

**Decision IPCC/XLV-2. Sixth Assessment Report (AR6) Products, Outline of the Special Report on climate change and oceans and the cryosphere**

The Intergovernmental Panel on Climate Change decides:

(1) to agree to the outline of the *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* as contained in Annex 1 to this document;

(2) that this report assesses literature relevant to climate change and the oceans and the cryosphere, especially since the Fifth Assessment Report (AR5), consistent with the IPCC Guidance on the Use of Literature;

(3) that the bulleted text in Annex 1 to this Decision, that resulted from the scoping process and refined through comments by the Plenary, be considered by authors as indicative, taking into account the scope of the literature assessment referred to in bullet 2 and scientific gaps that will be explicitly identified;

(4) In order to achieve this, the timetable for the production of the Special Report is as follows:

7 April–19 May 2017	Call for nominations of Coordinating Lead Authors, Lead Authors and Review Editors
30 June 2017	Selection of authors
2–6 October 2017	First Lead Authors Meeting
12–16 February 2018	Second Lead Authors Meeting
4 May–29 June 2018	Expert Review of the First Order Draft
23–27 July 2018	Third Lead Authors Meeting
16 November–11 January 2019	Expert and Government Review of the Second Order Draft
25 February–1 March 2019	Fourth Lead Authors Meeting
14 June–9 August 2019	Final Government Distribution of the Final Draft and Final Government Review of the Summary for Policymakers
23–27 September 2019	IPCC approval of the Summary for Policymakers and acceptance of the Special Report

(5) that the budget for the production of the Special Report is as contained in Decision (IPCC/XLV-3) on the IPCC Trust Fund Programme and Budget.

## IPCC Special Report on the Ocean and Cryosphere in a Changing Climate

**Summary for Policymakers (~10 pages)**

***Technical Summary (consisting of chapter executive summaries with figures) (~20 pages)***

### **Chapter 1: Framing and Context of the Report (~15 pages)**

- Integrated storyline of the report, chapter narrative, chapter sequence and their linkages (including coverage of extremes and abrupt change and irreversible changes)
- Definition of ocean and cryosphere and their components
- Observing capacities, progress and limitations (e.g., time series and spatial coverage)
- Assessment methodologies, including indigenous and community knowledge, risk, including cascading risks, and applications of detection and attribution
- Role of ocean and cryosphere in the climate system, including characteristics, ocean heat content in Earth's energy budget, key feedbacks and time scales
- Implications of climate-related ocean and cryosphere change for resources, natural systems (e.g., change and loss of habitat, extinctions), human systems (e.g., psychological, social, political, cultural and economic aspects), and vulnerability assessments, adaptation limits, and residual risks
- Solutions, including policy options and governance, and linkages of this report to relevant institutional and policy contexts (e.g., UNFCCC, Paris Agreement and SDGs, Sendai Framework)
- Treatment of vulnerabilities and marginalized areas and people (e.g., gender) in this report
- Scenarios and time frames considered in this report
- Treatment of uncertainty

### **Chapter 2: High Mountain Areas (~30 pages)**

- Observed and projected changes in mountain cryosphere (glaciers, permafrost, and snow), common drivers of change, and feedbacks (e.g., CH<sub>4</sub> emissions, albedo) to regional and global climate
- Effects of a changing mountain cryosphere on natural hazards and management options for protecting lives, livelihoods, infrastructure, and ecosystems
- Impacts from changes in the mountain environment, including low latitudes (e.g., Himalayas, Andes, Africa) on habitability, community livelihoods and culture
- Risks for societies that depend on mountain cryosphere for water resources (e.g., human consumption, ecosystems and agriculture), including cascading risks, and potential response strategies (e.g., national and international water resource management and technologies)
- Impacts of variability and trends in water supply on hydropower production and implications for energy policy and water governance
- Influence of mountain cryosphere run-off on river and coastal systems and sea level

