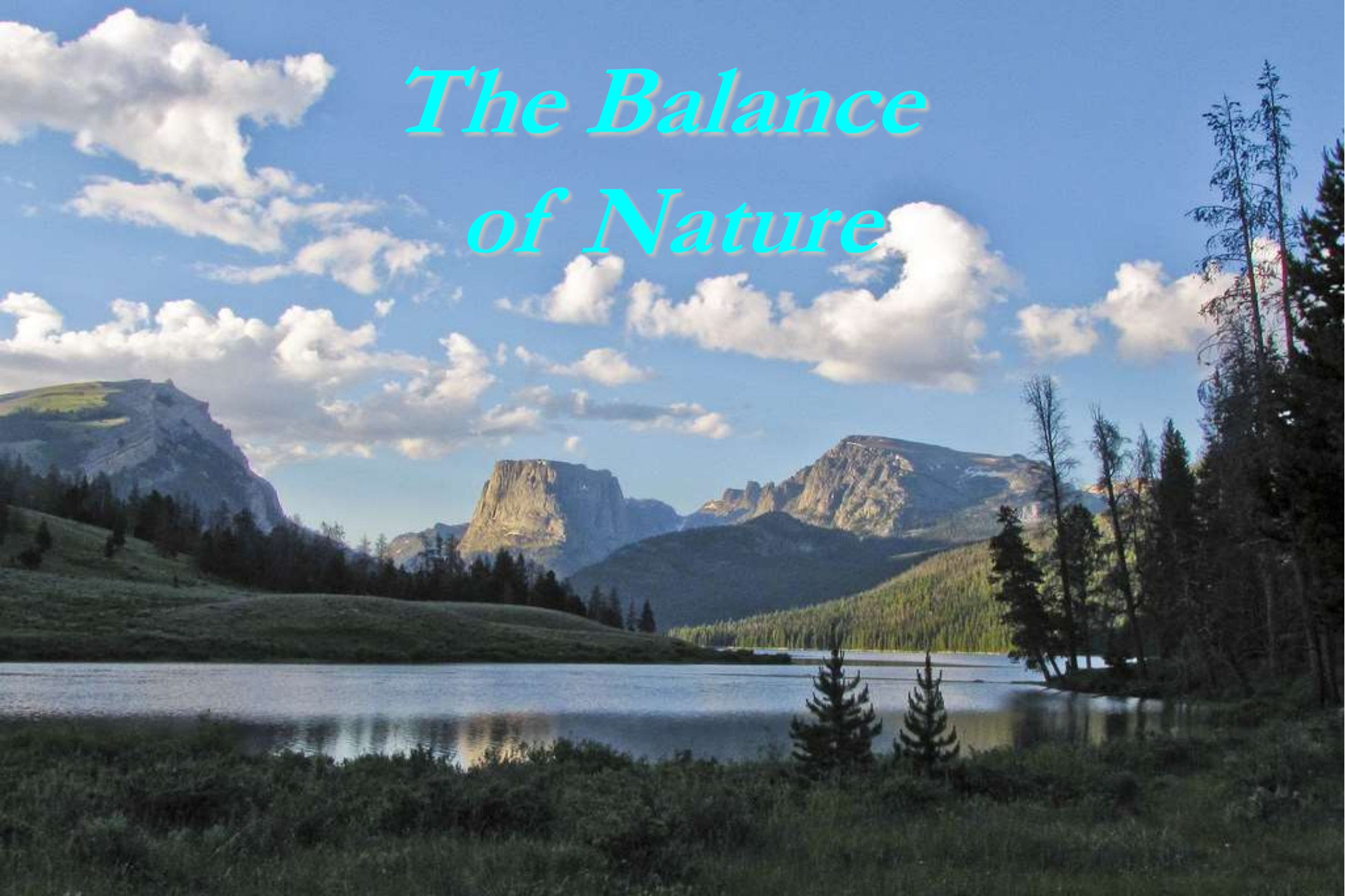


# Climate Science before 1988

**Spencer Weart**

American Institute of Physics

# *The Balance of Nature*







Joseph Fourier







*“As a dam built across a river causes a local deepening of the stream, so our atmosphere, thrown as a barrier across the terrestrial rays, produces a local heightening of the temperature at the Earth's surface.”*

