Geophysical Research Abstracts
Vol. 19, EGU2017-8467, 2017
EGU General Assembly 2017

North Atlantic sub-decadal variability in climate models

Annika Reintges (1), Thomas Martin (1), Mojib Latif (1,2), and Wonsun Park (1)

(1) GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany (areintges@geomar.de), (2) University of Kiel, Kiel, Germany

The North Atlantic Oscillation (NAO) is the dominant variability mode for the winter climate of the North Atlantic sector. During a positive (negative) NAO phase, the sea level pressure (SLP) difference between the subtropical Azores high and the subpolar Icelandic low is anomalously strong (weak). This affects, for example, temperature, precipitation, wind, and surface heat flux over the North Atlantic, and over large parts of Europe. In observations we find enhanced sub-decadal variability of the NAO index that goes along with a dipolar sea surface temperature (SST) pattern. The corresponding SLP and SST patterns are reproduced in a control experiment of the Kiel Climate Model (KCM). Large-scale air-sea interaction is suggested to be essential for the North Atlantic sub-decadal variability in the KCM. The Atlantic Meridional Overturning Circulation (AMOC) plays a key role, setting the timescale of the variability by providing a delayed negative feedback to the NAO. The interplay of the NAO and the AMOC on the sub-decadal timescale is further investigated in the CMIP5 model ensemble. For example, the average CMIP5 model AMOC pattern associated with sub-decadal variability is characterized by a deep-reaching dipolar structure, similar to the KCM's sub-decadal AMOC variability pattern. The results suggest that dynamical air-sea interactions are crucial to generate enhanced sub-decadal variability in the North Atlantic climate.