



Climate Change 2013: The Physical Science Basis. An overview of the Working Group 1 contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Simon K. Allen (1), Gian-Kasper Plattner (1), Alexander Nauels (1), Yu Xia (1), and Thomas F. Stocker (2)

(1) IPCC WGI TSU, University of Bern, Bern, Switzerland (plattner@climate.unibe.ch), (2) Co-Chair IPCC WGI, Climate and Environmental Physics, University of Bern, Bern, Switzerland

The Working Group 1 contribution to the IPCC Fifth Assessment Report (AR5) extends from observations and paleoclimate information regarding past changes in the climate system, a comprehensive evaluation of climate models, the detection and attribution of observed changes to natural or anthropogenic forcing, through to projected future changes on both near-term and long-term time scales.

Human influence on the climate system is now detected with increased certainty, both globally and in most regions. Since the mid-20th century, the increase in anthropogenic greenhouse gas concentrations has led to surface warming over almost the entire globe, while at the same time, the ocean has continued to warm and store energy. Satellite based observations reveal with improved precision that summer sea ice extent is declining rapidly in the Arctic, glaciers are retreating world-wide, and global mean sea level continues to rise. Concurrent with a continued increase in atmospheric CO₂ concentrations, the oceanic uptake of CO₂ has resulted in decreasing pH of seawater since the beginning of the industrial era.

Projections of future changes in the climate system to the end of the 21st century are based on a series of new climate models and new scenarios, but are broadly consistent with previous assessment findings, confirming widespread and significant changes across the climate system. Greater warming is projected to occur over land than ocean, with the most rapid warming in the Arctic region. Based on modeled changes in seasonal mean precipitation, the contrast between wet and dry regions, and wet and dry seasons is projected to increase as global temperatures rise. Confidence in projections of global mean sea level rise has increased since the previous IPCC assessment report, and projections now include future rapid ice-sheet dynamical changes. On long time scales, warming is dominated by total emissions of CO₂, and many changes will persist for centuries even if CO₂ emissions were stopped.

In 2014, the Fifth Assessment cycle of the IPCC will be completed following the release of the reports of Working Groups II (impacts, adaptation and vulnerability) and Working Groups III (mitigation of climate change), and finally the Synthesis Report, the combined synthesis product based on all three underlying Working Group assessment reports.