— 1862

John Tyndall



Svante Arrhenius

Cutting the carbon dioxide level in half will lower global temperature by a few degrees

... enough to make an Ice Age





Arvid  
Högbom





Svante Arrhenius

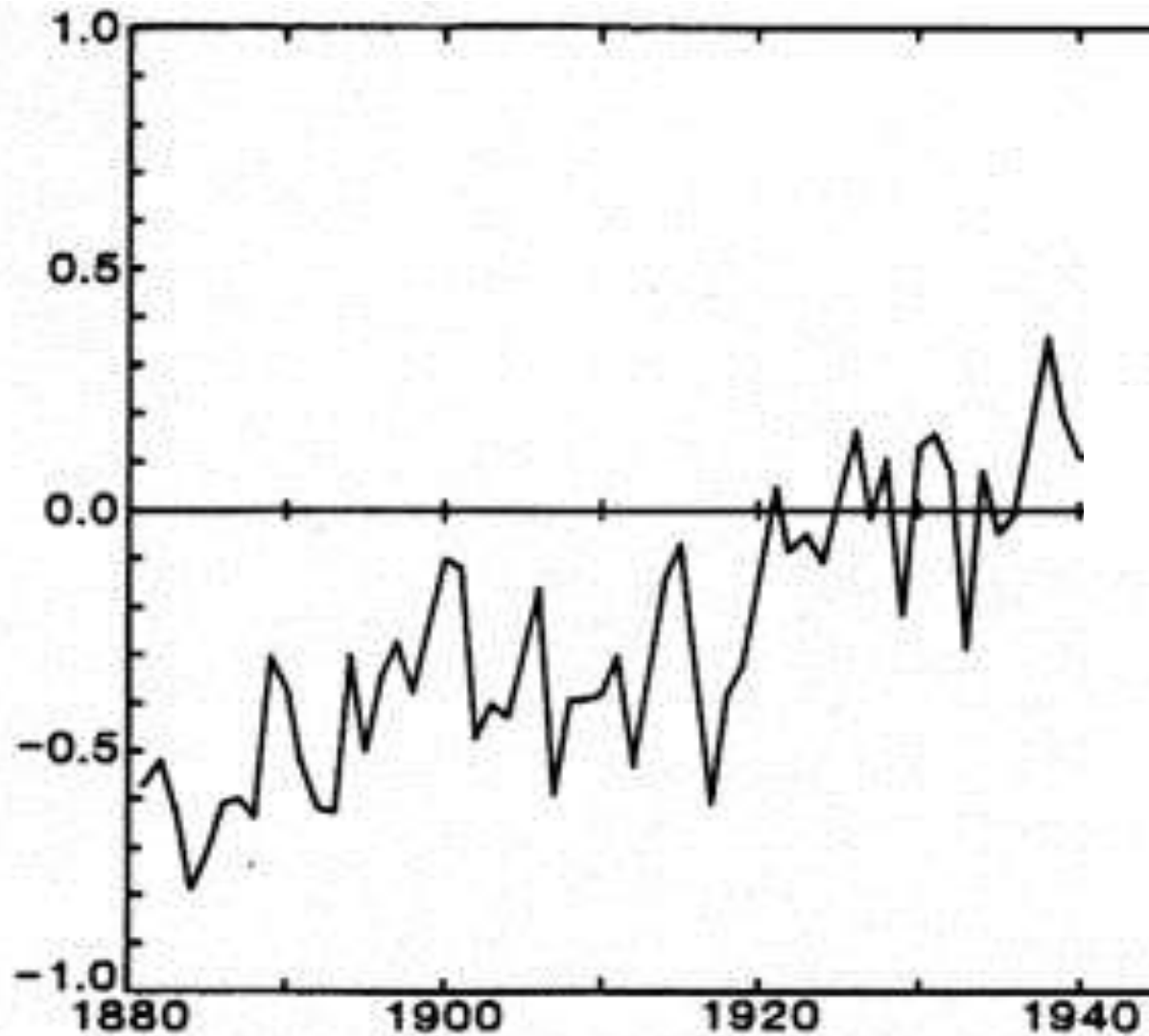
Doubling the carbon dioxide level will raise global temperature by a few degrees

