Geophysical Research Abstracts
Vol. 21, EGU2019-3134, 2019
EGU General Assembly 2019

Developing a protocol for reconstructing the AMOC in the historical period using surface data

Victor Estella Perez (1), Juliette Mignot (1), Eric Guilyardi (1), and Didier Swingedouw (2)

(1) LOCEAN, IPSL-IRD-CNRS, Université Pierre et Marie Curie, Paris, France (victor.estella-perez@locean-ipsl.upmc.fr), (2) EPOC, CNRS, Université de Bordeaux, Bordeaux, France

The Atlantic Meridional Overturning Circulation is one of the main drivers of the Atlantic climate variability, primarily through its role in transporting heat to the northern latitudes. The reconstruction of the AMOC assimilating both Sea Surface Temperature (SST) and Sea Surface Salinity (SSS) have proved successful in a perfect model framework in the IPSL coupled climate model. The strategy is based on a simple Newtonian relaxation, or nudging, of the modelled SSS and SST towards observations. In this work we present the development of a protocol aiming at applying these techniques in the historical framework, using records of SST and a recently released SSS dataset extending from 1896 to present over the North and tropical Atlantic. The specificities of the dataset, with very coarse spatial and low temporal resolutions, have been explored in a perfect model framework: a set of experiments using a pseudo-proxy approach has been designed to define the best strategy to use these data. Using spatial and temporal resolutions for SSS consistent with the available observation data sets and an adapted nudging coefficient yields a promising reconstruction of the AMOC maxima at 48N with high correlation to the targeted time series (r= 0.81) and mean error of about 1.25 Sv (RSME). This correlation skill is only slightly lower to the reconstruction obtained when full resolution SST and SSS from the target run are used in the nudging (r= 0.85) but with a lower mean error of 0.56 Sv (RSME). Given the strong uncertainty on subsurface salinity observations and reanalysis, these results yield promising consequences in terms of AMOC reconstructions using robust observations. A first ensemble of historical reconstructions of the North Atlantic climate, and in particular the AMOC, is then presented using the developed protocol.