Geophysical Research Abstracts
Vol. 15, EGU2013-4905, 2013
EGU General Assembly 2013

Warm water events in the southeast Atlantic and their impact on regional and large-scale atmospheric conditions in the CMIP5 model output

Irena Ott, Karin Lutz, Joachim Rathmann, and Jucundus Jacobeit
Institute of Geography, University of Augsburg, Germany

Two types of El Niño-like events are described in the South Atlantic: the Atlantic Niño in the equatorial Atlantic and the Benguela Niño off the Namibian and Angolan coast. These warm water events are known to be associated with rainfall anomalies at the West and Southwest African coastal region and harm marine ecosystems and fish populations. The two phenomena are handled separately so far, but the identification of warm water events in our study – via similar variabilities of sea surface temperatures (SST) – based on observed SST data (HadISST1.1) as well as global climate model output from CMIP5, involved the definition of an area mean index that includes both Niño types from the Atlantic region.

A multi-model ensemble of the CMIP5 output is used to investigate the impact of Atlantic Niño events on regional atmospheric conditions. Based on the Atlantic SST index, composite analyses give information about anomalous precipitation, air pressure, humidity, evaporation, horizontal wind and vertical air motion patterns over the African continent and the South Atlantic.

The Atlantic variability mode is similar to the Pacific El Niño system, but more irregular and less intense. However, recent studies show that the Atlantic influences the El Niño Southern Oscillation (ENSO) in the Pacific Ocean by the modification of the Walker and Hadley circulations and associated wind stress, thermocline and SST anomalies, further amplified by the Bjerknes positive feedback. As a result, an Atlantic Niño is followed by a La Niña-like phenomenon in the Pacific area with a lag of six months. In our study, the CMIP5 output is considered with respect to its ability of describing the complex connection between the Atlantic and Pacific variability modes. For that purpose, the inter-ocean teleconnection is studied with correlation analyses of the ensemble members of the CMIP5 output by means of the Atlantic index, the Southern Oscillation (SOI) and the Pacific El Niño indices (Niño 1-4 regions).

To estimate the future development of the Atlantic warm water events and their impacts on regional and global atmospheric conditions under enhanced greenhouse warming conditions, the CMIP5 simulations based on Representative Concentration Pathways (RCP) are used.