

Statement to SBSTA 51 on behalf of WCRP

2-13 December 2019, Madrid

The World Climate Research Programme (WCRP) leads the way in addressing frontier scientific questions related to the coupled climate system.

The collection, and analysis, of sustained high-quality multi-variate, multi-scale observations of the climate system is a fundamental element of climate system research. Climate observations are global by definition; however strong regional and local scale observations are required to capture intermediate and small-scale processes that play a critical role in the climate evolution.

Climate observations are needed to characterize climate processes and feedback mechanisms that need to be understood and implemented in climate models. Observations are critical to understand the climate system but also to verify and improve climate simulations through model improvements and through data assimilation and parameter estimation. The observations are necessary to capture the evolving climate system, to identify the human impact on climate and to identify also the positive effect of mitigation strategies.

As an example, monitoring the evolution of the Earth's Energy budget, systematic observations are required of the Earth system for the storage of heat in the ocean, land, cryosphere and atmosphere from seasonal to longer time scales. A combined use of observations and models is fundamental. For decadal predictions, syntheses of ocean observations are essential as initial conditions and comprehensive information is also needed on conditions on the atmosphere, the cryosphere and the land.

For the longer timescales model simulations, e.g., generated through the WCRP Coupled Model Intercomparison Project (CMIP), climate observations are essential to document the credibility of the models. Early results from CMIP6 suggest the existence of higher climate sensitivity than previously believed. Observations are required to solve this puzzle.

To support climate research, we require well-coordinated international *in situ* and space-based observing programs, which build on the most advanced sensor technology and instruments. Developing synergies between disparate observing components is critical to capture the full complexity of the system, as is the characterization of bias and uncertainty in instruments and observational products.

We also need sustained and quality-controlled climate system observational records, and the continuous improvement and timely availability of temporally consistent datasets. This includes sustained synthesis efforts, such as reanalysis in the atmosphere, the ocean and, in the future, in the coupled climate system. Common data formats, metadata requirements, and citation standards are needed to improve the accessibility of datasets for all researchers.

To serve these purposes, free access to all data and products by the international community is necessary.

Thank you.