— 1896



**CO<sub>2</sub>**





## Northern Hemisphere Temperatures 1880-1940



WORLD  
METEOROLOGICAL  
ORGANIZATION





Guy Stewart Callendar

**Global temperature will  
rise  $0.3^{\circ}\text{C}$  per century  
— 1938**

*“Meteorologists do not know whether the present warm trend is likely to last 20 years or 20,000 years.”*

*—Time, 1939*



Roger Revelle



CO<sub>2</sub>











Roger Revelle

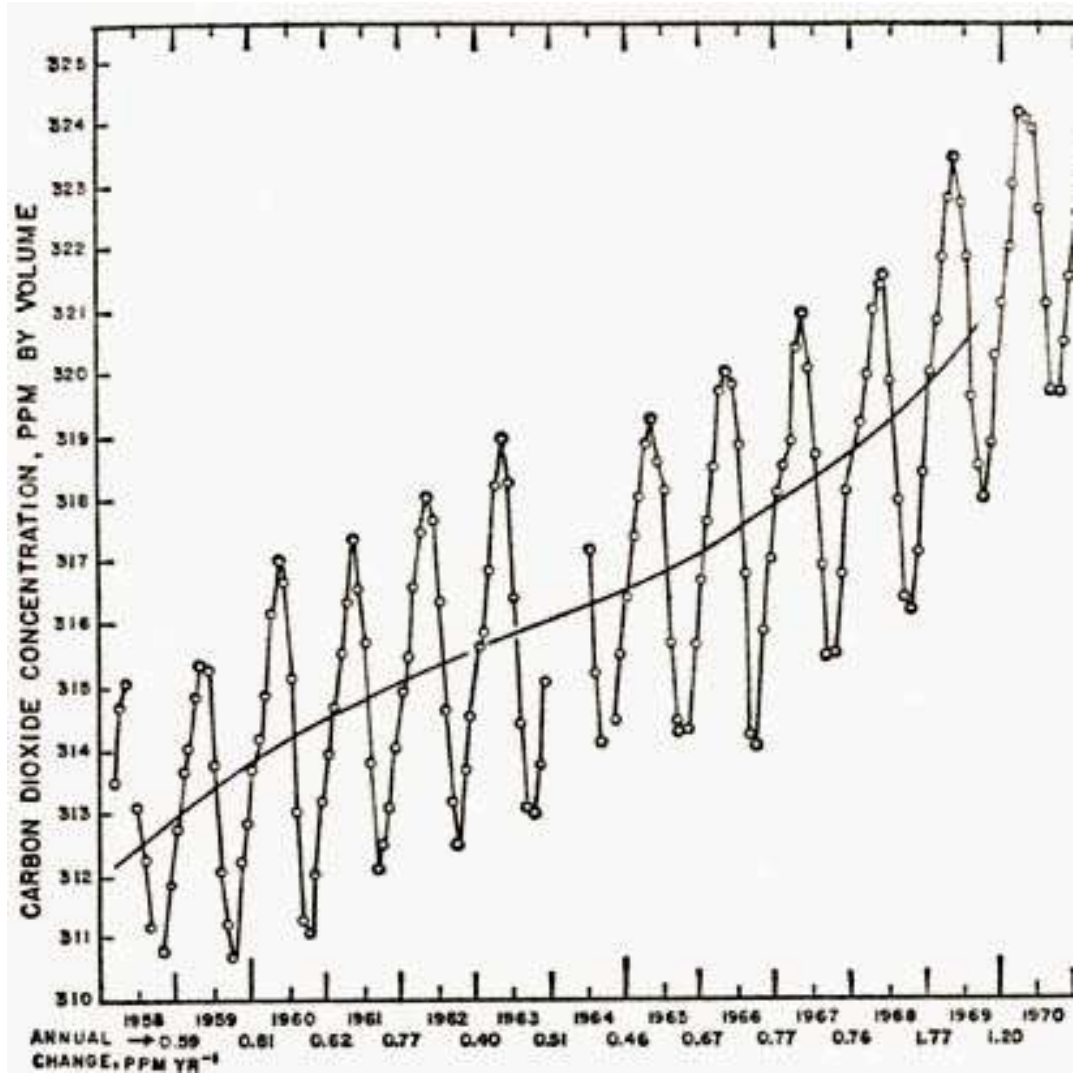
*“Human beings are  
now carrying out a  
large scale  
geophysical  
experiment”*

