Geophysical Research Abstracts
Vol. 16, EGU2014-7071, 2014
EGU General Assembly 2014

Anomaly Transform method for initializing climate forecas.

Vanya Romanova and Andreas Hense
Meteorological Institute, University of Bonn, Bonn, Germany (romanova@uni-bonn.de)

A new approach, an Anomaly Transform method (AT) using a physics based metric, is developed to initialize decadal climate hindcast within the German climate prediction MiKlip project. The method starts from balanced anomaly structures in space and time and between variables derived from control runs and applies an orthogalization to these. Two physics based metric are used to set up the eigen problem (1) the weighted total energy with its zonal, meridional kinetic and available potential energy terms having equal contributions, and (2) the weighted ocean heat content in which a disturbance is applied only to the initial temperature fields. The choice of a reference state defining the anomalies and the selected sequence of anomalies, once on a seasonal timescales and second on an interannual timescales, project a-priori only the slow modes of the ocean physical processes, such that the disturbances grow mainly in the Western Boundary Currents, in the ACC and ENSO regions. An additional set of initial conditions was designed to fit in a least square sense anomalies from the GECCO-2 ocean reanalysis.

These sets of AT initial conditions and the MPIOM-ESM coupled model in T63L47/GR15 resolution were used for ensemble experiments and a retrospective forecast. The weighted total energy norm is used to monitor the amplitudes and rates of the fastest growing error modes. The results showed minor dependence of the instability growth on the selected metric but considerable change due to the rescaling coefficients magnitude on the perturbation amplitude. In contrary to similar atmospheric applications, we find an energy conversion from kinetic to available potential energy, which suggests different source of uncertainties mainly associated with changes in density fields.