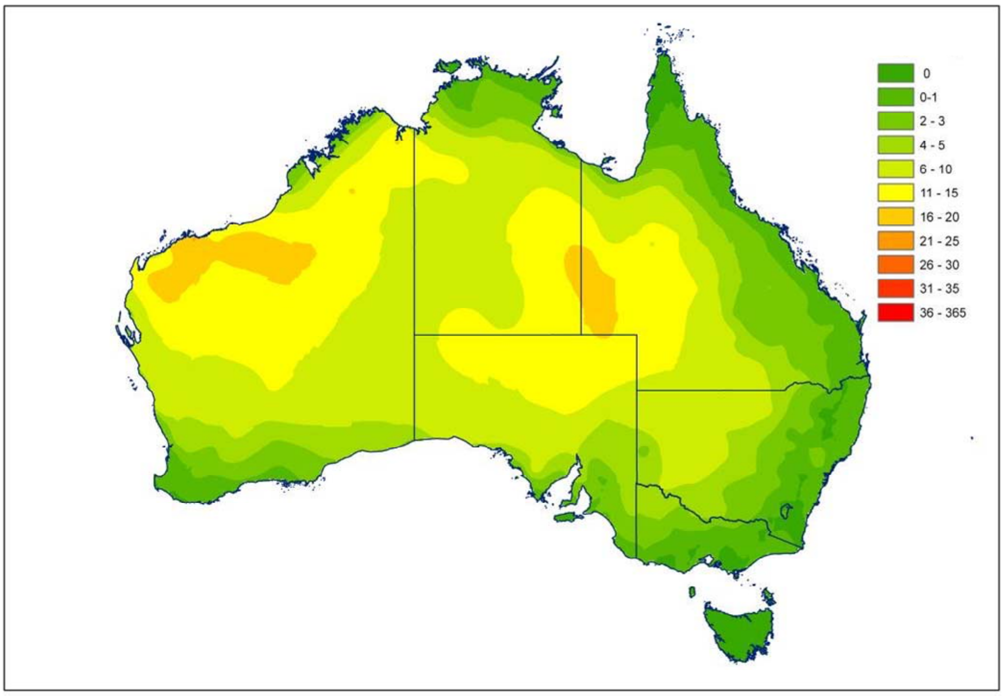


Figure E.4.3 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 40°C at 50-year return period

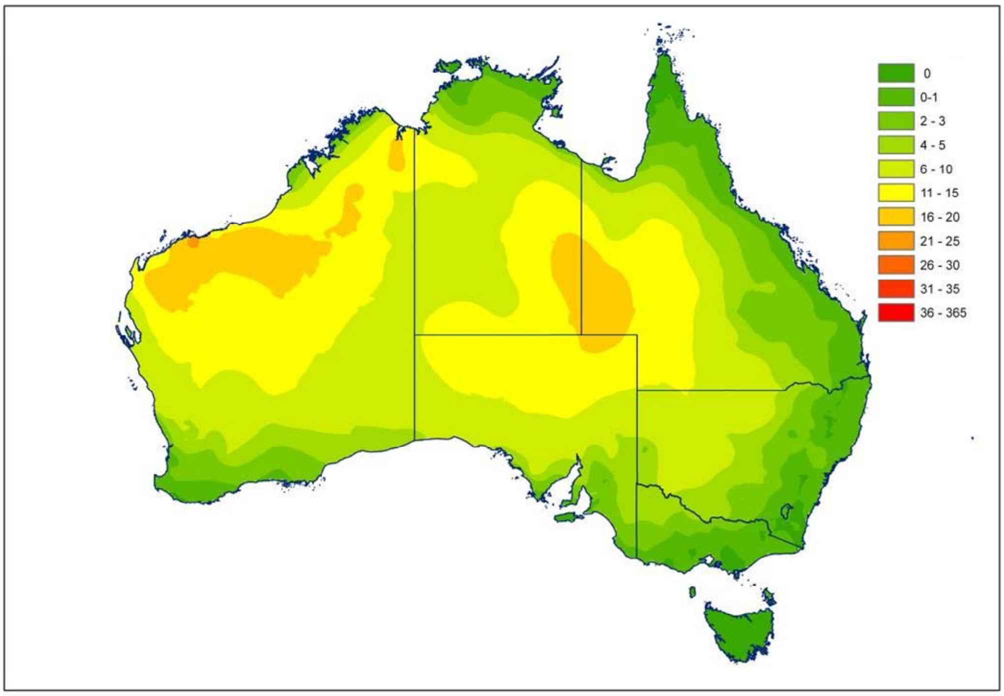


Figure E.4.4 – Contour map of yearly total number of hot spells that last 2 days or more with maximum temperature threshold of 40°C at 100-year return period

APPENDIX F – OBSERVED CHANGES IN NUMBER OF EXTREME HEATWAVE EVENTS AT MAJOR CITIES

F.1 Hobart (Ellerslie Rd) Station

The analysis procedure in Section 4.1 was made for the daily maximum temperature record at the Hobart (Ellerslie Rd) Station. The length of the record is 126 years.

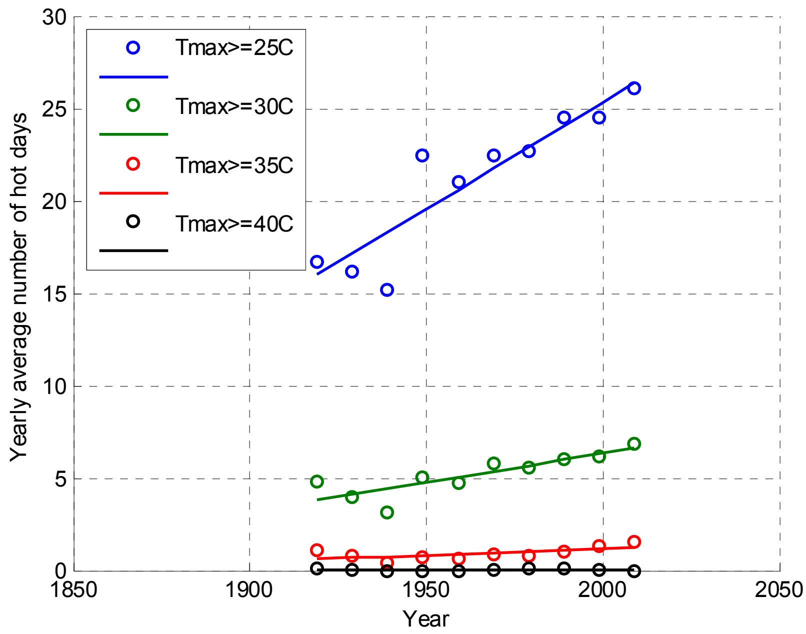


Figure F.1.1 – Changing trends observed in the yearly number of hot days - Hobart Ellerslie Rd station

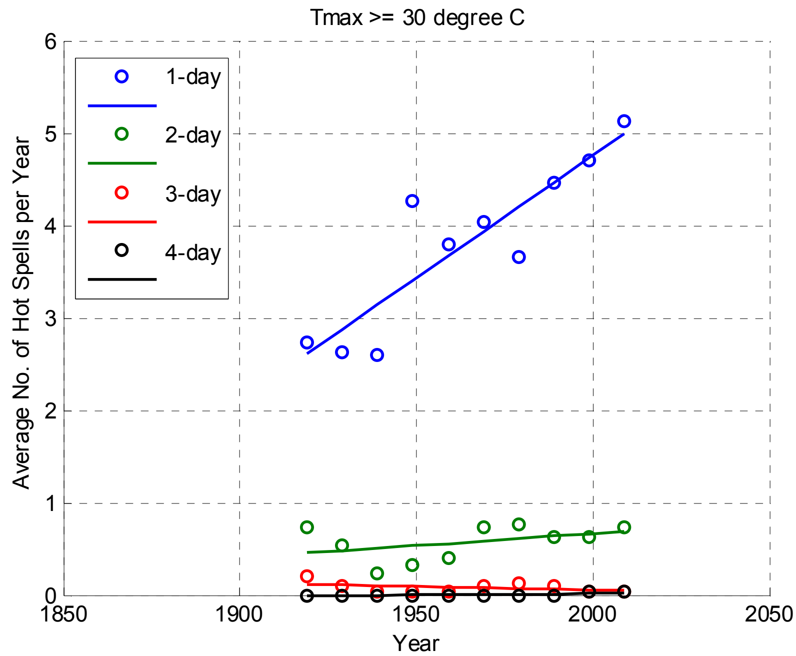


Figure F.1.2 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥30°C – Hobart Ellerslie Rd station

