



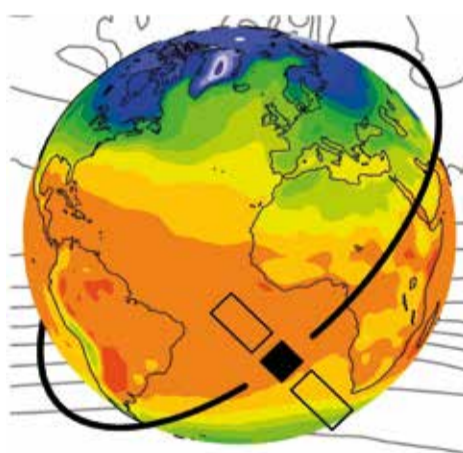
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Wednesday, 2nd December 2015, 2:00 p.m. [14:00h]
GEOMAR Lecture Hall West (R.B54) | Düsternbrooker Weg 20, 24105 Kiel

Earth System Model Evaluation with Observations to Constrain Future Climate Projections



The evaluation of Earth system models (ESMs) with observations is crucial for model improvements and a better process understanding of the climate system. It is also a vital prerequisite for trustworthy climate projections to be used for policy guidance.

High-profile reports such as the Intergovernmental Panel on Climate Change Fifth Assessment Report [IPCC AR5] attest to the exceptional societal interest in understanding and projecting future climate. The climate projections considered in IPCC AR5 are mostly based on ESM experiments defined and internationally coordinated as part of the Coupled Model Intercomparison Project Phase 5 [CMIP5]. However, adequate use of CMIP results requires an awareness of the limitations. It is essential, therefore, to subject models to a systematic evaluation against observations. While progress has been made in ESM evaluation over the last decades, there are important opportunities and challenges for CMIP6 which I will review in my talk, starting from existing knowledge. One longstanding open scientific question is the missing relation between model performance and future projections. While evaluation of the evolving climate state and processes can be used to build confidence in model fidelity, this does not guarantee the correct response to changed forcing in the future. The relatively new field of emergent constraint analysis which refers to the use of observations to constrain a simulated future Earth system feedback offers the potential to reduce uncertainty in climate projections.