

"The World Climate Research Programme (WCRP), sponsored by the World Meteorological Organization (WMO), the International Council for Science (ICSU), and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, has the major objectives to determine the predictability of climate and the effects of human activities on climate. It furthermore promotes and facilitates sharing of the most up-to-date tools, methods and information necessary to meet their climate-related mandates that benefit to society.

Building upon the global efforts of the climate research community, WCRP coordinates a range of activities from observations to modelling, on a foundation of Core-Projects aiming to improve understanding of Earth's physical climate system and the relationship between its elements – atmosphere, oceans, sea and land ice, and the land surface. In doing so, WCRP recognizes areas of major challenges in climate research, and in response has undergone an extensive community engagement process to identify a few Grand science Challenges (GCs): They focus on areas of high-priority research that require international partnerships and coordination, that yield tangible outcome and actionable information for decision makers in a defined time frame.

The GC on Understanding and Predicting Weather and Climate Extremes (GC-Extremes) addresses both the science questions and the data to better identify the factors and mechanisms that determine the location, intensity, and frequency of various extremes. One of the key underlying questions within the GC, "How can we improve the collation, dissemination and quality of observations needed to assess extremes and what new observations do we need?", leads rigorous evaluation of gaps in the amount, quality, consistency and availability in both in-situ and remote sensed measurements, especially for extremes. It also directly brings the need to improve utilization/blending of satellite observations and synthesis product that blend all observations to help to achieve the necessary spatial cover and, with limitations, temporal resolutions. Early success of the GC implementation shows that coordination effort among in-situ, remote sensing and reanalyses communities have made significant progress in the assessment of extremes (e.g. CLIMDEX). Currently identified gaps and opportunities also include a potential to use satellite data in monitoring and simulating extremes over complex terrain / mountainous areas, and for targeted extreme measurements such as heatwave."