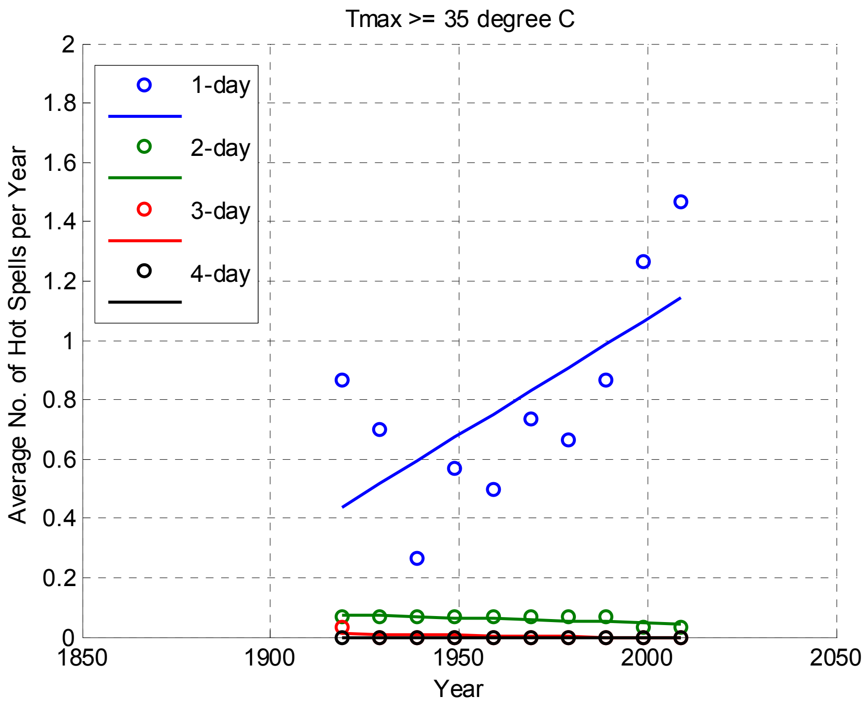


Figure F.1.3 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥35°C – Hobart Ellerslie Rd station

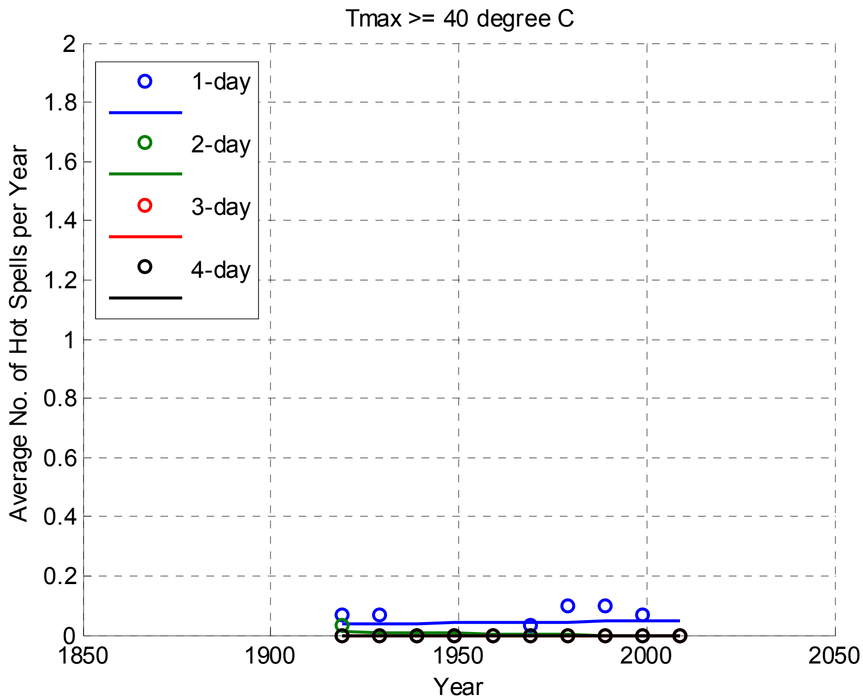


Figure F.1.4 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥40°C – Hobart Ellerslie Rd station

F.2 Sydney (Observatory Hill) Station

The analysis procedure in Section 4.1 was made for the daily maximum temperature record at the Sydney Observatory Hill station. The length of the record is 149 years.

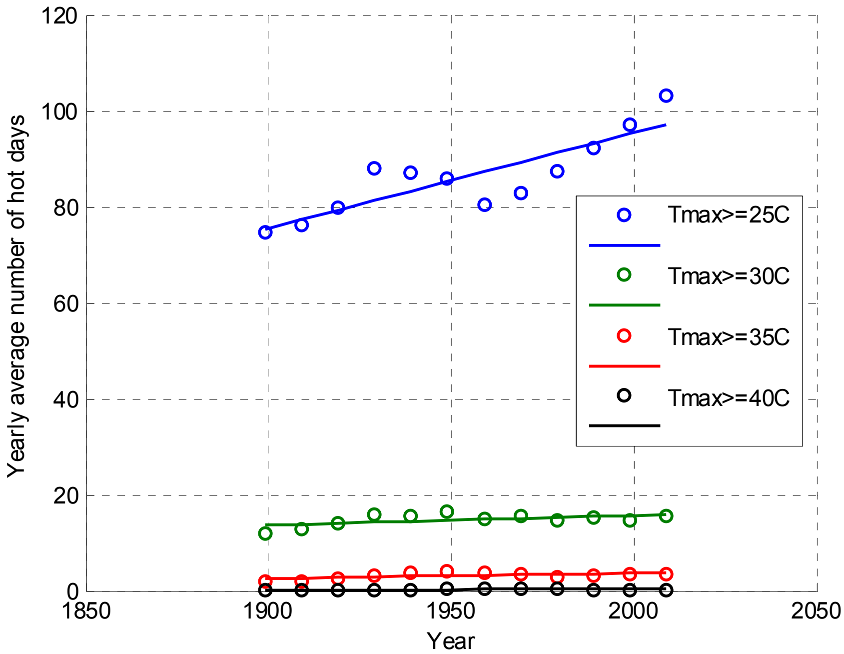


Figure F.2.1 – Changing trends observed in the yearly number of hot days - Sydney Observatory Hill station

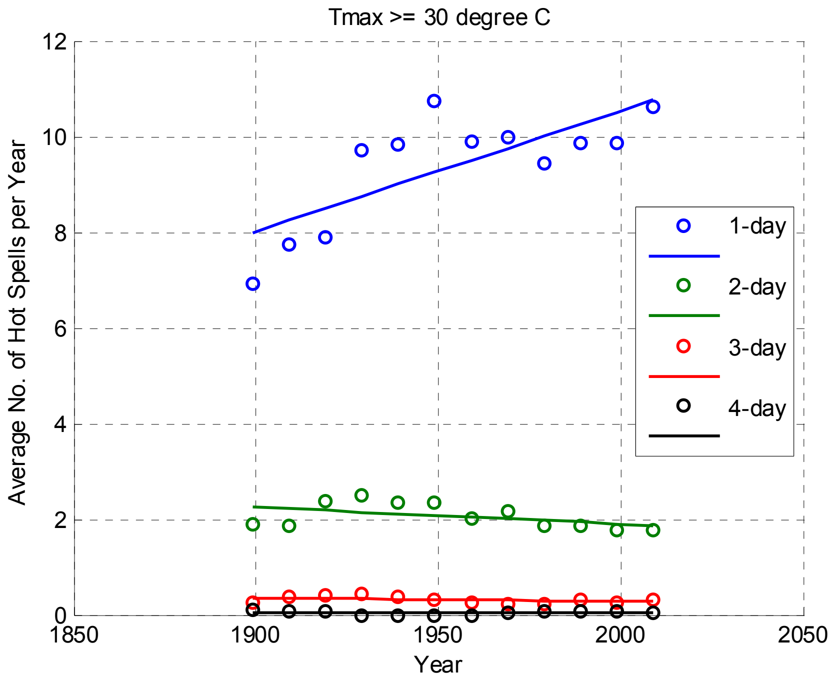


Figure F.2.2 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥30°C – Sydney Observatory Hill station

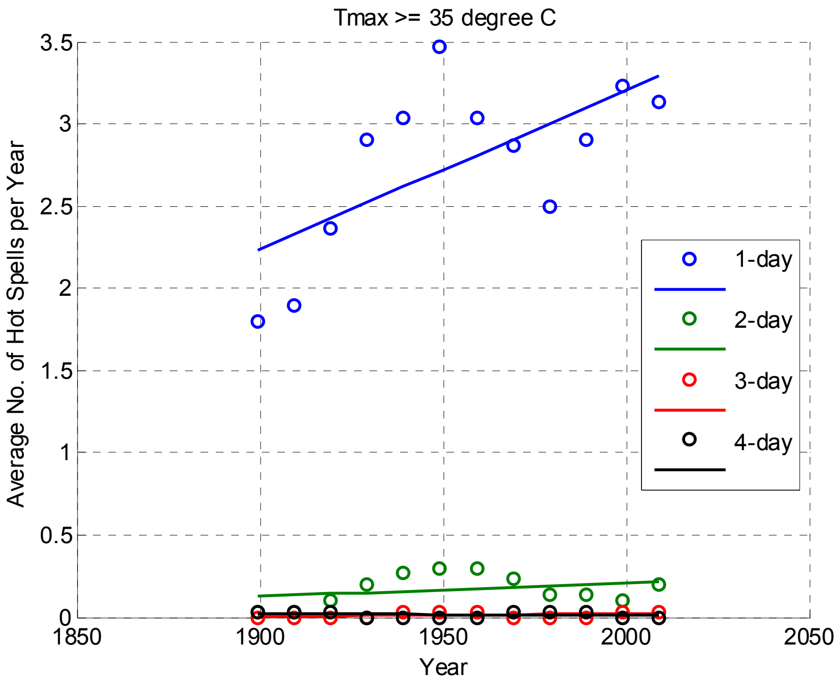


Figure F.2.3 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥35°C – Sydney Observatory Hill station