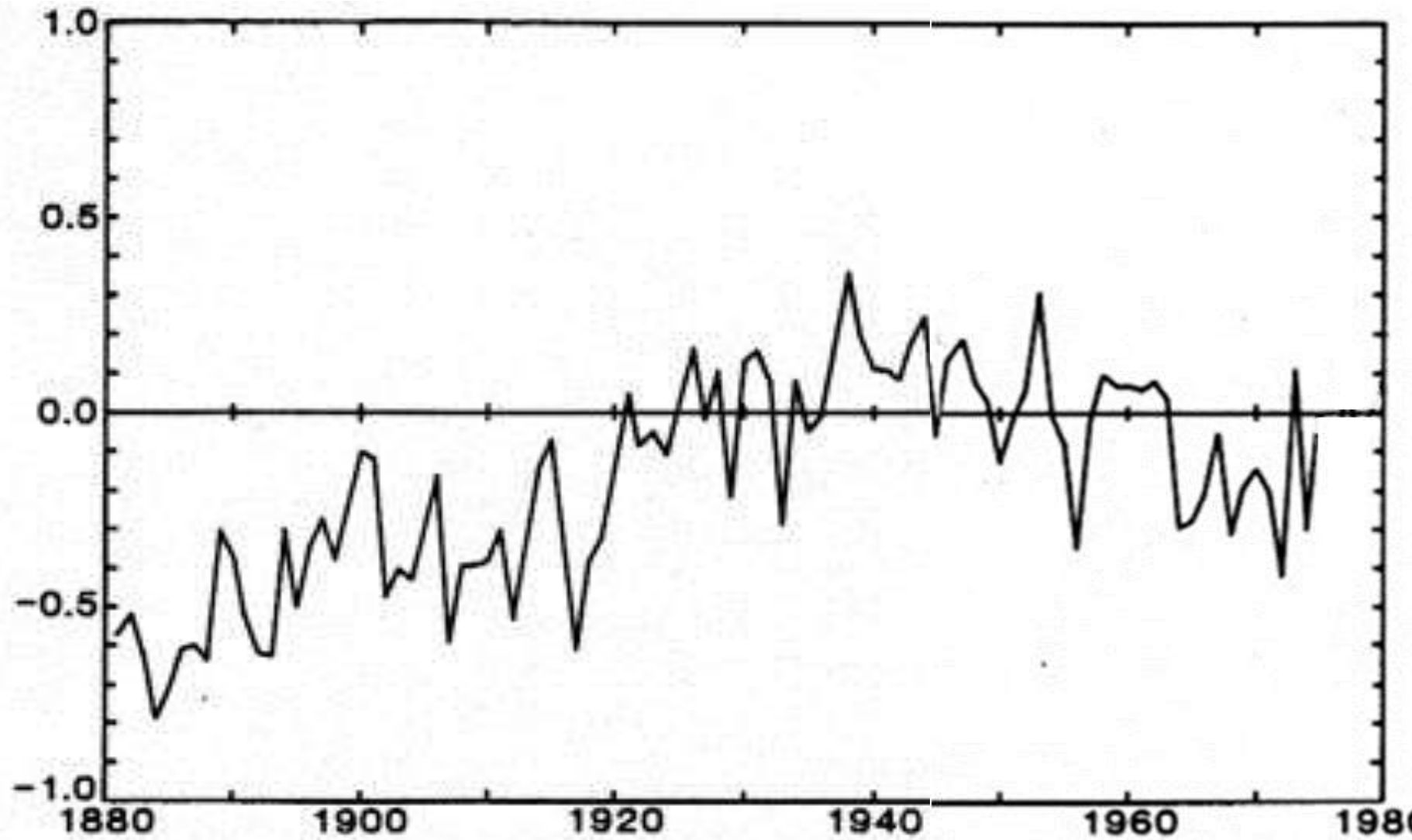
— 1957





Charles David Keeling



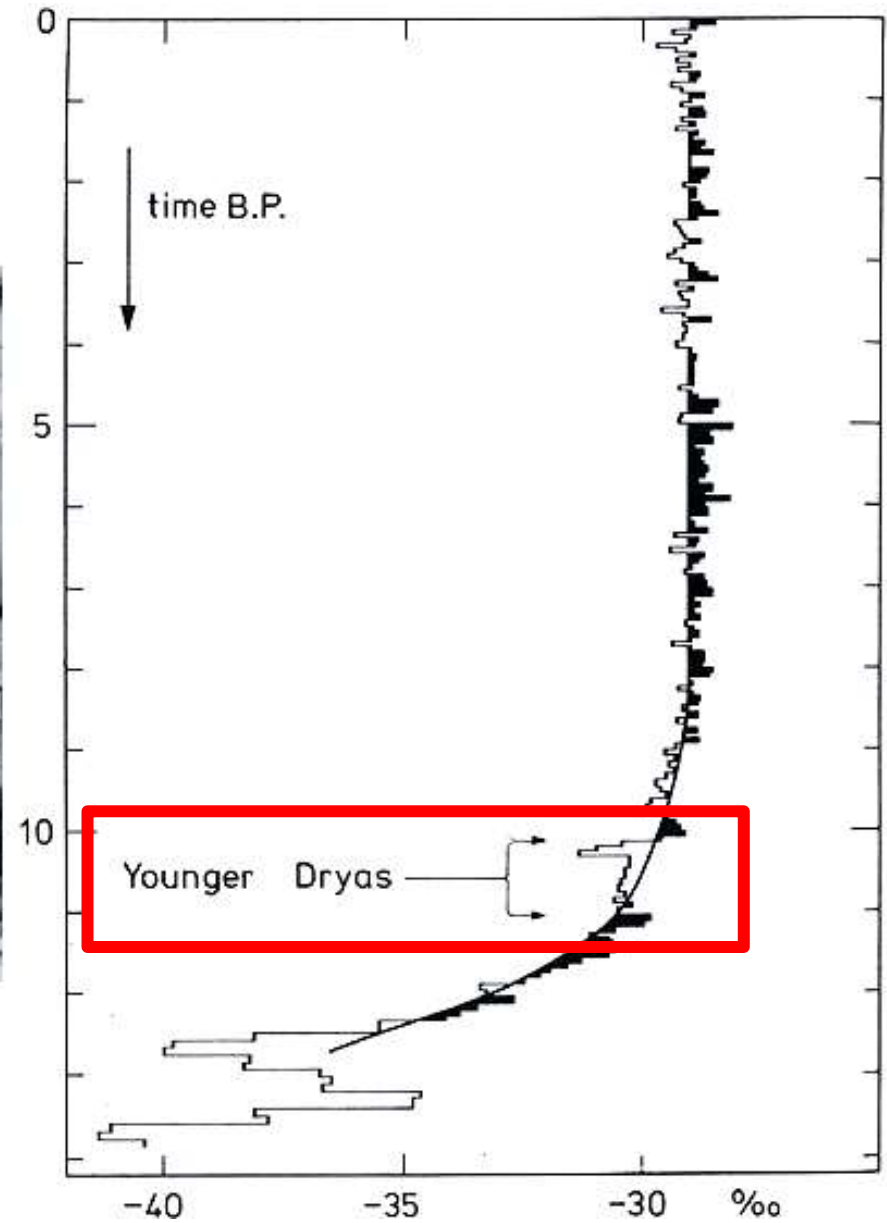


