EMS Annual Meeting Abstracts
Vol. 8, EMS2011-154, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Delayed ENSO impact on spring precipitation over North Atlantic/European region

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Delayed impact of winter sea-surface temperature (SST) anomalies in tropical Pacific on spring precipitation over the North Atlantic/European (NAE) region is examined using both measured and modeled data for the period 1901-2002. The study utilizes Climate Research Unit (CRU) monthly precipitation dataset and also sea-level pressure dataset taken from re-analysis performed by Hadley Centre. Furthermore, ensembles of numerical simulations from three different model experiments made by SPEEDY, an AGCM of intermediate complexity were also used. The SPEEDY simulations forced with observed global SST anomalies as well as integrations performed by SPEEDY coupled with a fixed slab ocean layer in North Atlantic while forced with observed SST anomalies in tropical oceans were applied for the purpose of a more detailed examination of that relationship and to propose a possible physical mechanism of delayed ENSO impact on spring precipitation in the remote NAE region. Additional SPEEDY experiment with the slab ocean layer that has time restricted SST forcing in such a way that ENSO development is allowed only during the cold part of year is performed to distinguish delayed (indirect) and contemporaneous (direct) ENSO effect.

Observational as well as modelling data shows significant time-lagged NAE precipitation response to the winter ENSO forcing. Results obtained by SPEEDY experiment with ENSO forcing restricted to the cold part of year underlie those findings. Since seasonal persistence of ENSO is excluded in that experiment, respective results reflect only time-lagged ENSO impact. The proposed physical explanation of such delayed atmospheric response includes midlatitude SST anomalies in eastern North Atlantic that are affected by tropical Pacific via so called atmospheric bridge. They further interact with the overlaying midlatitude atmosphere altering prevailing westerlies in that region and onshore moisture advection resulting in enhanced (decreased) downstream precipitation during the El Niño (La Niña) events.