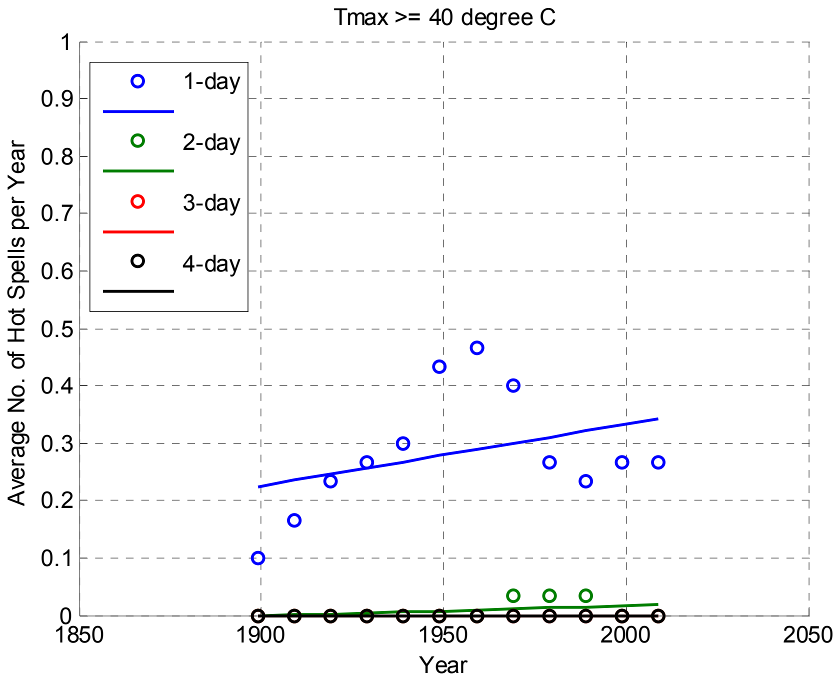


Figure F.2.4 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥40°C – Sydney Observatory Hill station

F.3 Brisbane Regional Office Station

The analysis procedure in Section 4.1 was made for the daily maximum temperature record at the Brisbane Regional Office station. The length of the record is 99 years.

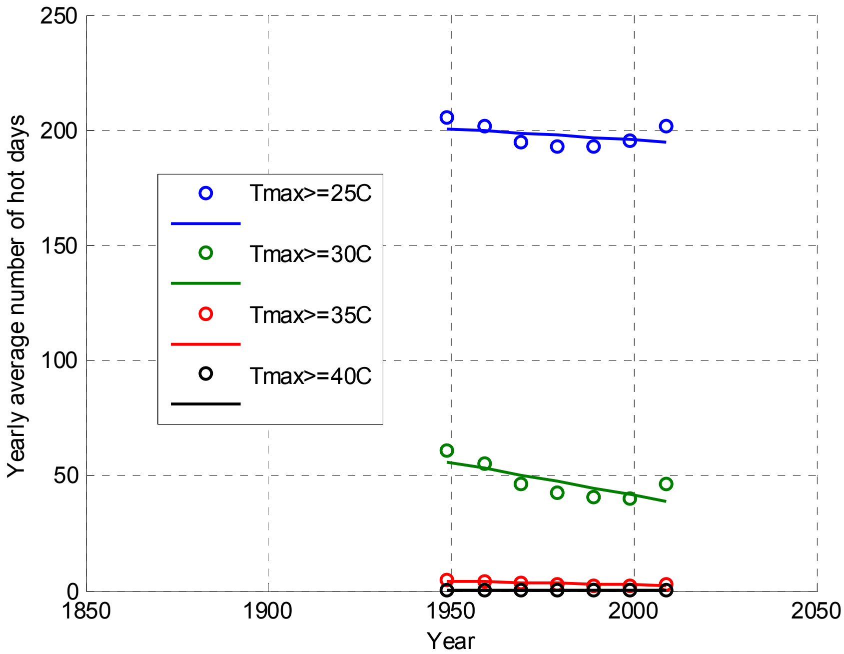


Figure F.3.1 – Changing trends observed in the yearly number of hot days - Brisbane Regional Office

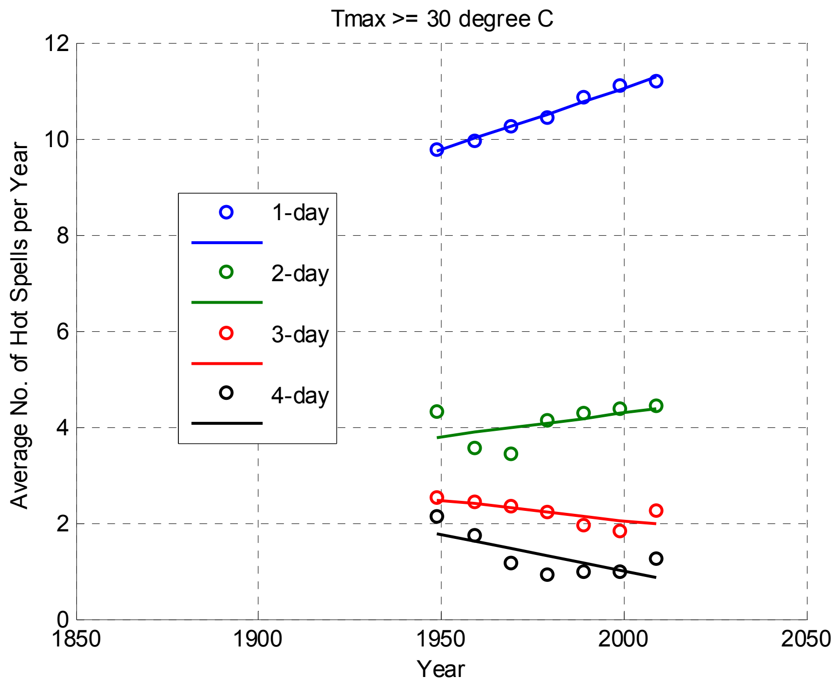


Figure F.3.2 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥30°C – Brisbane Regional Office

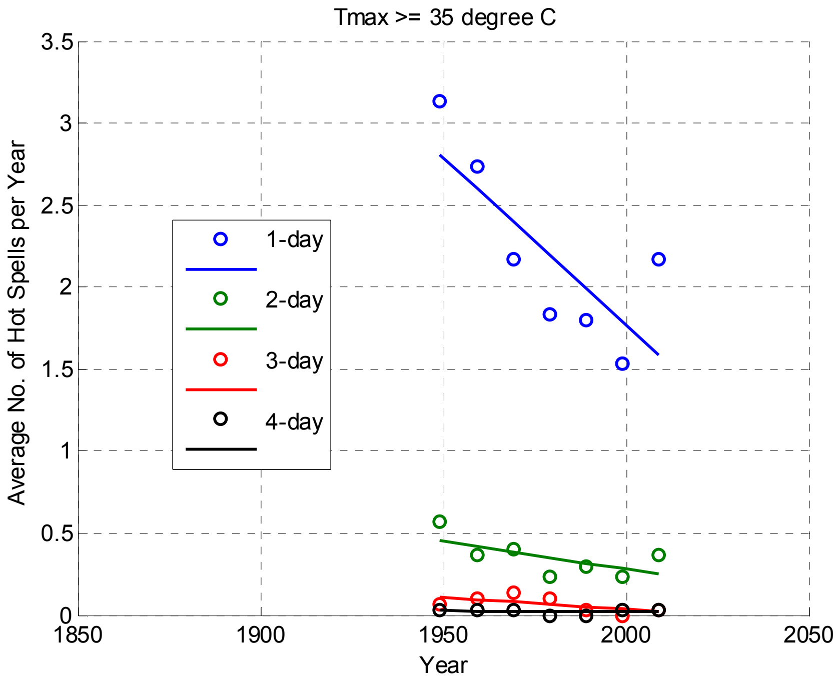


Figure F.3.3 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥35°C – Brisbane Regional Office