## Northern Hemisphere Temperatures





# Camp Century, Greenland



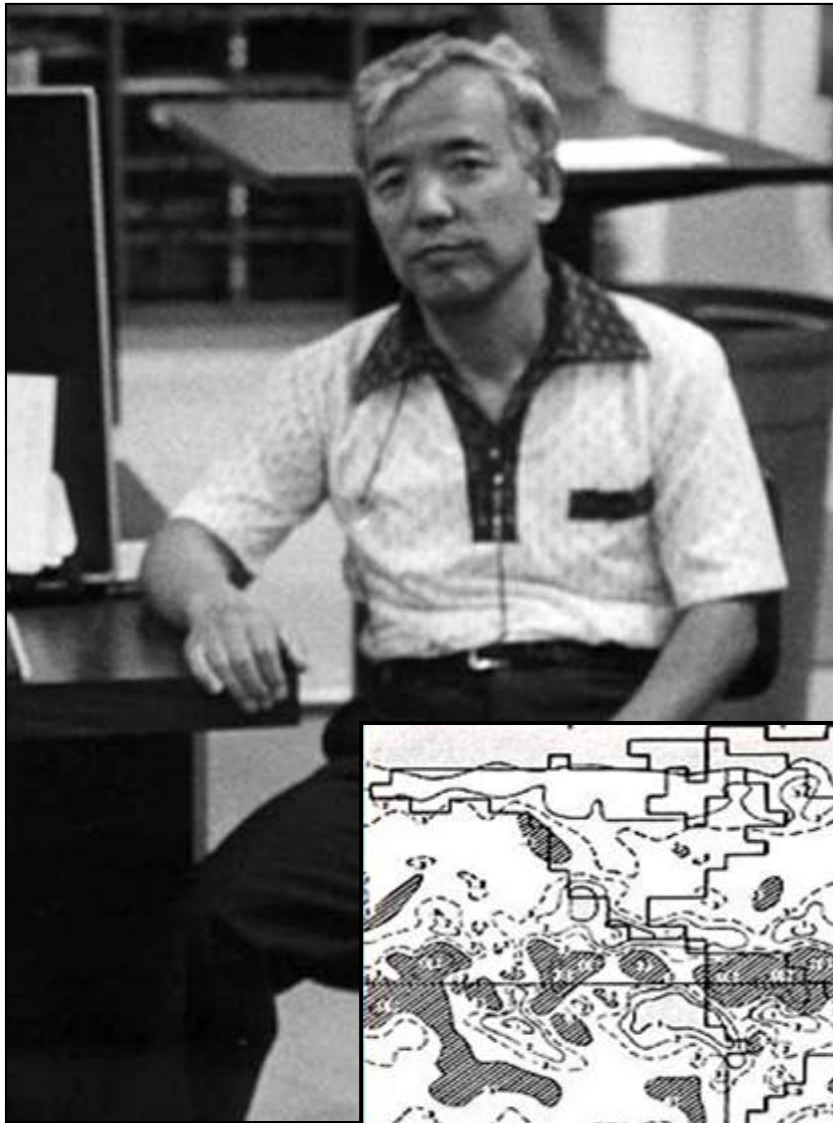
Predictions in 1975 for 21<sup>st</sup> century  
~50 climate experts

