Geophysical Research Abstracts
Vol. 18, EGU2016-17529, 2016
EGU General Assembly 2016

Forced and internal variability in temperature simulations and reconstructions of the Common Era

Laura Fernández-Donado (1), J. Fidel González-Rouco (1), Elena Garcia-Bustamante (2), Jason S. Smerdon (3), Juerg Luterbacher (4), and Christoph C. Raible (5)

(1) Instituto de Geofisicas (CSIC-UCM). Universidad Complutense de Madrid, CC. Físicas, Dpto. Física de la Tierra, Astronomía y Astrofísica II, Madrid, Spain (laurafernandez@fis.ucm.es), (2) Renewable Energy Unit. CIEMAT. Madrid, Spain, (3) Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York, USA., (4) Department of Geography, Climatology, Climate Dynamics and Climate Change, Justus Liebig University of Giessen, Giessen, Germany., (5) Climate and Environmental Physics, and Oeschger Centre for Climate Change Research, University of Bern, Bern, Switzerland.

The relatively short ranges of external forcing variability within the CE represent a challenge in as much as the consistency between simulations and reconstructions can be affected by the large uncertainties in their respective responses to the external forcings. One of the core questions within this work relates therefore the extent to which a straight response to the external forcing can be identified during the period under study and whether this signal is common to simulated and reconstructed temperature.

This study is based on an exhaustive compilation, analysis and intercomparison of the available hemispherical and global temperature reconstructions as well as a complete ensemble of simulations including both PMIP3/CMIP5 and non-PMIP3 model experiments. In addition, the various external forcing configurations applied to the models are characterized and a Total External Forcing, including all the individual forcing contributors, is developed for each experiment.

Based on the linear relationship found at multidecadal and longer timescales during the last millennium between the temperature and the total external forcing, a quantitative metric of the ratio of response, the so-called Last Millennium Transient Climate Response (LMTCR), is obtained and compared for simulations and reconstructions. Within the LMTCR context, a significant quantitative consistency between the simulations and reconstructions is addressed.

This work also offers a discussion about the impact that a range of generally accepted methodological approaches might have on the reconstructed ensemble uncertainties and their influences on model-data comparison exercises. A segregation among the various existing spatial targets within the NH, based on the different level of temperatura variability observed in the series, suggests a lower level of model-data consistency during the MCA than previously reported.