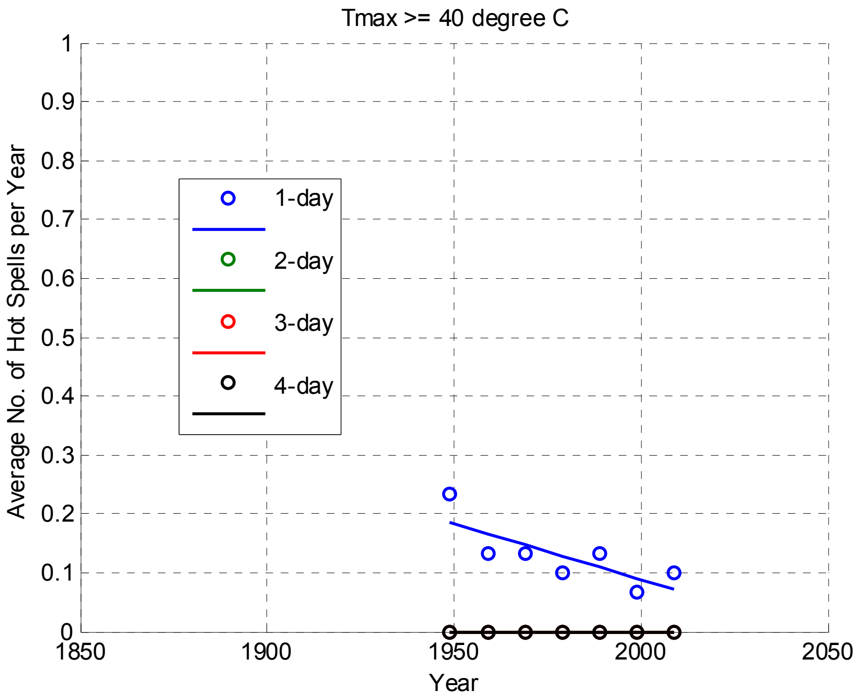


Figure F.3.4 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥40°C – Brisbane Regional Office

F.4 Adelaide (West Terrace) Station

The analysis procedure in Section 4.1 was made for the daily maximum temperature record at the Adelaide West Terrace station. The length of the record is 92 years.

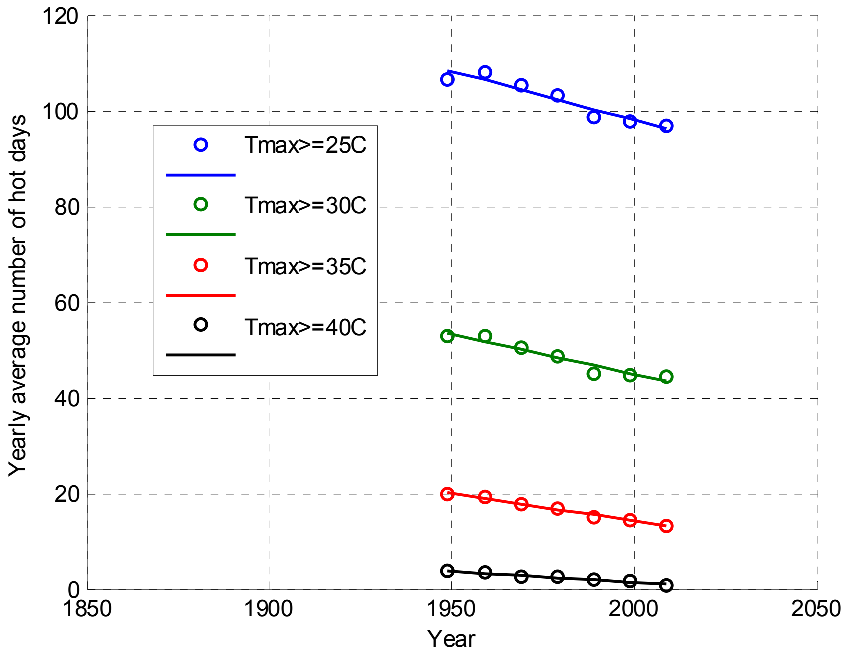


Figure F.4.1 – Changing trends observed in the yearly number of hot days - Adelaide West Terrace station

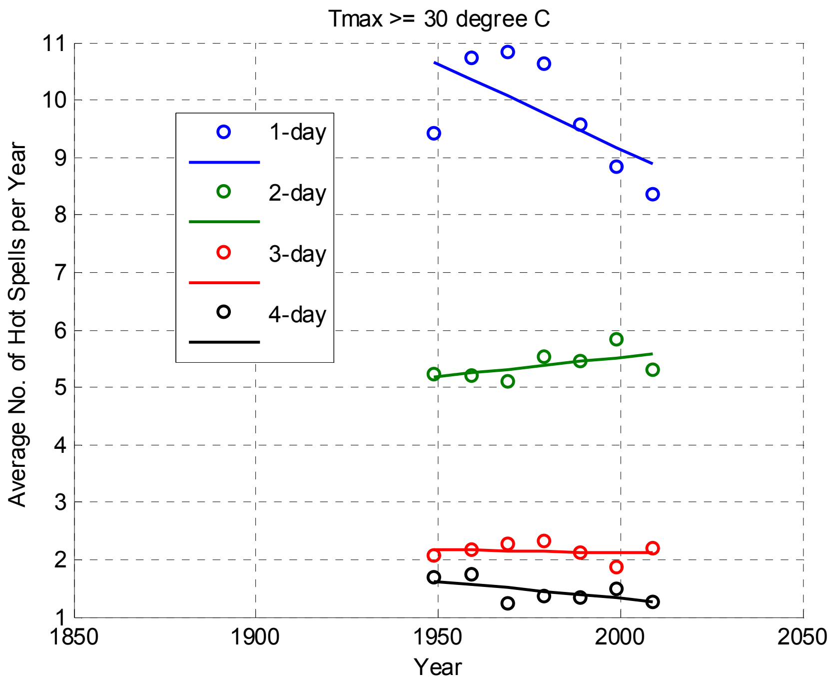


Figure F.4.2 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥30°C – Adelaide West Terrace station

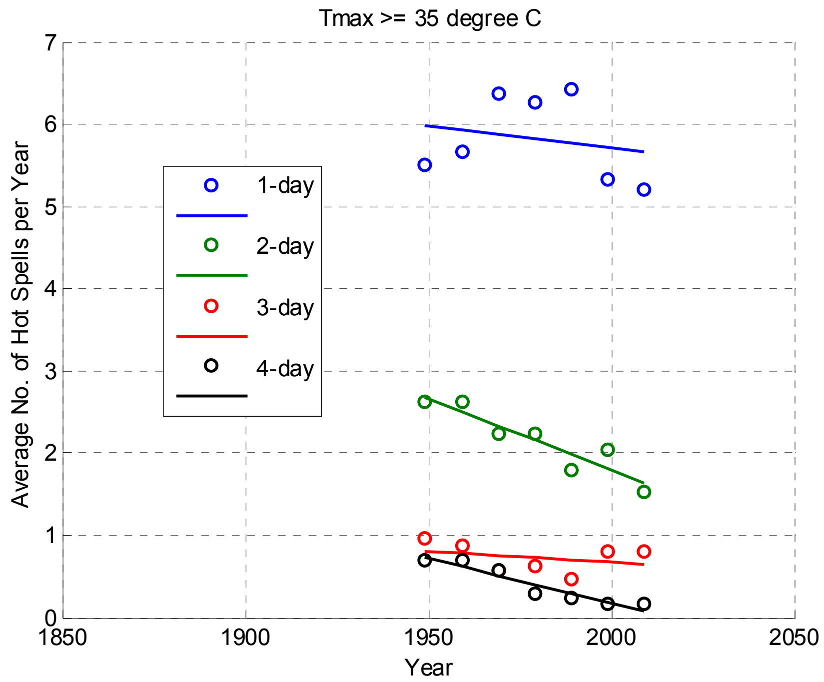


Figure F.4.3 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥35°C – Adelaide West Terrace station

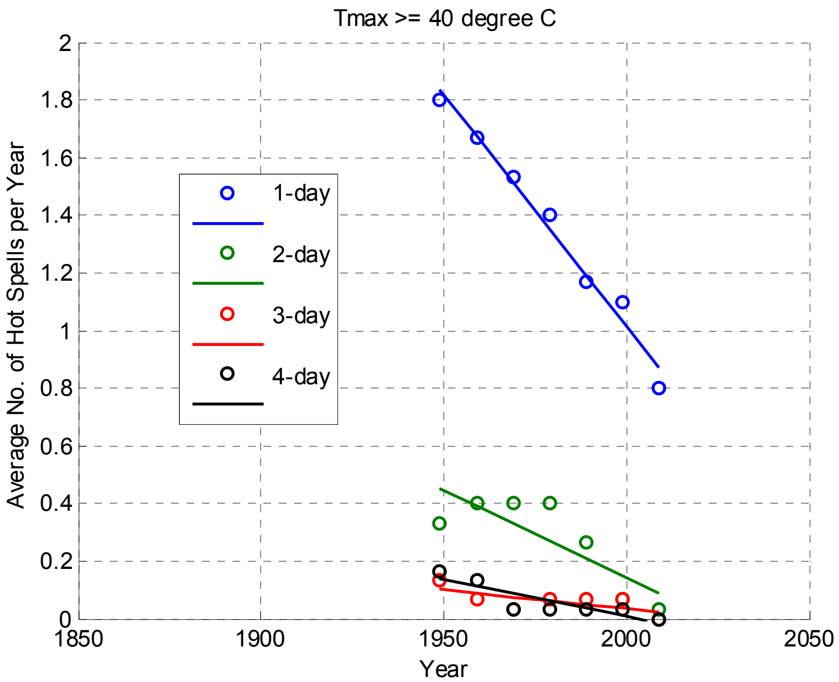


Figure F.4.4 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥40°C – Adelaide West Terrace station

F.5 Perth Regional Office Station

The analysis procedure in Section 4.1 was made for the daily maximum temperature record at the Perth Regional Office station. The length of the record is 95 years.