Some worry about slow cooling

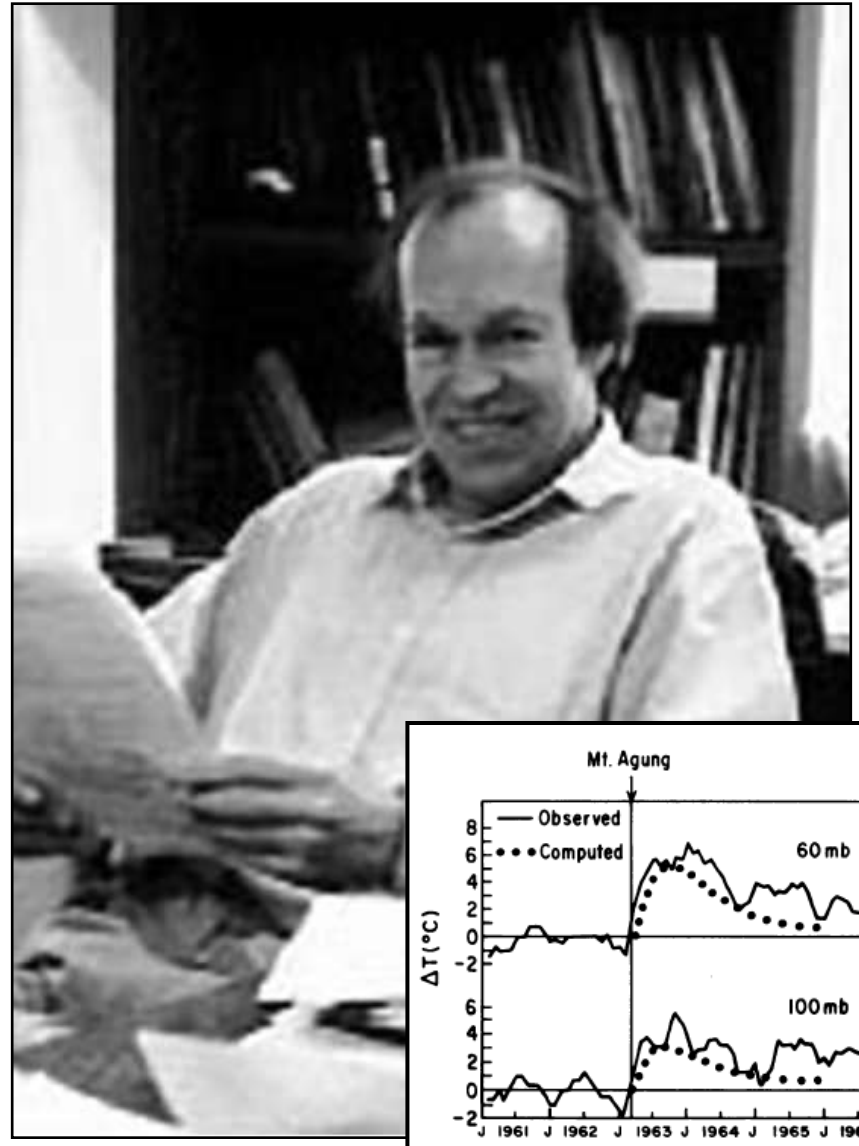
Some worry about slow warming

Most aren't worried

All admit they're just guessing



Syukuro Manabe



James Hansen



# U.S. National Academy of Sciences Charney Panel, 1979



Jule Charney

1½ – 4½ °C rise  
for doubled CO<sub>2</sub>  
...in the next century



V. Ramanathan

**Methane plus other  
trace gases add a  
greenhouse effect  
roughly the same  
amount as CO<sub>2</sub>'s  
— 1985**

# Villach (Austria) meeting, 1985



Mostafa Tolba



Bert Bolin



## Villach (Austria) meeting, 1985

*“A rise of global mean temperature could occur which is greater than any in man's history”*

