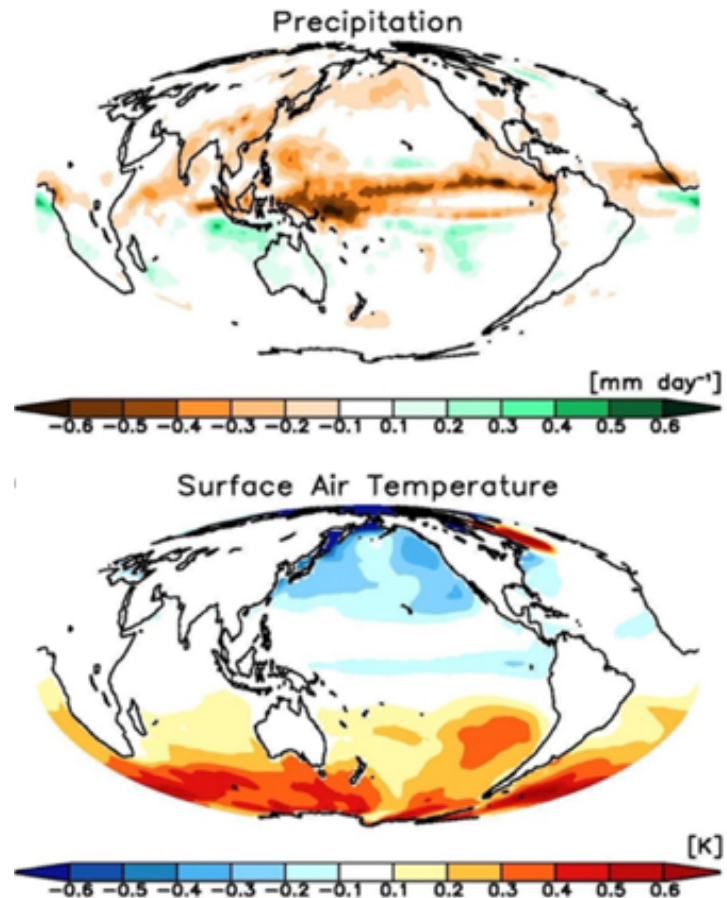


Climate Change: Impacts of Global Warming on the Hydrological Cycle

The goals of this research are: 1) to better understand how the increases in greenhouse gases and anthropogenic aerosols modify the intensity and distribution of rainfall; and 2) to better understand how changes the atmospheric circulation further amplifies the rainfall changes through radiative feedbacks involving clouds and water vapor. We use global climate model simulations that performed as part of the Coupled Model Intercomparison Project (CMIP6) to examine the response of rainfall to both realistic and idealized emission scenarios. These simulations are used in conjunction with detailed feedback analyses to better understand the contributions of individual climate feedbacks to the changes in rainfall and atmospheric circulation. Historical observations are used to constrain the range of model simulations over the 20th Century and provide improved projections of future rainfall change.



Climate Change: Sensitivity of the Climate to Increasing Greenhouse Gases

The sensitivity of the climate to increasing greenhouse gases is largely determined by radiative feedbacks that act to amplify the initial perturbations in energy at the top of the atmosphere. The goals of this research are to: 1) Diagnose these radiative feedback processes in global climate models used in support of the upcoming Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6); 2) Compare the model-simulated radiative feedbacks with those inferred from observations using the NASA “A-Train” constellation of climate monitoring satellites. The climate model simulations will be used to assess the relationship between observable changes in climate over the satellite-period of record with model projections of future change during the 21st Century. The satellite observations will be used to identify those feedback processes that are most faithfully reproduced in the models. These results will then be used to constrain future projections of climate change.