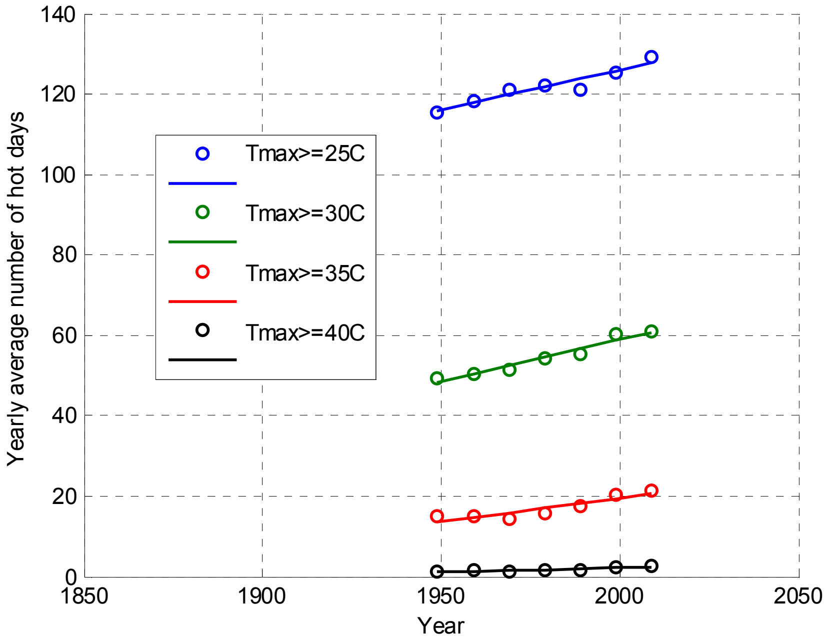


Figure F.5.1 – Changing trends observed in the yearly number of hot days - Perth Regional Office station

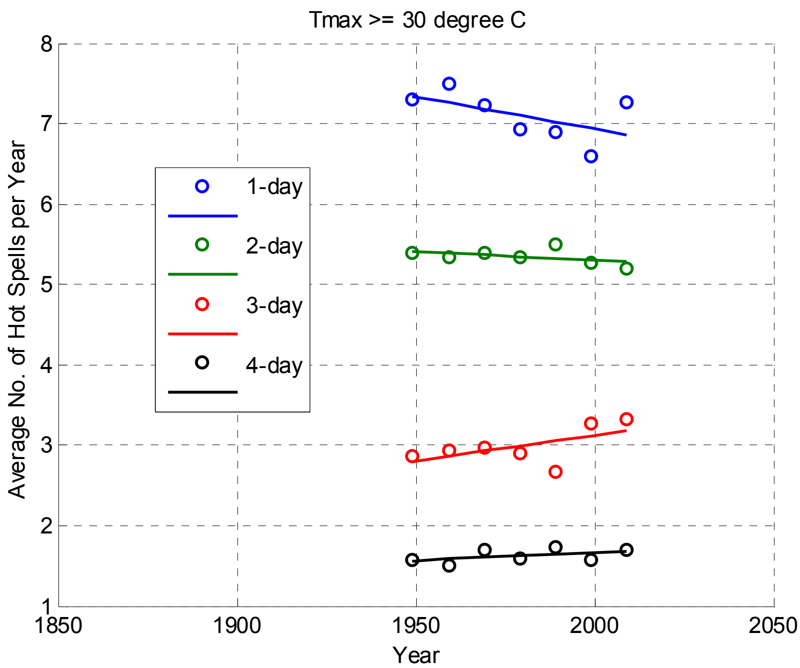


Figure F.5.2 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥30°C – Perth Regional Office station

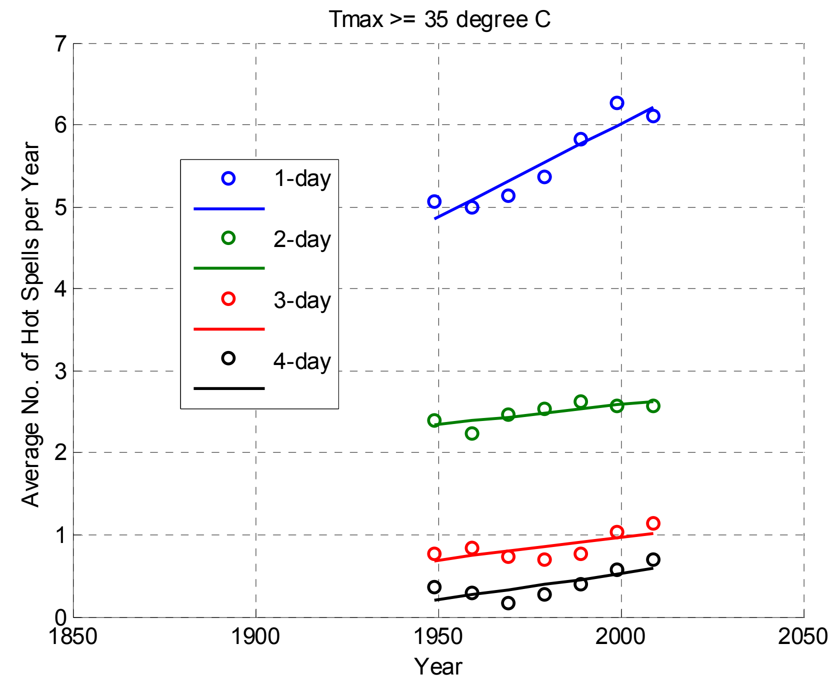


Figure F.5.3 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥35°C – Perth Regional Office station

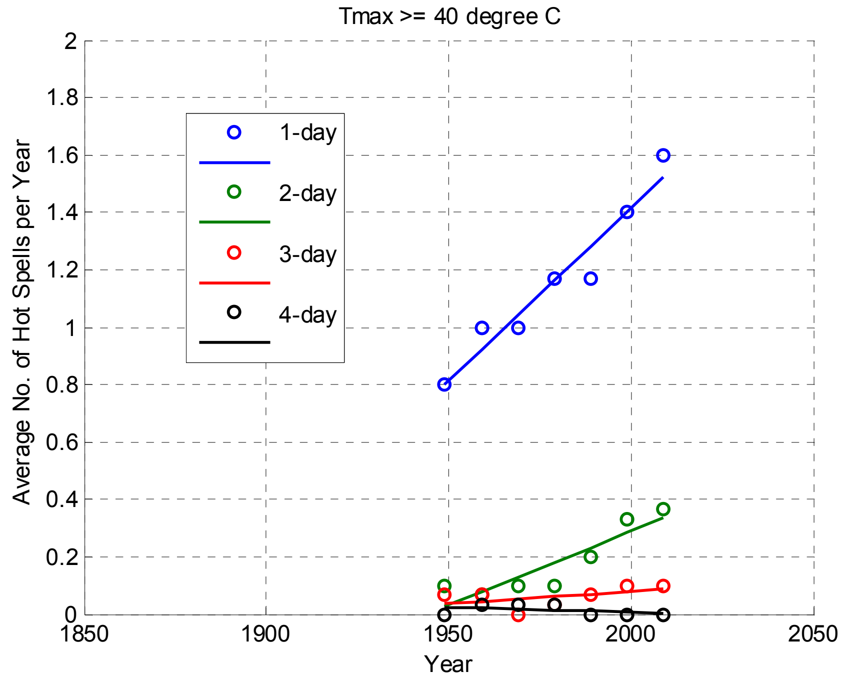


Figure F.5.4 – Changes in the yearly number of 1-day, 2-day, 3-day, and 4-day hot spells with Tmax≥40°C – Perth Regional Office station

APPENDIX G – Observed Changing Trends in Number of Extreme Heatwave events at Locations with Long Record of More Than 90 Years

Table G.1 – Changing trends in number of heatwave events in 46 long-record stations with temperature threshold of 30°C