– call for *“global convention”*

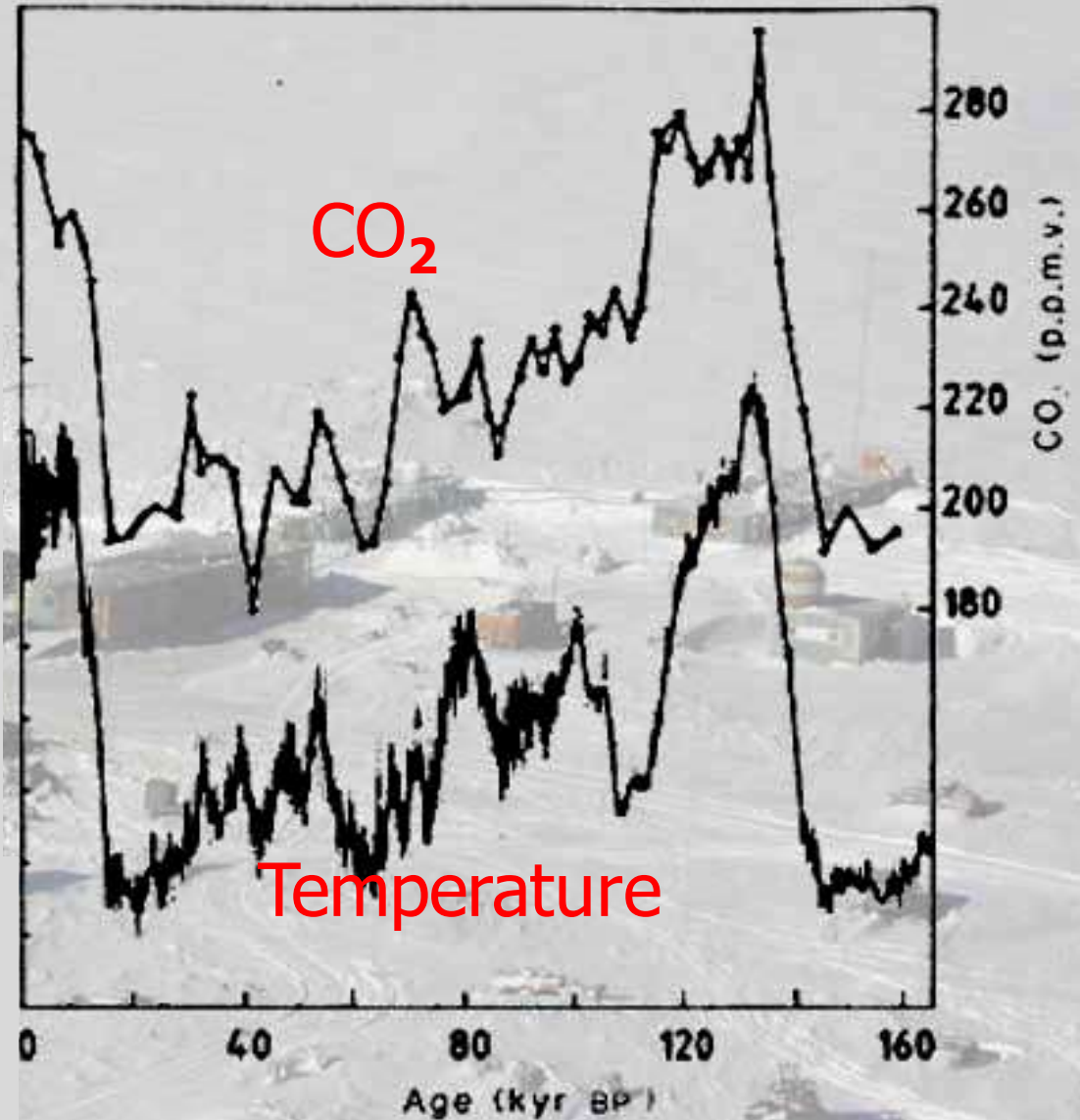
84	1	178	5	173	1	170	4	167	8	165	2	162	7	160	3	157	9
89	8	184	0	178	5	175	7	173	0	170	4	167	8	165	3	162	8
95	6	189	6	183	9	181	1	178	3	175	6	172	9	170	3	167	6
01	4	195	2	189	3	186	4	183	5	180	7	178	0	175	3	172	7
07	1	200	8	194	7	191	7	188	8	185	9	183	1	180	3	177	6
12	9	206	3	200	1	197	0	194	6	191	0	188	1	185	3	182	6
18	6	211	9	205	5	202	4	199	3	196	8	193	2	190	3	187	5
24	4	217	5	210	9	207	7	204	5	201	7	198	3	195	3	192	4
30	1	223	0	216	3	213	0	209	7	206	5	203	4	200	3	197	4
35	9	228	6	221	7	218	3	215	0	211	7	208	5	205	3	202	3
41	6	234	2	227	1	224	7	220	2	216	8	213	5	210	4	207	2
47	4	239	8	232	5	229	0	225	5	222	0	218	6	215	4	212	2
53	1	245	4	237	9	234	3	230	7	227	2	223	7	220	4	217	1
58	8	250	0	243	4	239	6	235	9	232	3	228	8	225	4	222	0
64	6	256	3	248	8	245	0	241	2	237	5	233	9	230	4	227	0
70	4	262	1	254	2	250	3	246	4	242	7	239	0	235	4	231	9
76	1	267	7	259	6	255	6	251	7	247	8	244	0	240	4	236	8
81	9	273	2	265	0	260	9	256	9	253	0	249	1	245	4	241	8
87	6	278	8	270	4	266	2	262	2	258	1	254	2	250	4	246	7



There is a tight link between CO<sub>2</sub> and temperature.

~3°C rise for doubled CO<sub>2</sub>, give or take a degree

...just as the computer models say



# Toronto Conference, 1988

*Goal: “Reduce CO<sub>2</sub> emissions by approximately 20% of 1988 levels by the year 2005”*



[aip.org/history/climate](http://aip.org/history/climate)