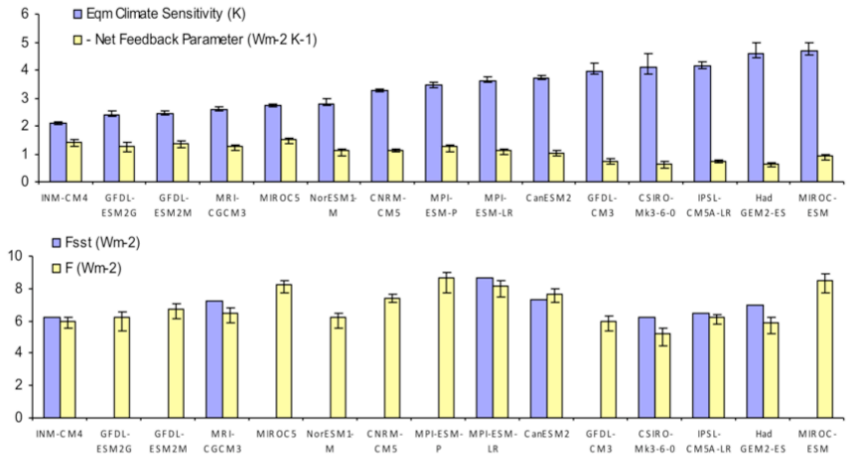
Forcing, feedbacks and climate sensitivity in CMIP5 models

Objectives:

- Quantify forcing and feedbacks in CMIP5 simulations
- Account for "fast adjustments" that affect forcing
- Determine which feedbacks are responsible for the range of model responses



Across CMIP5 models the equilibrium $2xCO_2$ climate sensitivity spans the range 2.1 – 4.7 K with climate feedbacks and (to a lesser degree) adjusted CO_2 radiative forcing responsible for the differences.

Research:

Exploiting the CMIP5 abrupt $4xCO_2$ experiments, we applied a linear forcing-feedback regression technique to diagnose both the climate sensitivity and the adjusted $4xCO_2$ radiative forcing.

Impact:

By showing which feedbacks are responsible for the range of climate responses in CMIP5 models, we demonstrate the continued uncertainty associated with clouds. The estimates of forcing and feedback will help us to better understand the range of future projections produced by CMIP5 models.

Reference: Timothy Andrews, Jonathan M. Gregory, Mark J. Webb, and Karl E. Taylor: Forcing, feedbacks and climate sensitivity in CMIP5 coupled atmosphere-ocean climate models. *Geophys. Res. Letts.*, **39**, L09712, doi:10.1029/2012GL051607, 2012.