ID and Location							Average change in number of events in 100 years Tmax >= 30C										
Station No	Station Name	State	Lat-itude	Long-itude	No.of yrs	BCA Climate Zone	Hot day	1-day hotspell	2-day hotspell	3-day hotspell	4-day hotspell	5-day hotspell	6-day hotspell	7-day hotspell	8-day hotspell	9-day hotspell	10-day hotspell
4020	MARBLE BAR COMPARISON	WA	-21.18	119.75	105	1	-17.72	0.63	1.03	-0.12	0.40	0.49			0.12	-0.28	-0.19
9034	**PERTH REGIONAL OFFICE**	WA	-31.96	115.87	95	5	20.68	-0.80	-0.23	0.63	0.20	0.37	0.43	0.93	-0.21	0.48	0.11
9500	ALBANY	WA	-35.03	117.88	101	6	-9.98	-7.17	-1.40								
9510	BRIDGETOWN COMPARISON	WA	-33.96	116.14	101	5	-7.91	-1.25		-1.27	-0.98	0.66	0.12	0.24	-0.21		
9518	CAPE LEEUWIN	WA	-34.37	115.14	101	5	1.12	-0.59	0.54		0.11						
9534	DONNYBROOK	WA	-33.57	115.82	101	5	7.23	-1.27	0.66	-0.61		0.32	0.42	0.15	0.29	0.17	-0.14
9581	MOUNT BARKER	WA	-34.63	117.64	101	6	-11.28	-5.03	-2.44	-0.61			0.10				
10073	KELLERBERRIN	WA	-31.62	117.72	98	4	-21.04	1.02	-0.37	-1.46	0.36	-1.20	-0.30	0.12	-0.27	-0.38	-0.60
10111	NORTHAM	WA	-31.65	116.66	101	5	-3.67	1.34	-0.71	0.16		-0.83	-0.16	-0.49		0.44	
10579	KATANNING COMPARISON	WA	-33.69	117.56	101	4	1.44	0.95	0.65	-0.62	-0.40	0.28	0.23		0.15	-0.17	
10614	NARROGIN	WA	-32.93	117.18	95	4	-2.29	2.39	0.89	-0.58	-0.71	0.39			0.14	-0.26	0.13
10648	WANDERING COMPARISON	WA	-32.68	116.68	102	4	10.87	-0.58	1.10	0.13	-0.33	-0.16		0.37	0.37	-0.23	
12074	SOUTHERN CROSS	WA	-31.23	119.33	100	4	-18.31	0.11	0.23	-1.16	-0.29	-0.24			-0.21		-0.34
18070	PORT LINCOLN	SA	-34.72	135.86	110	5	0.71	-1.50	1.35	0.61	-0.35	-0.20					
21046	SNOWTOWN	SA	-33.78	138.21	93	5	-6.87	-1.42	-1.70	-0.33	-1.04	0.65	0.42	0.26		-0.62	0.24
23000	**ADELAIDE WEST TERRACE**	SA	-34.93	138.59	92	5	-16.68	-2.95	0.65	-0.12	-0.60	-0.73	-0.20	-0.33		-0.21	-0.26
26026	ROBE COMPARISON	SA	-37.16	139.76	124	6	0.11	0.61	0.17		-0.17						
29004	BURKETOWN POST OFFICE	QLD	-17.74	139.55	118	1	-45.22	-2.67	-1.11	-0.46	-0.43	-0.47	-0.23	-0.33		-0.27	
30018	GEORGETOWN POST OFFICE	QLD	-18.29	143.55	113	1	22.44	-0.47	0.16	-0.17		0.23	-0.43	-0.39			
30045	RICHMOND POST OFFICE	QLD	-20.73	143.14	115	3	0.82	0.15	0.21	-0.39		0.49	0.16	-0.30	-0.22	-0.38	-0.21
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.58	147.41	94	1	-29.46	-4.18	-2.11	-1.24	-0.76	-0.50	-0.23	-0.21	-0.29	-0.19	
33047	TE KOWAI EXP STN	QLD	-21.16	149.12	100	2	-80.87	-0.27	-0.45	-0.58	-0.28	-0.99	0.26	-0.41			
34002	CHARTERS TOWERS POST OFFICE	QLD	-20.08	146.26	99	3	-5.40	0.52	1.82	-0.32	-0.94	-0.68	0.29	0.45		-0.12	
35027	EMERALD POST OFFICE	QLD	-23.53	148.16	103	2	1.75	0.33	0.32	-0.77	-0.52	0.40		0.23	0.15	-0.17	
38003	BOULIA AIRPORT	QLD	-22.91	139.90	120	3	9.55	0.22	-0.33	0.22		-0.16	-0.32		-0.19	-0.16	0.41
39015	BUNDABERG POST OFFICE	QLD	-24.87	152.35	98	2	-5.43		-0.30	0.33	0.63	0.69	-0.60	0.57	-0.68	0.37	
39039	GAYNDAH POST OFFICE	QLD	-25.63	151.61	115	3	3.95		-1.17		-0.41	0.40	-0.17		0.29		
40214	**BRISBANE REGIONAL OFFICE**	QLD	-27.48	153.03	99	2	-28.46	2.56	0.99	-0.85	-1.51	-0.31	-0.68	-0.40	-0.46		-0.35
40264	TEWANTIN POST OFFICE	QLD	-26.39	153.04	101	2	3.14	4.32	2.13	0.52	-0.25	0.20		-0.11	-0.40		
41023	DALBY POST OFFICE	QLD	-27.18	151.26	99	3	-13.31	-0.74	0.55	0.64	0.18	0.29	-0.33	0.60	0.14	0.13	
41038	GOONDIWINDI POST OFFICE	QLD	-28.55	150.31	100	3	-4.78	0.47	0.34			-0.21	0.21	-0.27		0.18	0.36
46037	TIBOOBURRA POST OFFICE	NSW	-29.43	142.01	98	4	22.98	-0.43	1.14	1.11	-0.14	-0.18	0.29		0.12	0.49	
48013	BOURKE POST OFFICE	NSW	-30.09	145.94	125	4	-25.61	-0.14	0.40	0.35	-0.49		0.16	0.68	-0.17	-0.13	-0.10
52026	WALGETT COUNCIL DEPOT	NSW	-30.02	148.12	115	4	5.94	1.81	0.23		-1.00			0.12	0.39	0.34	
55023	GUNNEDAH POOL	NSW	-30.98	150.25	132	4	-19.30	1.78	1.42		0.26	0.86	0.45		-0.12	-0.18	-0.11
56017	INVERELL COMPARISON	NSW	-29.78	151.11	123	4	1.03	1.35	1.04	0.72	0.46	0.31	0.58	0.39			
63004	BATHURST GAOL	NSW	-33.42	149.55	125	7	-18.90	-0.75	-1.42	-0.55		-0.37	-0.12	-0.45	0.18	-0.33	
65016	FORBES (CAMP STREET)	NSW	-33.39	148.01	125	4	-19.25	0.80	1.56	0.12	0.13	-0.17	-0.21	-0.11	-0.27		-0.23
66062	**SYDNEY (OBSERVATORY HILL)**	NSW	-33.86	151.21	149	5	2.01	2.52	-0.34								
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.53	144.95	145	4	-23.66	1.20	0.89		0.44		-0.76	-0.21		-0.22	
78031	NHILL	VIC	-36.33	141.64	111	2	11.53	0.51	-0.32		1.11	0.29	0.13	-0.12			0.21
82039	RUTHERGLEN RESEARCH	VIC	-36.10	146.51	96	4	2.75	-2.25	0.42	0.96	-1.13	0.46	-0.49	0.26	-0.51		
86071	**MELBOURNE REGIONAL OFFICE**	VIC	-37.81	144.97	153	6	2.02	-0.65	0.25	0.55	0.18						
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.86	143.51	144	6	-4.31	-0.69	-0.76	-0.42							
91057	LOW HEAD (COMPARISON)	TAS	-41.06	146.79	106	7											
94029	**HOBART (ELLERSLIE ROAD)**	TAS	-42.89	147.33	126	7	3.08	2.66	0.26								

Table G.2 – Changing trends in number of heatwave events in 46 long-record stations with temperature threshold of 35°C

