



## **Adjustments in the forcing-feedback framework for understanding climate change**

Piers Forster (1), Steven Sherwood (2), Sandrine Bony (3), Olivier Boucher (3), Christopher Bretherton (4), Jonathan Gregory (5,6), and Bjorn Stevens (7)

(1) University of Leeds, Leeds, UK, (2) University of New South Wales, Sydney, Australia, (3) Laboratoire de Meteorologie Dynamique, CNRS, France, (4) University of Washington, Seattle, U.S, (5) University of Reading, Reading, UK, (6) UK Met Office, Exeter, UK, (7) Max Planck Institute for Meteorology, Hamburg, Germany

The simple forcing-feedback framework that has been developed over the past decades has proven indispensable for interpreting global climate change. However, as simulations have probed this framework, shortcomings and ambiguity in the framework have become more evident and physical effects unaccounted for by the traditional framework have become interesting.

As a result, the IPCC 5th Assessment Report has extended the concept of forcing to include rapid adjustments and introduces the associated effective radiative forcing concept. These concepts, related to the older ones of climate efficacy and stratospheric adjustment, are a more physical way of capturing unique responses to specific forcings.

This presentation presents, in a historical and pedagogical manner, the concept of adjustment, why it is important, and how it can be used, highlighting its use within the IPCC report. It is particularly useful for aerosols, where it helps to organize what has become a complex array of forcing mechanisms. It also helps clarify issues around cloud and hydrological response, transient vs. equilibrium climate change, and geoengineering.