Geophysical Research Abstracts,
Vol. 11, EGU2009-12173, 2009
EGU General Assembly 2009

Predictability of observed and modeled North Atlantic sea surface temperatures

L. Zanna (1,2) and E. Tziperman (1)

(1) Harvard University, Earth & Planetary Sciences, Cambridge, MA, United States (zanna@fas.harvard.edu), (2) Oxford University, Atmospheric, Oceanic and Planetary Physics, Oxford, OX1, UK

We explore the optimal perturbations of annual North Atlantic sea surface temperature anomalies (SSTA) using past 100 years ship-based observations and an ocean general circulation model (OGCM).

In order to obtain the optimal initial conditions leading to a transient amplification of the North Atlantic SSTA due to the non-normality of the dynamical operator, a generalized eigenvalue problem is solved. The evaluation of optimals initial conditions in the OGCM is achieved by using its associated tangent linear and adjoint models.

The situation being more complex when using observational data, we follow the linear inverse modeling approach and rely on the statistics of the timeseries to evaluate the dynamical propagator using a reduced space based on empirical orthogonal functions and principal components.

We investigate the predictability of SSTA on interannual to decadal timescales from both model and observations. In addition, we argue that the optimal perturbations reflect the greatest error growth which can be used for ensemble forecast. Basically, the methodology presented here may be used to produce initial perturbations to the ocean state that may result in a stricter estimate of SST and ocean circulation predictability than the common procedure of initializing with an identical ocean state and a perturbed atmosphere.