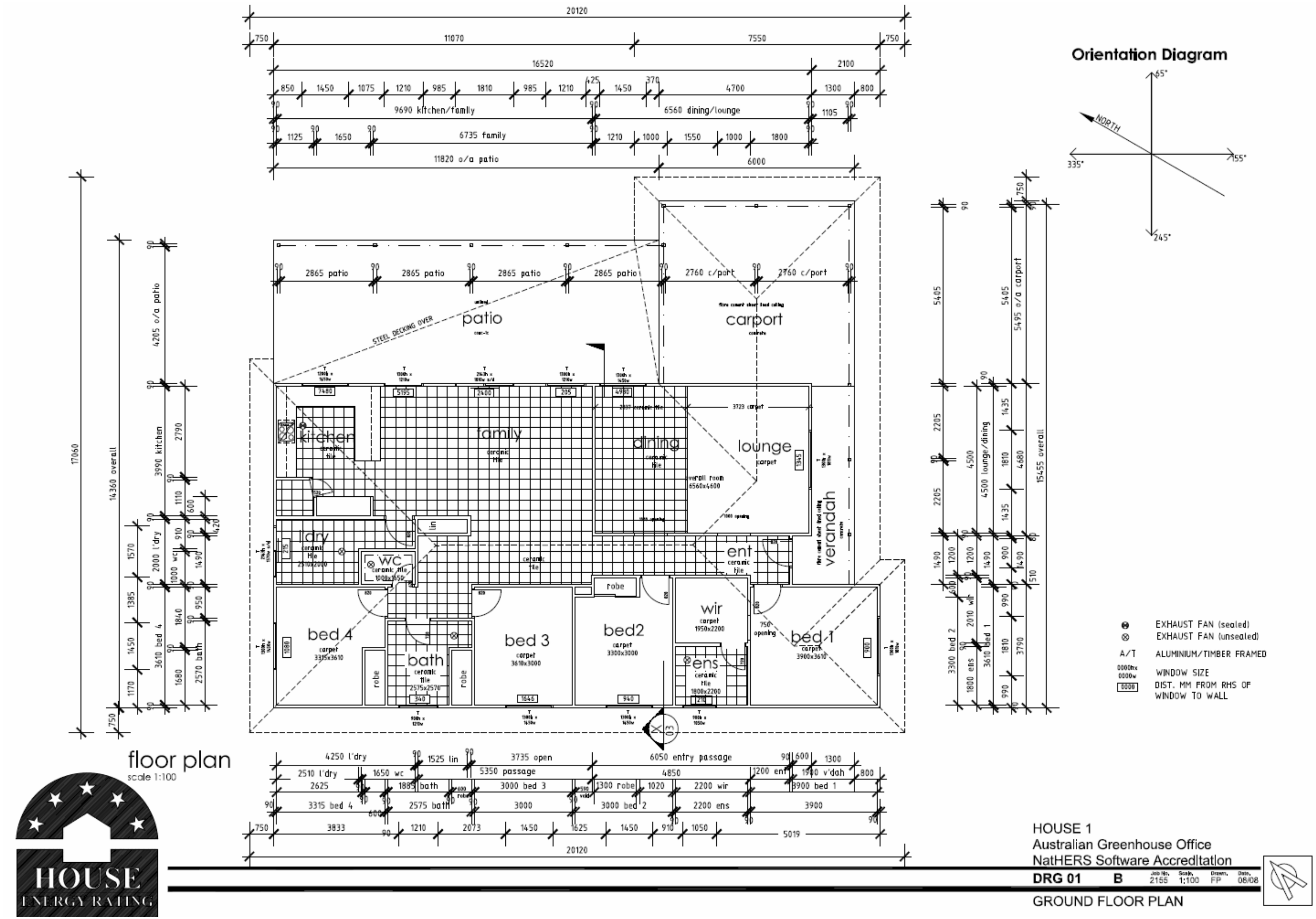
ID and Location							Average change in number of events in 100 years Tmax >= 35C										
Station No	Station Name	State	Lat-itude	Long-itude	No.of yrs	BCA Climate Zone	Hot day	1-day hotspell	2-day hotspell	3-day hotspell	4-day hotspell	5-day hotspell	6-day hotspell	7-day hotspell	8-day hotspell	9-day hotspell	10-day hotspell
4020	MARBLE BAR COMPARISON	WA	-21.18	119.75	105	1	-21.28	0.64	0.14	0.13		0.18	-0.32			0.26	
9034	**PERTH REGIONAL OFFICE**	WA	-31.96	115.87	95	5	11.82	2.26	0.48	0.55	0.63	0.49	0.12				
9500	ALBANY	WA	-35.03	117.88	101	6	-2.34	-2.18									
9510	BRIDGETOWN COMPARISON	WA	-33.96	116.14	101	5	-5.73		-0.99	-0.84	-0.26						
9518	CAPE LEEUWIN	WA	-34.37	115.14	101	5											
9534	DONNYBROOK	WA	-33.57	115.82	101	5	2.52	2.20	-0.52	-0.63	0.34	0.35	0.13				
9581	MOUNT BARKER	WA	-34.63	117.64	101	6	-3.87	-1.94	-1.16		0.14						
10073	KELLERBERRIN	WA	-31.62	117.72	98	4	-9.52	-1.06	-1.89	-1.79		-0.75	0.40		0.20		
10111	NORTHAM	WA	-31.65	116.66	101	5	-1.02	-0.12	-0.29	0.35	-0.45	-0.24	0.15	-0.17			0.12
10579	KATANNING COMPARISON	WA	-33.69	117.56	101	4	0.55	1.90	-1.17	-0.29	0.14		0.13				
10614	NARROGIN	WA	-32.93	117.18	95	4	-1.05	0.90	0.36	-0.87	0.42	-0.12					
10648	WANDERING COMPARISON	WA	-32.68	116.68	102	4	8.65	0.37	0.57	-0.23	0.66	0.12	0.42	0.14	0.15		
12074	SOUTHERN CROSS	WA	-31.23	119.33	100	4	-19.07	-1.41	-1.25	-1.47	-0.90	-0.18		-0.38	0.31	-0.23	-0.20
18070	PORT LINCOLN	SA	-34.72	135.86	110	5	-0.63	-0.94	0.33								
21046	SNOWTOWN	SA	-33.78	138.21	93	5	-2.33	-1.27	-1.76	0.65	0.46		0.30	-0.39	-0.14	0.13	
23000	**ADELAIDE WEST TERRACE**	SA	-34.93	138.59	92	5	-11.69	-0.54	-1.76	-0.26	-1.07		-0.18		-0.18		
26026	ROBE COMPARISON	SA	-37.16	139.76	124	6	-0.42	-0.15	-0.14								
29004	BURKETOWN POST OFFICE	QLD	-17.74	139.55	118	1	11.72	-3.61	-1.41	0.67	-0.72	0.40	0.38	-0.20	0.54		0.32
30018	GEORGETOWN POST OFFICE	QLD	-18.29	143.55	113	1	41.21	0.69	1.51		0.22	0.27	0.16	0.12	0.11	0.19	
30045	RICHMOND POST OFFICE	QLD	-20.73	143.14	115	3	-1.64	-0.27	0.11	0.31	-0.98	0.21	0.17	0.23		-0.14	-0.44
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.58	147.41	94	1	2.35	1.90	-0.14	0.70	-0.13						
33047	TE KOWAI EXP STN	QLD	-21.16	149.12	100	2	-8.45	-1.37	-0.51	-0.62	-0.46	-0.18					
34002	CHARTERS TOWERS POST OFFICE	QLD	-20.08	146.26	99	3	-14.46	-1.76	-0.32	0.56	-0.46	0.38		-0.36	-0.12	-0.11	-0.18
35027	EMERALD POST OFFICE	QLD	-23.53	148.16	103	2	-20.01	1.70	0.71		-0.60	-0.12	-0.74		0.23	-0.24	
38003	BOULIA AIRPORT	QLD	-22.91	139.90	120	3	4.08		0.23	-0.54	0.43	0.17			-0.15		
39015	BUNDABERG POST OFFICE	QLD	-24.87	152.35	98	2											
39039	GAYNDAH POST OFFICE	QLD	-25.63	151.61	115	3	-13.73	-0.11	-0.28	-0.71	-0.39	-0.33	-0.31	-0.26			
40214	**BRISBANE REGIONAL OFFICE**	QLD	-27.48	153.03	99	2	-3.62	-2.02	-0.35	-0.14							
40264	TEWANTIN POST OFFICE	QLD	-26.39	153.04	101	2	0.33	0.88			-0.13						
41023	DALBY POST OFFICE	QLD	-27.18	151.26	99	3	-13.96	0.38	0.81	-1.48		-0.58	-0.19	-0.12		-0.26	-0.26
41038	GOONDIWINDI POST OFFICE	QLD	-28.55	150.31	100	3	-27.25	0.33		-1.75	-0.79	-0.17	0.16	-0.55	-0.13	-0.11	-0.27
46037	TIBOOBURRA POST OFFICE	NSW	-29.43	142.01	98	4	10.12	1.71	0.30	-0.30	0.63	-0.21		0.44		-0.32	-0.12
48013	BOURKE POST OFFICE	NSW	-30.09	145.94	125	4	-45.11		-0.22	-1.30	-0.12	-0.45	0.42	-0.59	-0.46	-0.26	-0.23
52026	WALGETT COUNCIL DEPOT	NSW	-30.02	148.12	115	4	-11.32	0.28	-0.22		0.19	0.18	0.49	-0.33	-0.18	-0.23	-0.15
55023	GUNNEDAH POOL	NSW	-30.98	150.25	132	4	-36.98	-0.75	-1.07	-0.64	-0.45	-0.39	-0.51	-0.80	-0.22	-0.17	-0.24
56017	INVERELL COMPARISON	NSW	-29.78	151.11	123	4	-8.84	-0.37	-0.28	-0.23	-0.34	-0.40	-0.19	-0.22			
63004	BATHURST GAOL	NSW	-33.42	149.55	125	7	-9.00	-1.99	-0.76	-0.52	-0.28	-0.22					
65016	FORBES (CAMP STREET)	NSW	-33.39	148.01	125	4	-20.51	-1.44	-0.64	-1.09	-0.59		-0.54	-0.14	-0.30		-0.15
66062	**SYDNEY (OBSERVATORY HILL)**	NSW	-33.86	151.21	149	5	1.12	0.96									
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.53	144.95	145	4	-24.40	-0.62	-1.64	-1.07	-0.47	-0.82	-0.36	-0.47	-0.24		
78031	NHILL	VIC	-36.33	141.64	111	2	3.28	0.37		0.83	0.31		-0.11	-0.10		0.11	
82039	RUTHERGLEN RESEARCH	VIC	-36.10	146.51	96	4	0.77	-0.29			0.11		0.20	-0.23	0.14	0.14	
86071	**MELBOURNE REGIONAL OFFICE**	VIC	-37.81	144.97	153	6	-0.71	-1.21	0.16	0.18							
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.86	143.51	144	6	-1.36	-0.71	-0.20								
91057	LOW HEAD (COMPARISON)	TAS	-41.06	146.79	106	7											
94029	**HOBART (ELLERSLIE ROAD)**	TAS	-42.89	147.33	126	7	0.66	0.78									