### **Chapter 3: Polar Regions (~50 pages)**

- Changes in atmospheric and ocean circulation that influence polar regions, including climate feedbacks and teleconnections and paleo perspectives
- Greenland and Antarctic ice sheets and ice shelves, Arctic and Antarctic glaciers, mass change, physics of dynamical instability and accelerated ice discharge; consequences for ocean circulation and biogeochemistry, and sea level
- Changing snow cover, freshwater ice and thawing permafrost (terrestrial and subsea); carbon flux and climate feedbacks; impacts on infrastructure and ecosystems; community- based adaptation
- Changing sea ice; effects on ocean and atmospheric circulation and climate, including teleconnections; implications for ecosystems, coastal communities, transportation and industry
- Changing polar ocean (physical, dynamical and biogeochemical properties), implications for acidification, carbon uptake and release; impacts on ecosystems and their services (e.g., fisheries); adaptation options (e.g., ecosystem-based management and habitat protection) and limits to adaptation
- Access to resources and ecological, institutional, social, economic, livelihood and cultural consequences of polar change, including issues of international cooperation
- Responses to enhance resilience

### **Chapter 4: Sea Level Rise and Implications for Low Lying Islands, Coasts and Communities**

**(~50 pages)**

- Observations and projections of sea level at global and regional scale, attribution to drivers, factors that influence relative sea level change, and long-term commitment and paleo perspective
- Demographic and socio-economic factors that drive vulnerability and exposure to sea level rise
- Current and future sea level rise risks, including changes in coastal flooding, resulting in biophysical, ecological, economic, political, cultural, social and psychological impacts, displacement and resettlement
- Implications of sea level rise for highly vulnerable coastal zones, particularly SIDS, coastal cities and infrastructure, deltas and low-elevation areas
- Pathways to resilience and sustainable development: adaptation measures and limits, safety margins, barriers and enablers

**Chapter 5: Changing Ocean, Marine Ecosystems, and Dependent Communities (~65 pages)**

- Changes in key physical and biogeochemical properties and processes, including the deep ocean and relevant ocean regions, modes of variability, teleconnections and their feedbacks on the climate system
- Specific and combined effects of changes in climate related variables (e.g., warming, acidification, oxygen loss, dust inputs) on e.g., productivity, species distribution and exclusion, habitat compression, food webs
- Impacts of ecosystem changes on key ecosystem services (e.g., carbon uptake, biodiversity, coastal protection, fisheries, food security and tourism)
- Degradation in benthic habitat (e.g., storm-driven) and improved resilience through conservation and restoration, including coral reefs
- Interactions of climate and non-climatic drivers (e.g., pollution, fishing practices, resource extraction, habitat changes); impacts on marine environments, including coastal, deep and open ocean, ecosystems, and human health (e.g., harmful algal blooms)
- Blue carbon, mangrove restoration, and other nature-based solutions, and ocean implications of different mitigation measures
- Climate change impacts and trade-offs in ocean economies and governance across all scales
- Resilience pathways, adaptation options and limits for marine ecosystem dependent communities and their livelihoods

**Chapter 6: Extremes, Abrupt Changes and Managing Risks (~20 pages)**

- Risks of abrupt change in ocean circulation and cryosphere and potential consequences
- Extreme ENSO events and other modes of variability and their implications
- Marine heat waves and implications
- Changes in tracks, intensity, and frequency of tropical and extra-tropical storms and associated wave height
- Cascading risks (e.g., storm surge and sea level rise), irreversibility, and tipping points
- Monitoring systems for extremes, early warning and forecasting systems in the context of climate change
- Governance and policy options, risk management, including disaster risk reduction and enhancing resilience

**Case Studies, Frequently Asked Questions and Boxes (~20 pages throughout chapters)**

**Integrative Cross-Chapter Box: Low Lying Islands and Coasts (up to 5 pages)**

- Key climate drivers and changes relevant for low lying islands and low lying coastal areas
- Impacts and cascading risks of climate driven changes (e.g., sea level rise, ocean circulation, extreme events), interacting with other drivers, on habitability, infrastructure, communities, livelihoods, loss of lives and assets and territories, infrastructure, ecosystems, coral reefs, access to resources, and on institutional, social, economic, and cultural aspects
- Resilience pathways and adaptation options and their limits to address these changes