Geophysical Research Abstracts
Vol. 16, EGU2014-920, 2014
EGU General Assembly 2014


# The water mass structure and transports in the Atlantic Subpolar Gyre

Maribel I. García-Ibáñez (1), Paula C. Pardo (1), Lidia I. Carracedo (1), Herlé Mercier (2), Pascale Lherminier (3), Aida F. Ríos (1), and Fiz F. Pérez (1)

(1) Instituto de Investigaciones Marinas (CSIC), Vigo, Spain (maribelgarcia@iim.csic.es), (2) CNRS, Laboratoire de Physique des Océans, Brest, France, (3) IFREMER, Laboratoire de Physique des Océans, Brest, France

The water mass structure, mixing and spreading in the North Atlantic Subpolar Gyre (SPG) were analyzed by means of an extended Optimum MultiParameter (eOMP) approach over the six repeats of the WOCE A25 hydrographic line located at the southern boundary of this gyre. The data includes the Fourex (4x) line taken in 1997 and the five repeat sections of the OVIDE line taken every other year from 2002 to 2010. We proposed 10 water masses, defined by their thermohaline properties (potential temperature and salinity), oxygen and nutrients (nitrate, phosphate and silicate), to resolve the water mass structure of the SPG. The eOMP enables to decompose the transports by water mass quantitatively. Our model provides water mass distributions that are able to reproduce the input data of potential temperature, salinity and silicate with r2>0.997 and of oxygen, nitrate and phosphate with r2>0.96. By combining the velocity field and the water mass structure across each section we provide the relative contribution of each water mass to the Meridional Overturning Circulation (MOC) and we evaluate the water mass transformation in the North Atlantic. The MOC upper limb during OVIDE (2002-2010) is constituted by the northward transports of the central waters (9.4 Sv; 1 Sv = 106 m3 s-1), the Subarctic Intermediate Water (SAIW, 2.8 Sv) and the Subpolar Mode Water (SPMW) of the Iceland Basin (2.1 Sv). The MOC lower limb is constituted by the southward transports of the Iceland-Scotland Overflow Water (ISOW, 2.9 Sv), the Denmark Strait Overflow Water (DSOW, 2.5 Sv), the Polar Intermediate Water (PIW, 0.8 Sv), the Labrador Sea Water (LSW, 3.6 Sv) and the SPMW of the Irminger Sea (4.7 Sv). These results contrast with those obtained for the 1997, cruise developed after a period of high NAO index. The greater MOC strength in 1997 resulted in greater northward transports of central waters (17.5 Sv), while the SAIW transports remained approximately unchanged. The increase of the northward transports of the MOC upper limb is partially balanced by a greater southward export of the SPMW of the Irminger Sea (8.2 Sv) and the LSW (4.6 Sv). The transport of all the waters from the Arctic and Nordic seas (PIW, ISOW and DSOW) remained equal in both periods.