Table G.3 – Changing trends in number of heatwave events in 46 long-record stations with temperature threshold of 40°C

ID and Location							Average change in number of events in 100 years Tmax >= 40C											
Station No	Station Name	State	Lat-itude	Long-itude	No.of yrs	BCA Climate Zone	Hot day	1-day hotspell	2-day hotspell	3-day hotspell	4-day hotspell	5-day hotspell	6-day hotspell	7-day hotspell	8-day hotspell	9-day hotspell	10-day hotspell
4020	MARBLE BAR COMPARISON	WA	-21.18	119.75	105	1	-29.43	0.88	0.94	1.21	0.44	-0.15	0.16	-0.21	0.48	-0.53	-0.31
9034	**PERTH REGIONAL OFFICE**	WA	-31.96	115.87	95	5	2.33	1.20	0.51								
9500	ALBANY	WA	-35.03	117.88	101	6	-0.42	-0.42									
9510	BRIDGETOWN COMPARISON	WA	-33.96	116.14	101	5	-1.08	-0.67	-0.12								
9518	CAPE LEEUWIN	WA	-34.37	115.14	101	5											
9534	DONNYBROOK	WA	-33.57	115.82	101	5	0.40	0.71									
9581	MOUNT BARKER	WA	-34.63	117.64	101	6	-0.37	-0.44									
10073	KELLERBERRIN	WA	-31.62	117.72	98	4	-3.20	-1.80			-0.17						
10111	NORTHAM	WA	-31.65	116.66	101	5	3.15	0.23	0.72	0.47							
10579	KATANNING COMPARISON	WA	-33.69	117.56	101	4	1.29	0.87	0.22								
10614	NARROGIN	WA	-32.93	117.18	95	4		-0.14		0.19	-0.17						
10648	WANDERING COMPARISON	WA	-32.68	116.68	102	4	2.87	1.63	0.31	0.11							
12074	SOUTHERN CROSS	WA	-31.23	119.33	100	4	-9.21	-3.26	-1.33	-0.26	-0.14		-0.13				
18070	PORT LINCOLN	SA	-34.72	135.86	110	5	-0.32	-0.17									
21046	SNOWTOWN	SA	-33.78	138.21	93	5	-0.60	-0.32	0.48	-0.42	-0.14						
23000	**ADELAIDE WEST TERRACE**	SA	-34.93	138.59	92	5	-4.57	-1.61	-0.61	-0.13	-0.25						
26026	ROBE COMPARISON	SA	-37.16	139.76	124	6											
29004	BURKETOWN POST OFFICE	QLD	-17.74	139.55	118	1	0.92	0.10		0.17	0.14						
30018	GEORGETOWN POST OFFICE	QLD	-18.29	143.55	113	1	5.59	1.18	0.40	0.17	0.29	0.15					
30045	RICHMOND POST OFFICE	QLD	-20.73	143.14	115	3	-10.17	0.43	0.46	-0.48	-0.26		-0.27	-0.33		-0.13	-0.17
33001	BURDEKIN SHIRE COUNCIL	QLD	-19.58	147.41	94	1	0.11		0.13								
33047	TE KOWAI EXP STN	QLD	-21.16	149.12	100	2											
34002	CHARTERS TOWERS POST OFFICE	QLD	-20.08	146.26	99	3	-3.73	-0.61	-0.48	-0.37		-0.15					
35027	EMERALD POST OFFICE	QLD	-23.53	148.16	103	2	-5.82	-0.45	-0.93	-0.52	-0.14						
38003	BOULIA AIRPORT	QLD	-22.91	139.90	120	3	-7.55	-1.09	0.25	-0.45		0.11	0.13		0.24		-0.23
39015	BUNDABERG POST OFFICE	QLD	-24.87	152.35	98	2											
39039	GAYNDAH POST OFFICE	QLD	-25.63	151.61	115	3	-1.51	-0.42	-0.16		-0.12						
40214	**BRISBANE REGIONAL OFFICE**	QLD	-27.48	153.03	99	2	-0.19	-0.19									
40264	TEWANTIN POST OFFICE	QLD	-26.39	153.04	101	2											
41023	DALBY POST OFFICE	QLD	-27.18	151.26	99	3	-2.23	-0.60		-0.19	-0.20						
41038	GOONDIWINDI POST OFFICE	QLD	-28.55	150.31	100	3	-7.45	-1.29	-0.71	-0.37	-0.31	-0.14	-0.11				
46037	TIBOOBURRA POST OFFICE	NSW	-29.43	142.01	98	4	4.67	0.67	0.45		0.21	0.42		0.24	-0.11		
48013	BOURKE POST OFFICE	NSW	-30.09	145.94	125	4	-31.57	-4.58	-2.42	-1.16	-0.66	-0.90	-0.33	-0.20	-0.14	-0.23	-0.15
52026	WALGETT COUNCIL DEPOT	NSW	-30.02	148.12	115	4	-5.39	-0.82	-0.21		-0.24	-0.18					
55023	GUNNEDAH POOL	NSW	-30.98	150.25	132	4	-9.38	-1.75	-1.06	-0.78	-0.28	-0.28					
56017	INVERELL COMPARISON	NSW	-29.78	151.11	123	4	-0.73	-0.38		-0.12							
63004	BATHURST GAOL	NSW	-33.42	149.55	125	7	-0.69	-0.19	-0.21								
65016	FORBES (CAMP STREET)	NSW	-33.39	148.01	125	4	-4.36	-0.34	-0.66	-0.47	-0.25						
66062	**SYDNEY (OBSERVATORY HILL)**	NSW	-33.86	151.21	149	5	0.14	0.11									
74128	DENILIQUIN (WILKINSON ST)	NSW	-35.53	144.95	145	4	-10.90	-2.21	-1.13	-0.60	-0.53	-0.17					
78031	NHILL	VIC	-36.33	141.64	111	2	0.77	0.18	0.63								
82039	RUTHERGLEN RESEARCH	VIC	-36.10	146.51	96	4	-0.35	0.32	-0.12								
86071	**MELBOURNE REGIONAL OFFICE**	VIC	-37.81	144.97	153	6	-0.16										
90015	CAPE OTWAY LIGHTHOUSE	VIC	-38.86	143.51	144	6	-0.17										
91057	LOW HEAD (COMPARISON)	TAS	-41.06	146.79	106	7											
94029	**HOBART (ELLERSLIE ROAD)**	TAS	-42.89	147.33	126	7											

APPENDIX H – House 1 Base: Plan and Construction Details

House 1, Base specification	
External walls	Steel cladding on 90mm stud with R1.0 bulk insulation fitted between studs and 10mm plasterboard inner surface. Colour: Medium
Floor	Concrete slab on ground
Floor coverings	Locations as detailed on floor plan. Carpet with 10mm felt underlay. 8mm thick ceramic tiles fixed directly to floor.
Internal walls	90mm timber studs with 10mm thick plasterboard to each side.
Ceilings	13mm plasterboard. R2.0 bulk insulation.
Eave sheet	6mm fibre-cement sheet.
Roof	Continuous surface. Steel deck, light colour. Non reflective sarking.
Awning windows and sliding doors	Timber frames with single glazing, (Generic 03). Medium gap size. No weather strips or seals. Internal Holland blinds. No fly wire screens or doors. No external blinds
External doors	Front door: Timber (solid) 50mm thickness. Medium gap size. No weather strips or seals. No fly wire screens or doors.
Exhaust fans (sealed)	Kitchen (1)
Exhaust fans (unsealed)	1 each to Ensuite, Bathroom, Laundry and WC.


Orientation Diagram
NORTH
65°
155°
245°
335°
patio
carport
kitchen
family
dining
lounge
verandah
l'dry
wc
lin
ent
robe
wir
bed 4
bath
bed 3
bed2
ens
bed 1
floor plan
scale 1:100
EXHAUST FAN (sealed)
EXHAUST FAN (unsealed)
A/T ALUMINIUM/TIMBER FRAMED
WINDOW SIZE
DIST. MM FROM RHS OF WINDOW TO WALL
HOUSE 1
Australian Greenhouse Office
NatHERS Software Accreditation
DRG 01 B
GROUND FLOOR PLAN
HOUSE ENERGY RATING

Contact Us
Phone: 1300 363 400
+61 3 9545 2176
Email: enquiries@csiro.au
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