Geophysical Research Abstracts
Vol. 17, EGU2015-10894-1, 2015
EGU General Assembly 2015
© Author(s) 2015. CC Attribution 3.0 License.

Teleconnections between proxy sites of Arctica Islandica in simulated and observed sea surface temperatures in the North Atlantic Ocean

Maria Pyrina, Sebastian Wagner, and Eduardo Zorita
Institute for Coastal Research, Helmholtz Zentrum Geesthacht, Geesthacht, Germany, (maria.pyrina@hzg.de)

Arctica Islandica, an extremely long lived bivalve, was recently used for long-term climate reconstructions as it combines many characteristics required for being a comprehensive climate archive (Schoene et al., 2005). The North Atlantic Ocean (NA) is a climatic important region where this bivalve shell is widely found. Many studies connect the growth increment indices of this clam with the regional sea surface temperatures (SSTs) (Butler et al., 2013).
It is of critical importance to investigate if the SSTs derived from Arctica Islandica collection areas are dependent on the temperatures of different areas of the NA Ocean. The assement of these teleconnection patterns potentially allows the reconstruction of SSTs of other areas in NA, where this bivalve is not found. Using the temperatures derived from the comprehensive COSMOS Earth System Model (Jungclaus et al., 2010) for three fully forced ensemble simulations and re-analysed SSTs of the COBE2 project (Hirahara et al., 2014), we aim at identifying growing season (June-August) temperature patterns associated with the regions were usually Arctica Islandica is being collected.
We correlated the time series (1950-2000) calculated by the COSMOS model, between two proxy sites of Arctica Islandica and the NA Ocean (20˚–80˚N and 30˚E–90˚W). The first region is located north of Norway at 24° E, 73.8° N and the second north of Iceland at 18° W, 68.4° N. These sites where chosen based on previous studies (Wanamaker et al., 2012).
The comparison between the modelled and the re-analysis teleconnection pattern indicates some similarities concerning a tripole pattern in the North Atlantic Ocean for the Norway proxy site with positive correlation around Norway and the central and western North Atlantic, while the eastern North Atlantic shows slightly negative correlations. This pattern is however more heterogeneous in the COSMOS simulations possibly due to the impact of internal ocean variability in the 2nd half of the 20th century. For the Icelandic site the modelled correlation patterns also show a high degree of heterogeneity over the central and southern North Atlantic Ocean, except for the high correlations around Iceland towards the northeast. Some interesting regional-scale differences in the modelled and re-analysed correlation pattern are evident east and south of Greenland. Here the modelled pattern show high correlation for both, the Icelandic and Norway site, whereas the re-analysis data do not show any correlations.
Our results indicate that there seems to be some potential in reconstructing sea surface temperature patterns based on few proxy sites of Arctica Islandica in the North Atlantic ocean. However, the skill of the reconstruction will be largest over the North-east Atlantic region where proxy information is available.