Geophysical Research Abstracts
Vol. 14, EGU2012-3494, 2012
EGU General Assembly 2012

High sub-seasonal variability in water volume transports, revealed through a new ocean monitoring initiative using autonomous gliders

E. Heslop (1), S. Ruiz (1), J. Allen (2), J. Tintoré (1,3)

(1) IMEDEA (CSIC-UIB), Esporles, Spain (eheslop@imedea.uib-csic.es), (2) NERC, National Oceanography Centre, Southampton, UK (jta@noc.ac.uk), (3) SOCIB, Palma de Mallorca, Spain, (jtintore@socib.es)

One of the clear challenges facing oceanography today is to define variability in ocean processes at a seasonal and sub-seasonal scale, in order to clearly identify the signature of both natural large-scale climatic oscillations and the long-term trends brought about by the human-induced change in atmospheric composition. Without visibility of this variance, which helps to determine the margins of significance for long-term trends and decipher cause and effect, the inferences drawn from sparse data points can be misleading.

The cyclonic basin scale circulation pattern in the Western Mediterranean has long been known; the role/contribution that processes in the Balearic Basin play in modifying this is less well defined. The Balearic Channels (channels between the Balearic Islands) are constriction points on this basin scale circulation that appear to exert a controlling influence on the north/south exchange of water masses. Understanding the variability in current flows through these channels is important, not just for the transport of heat and salt, but also for ocean biology that responds to physical variability at the scale of that variability.

Earlier studies at a seasonal scale identified; an interannual summer/winter variation of 1 Sv in the strength of the main circulation pattern and a high cruise-to-cruise variability in the pattern and strength of the flows through the channels brought about by mesoscale activity. Initial results using new high-resolution data from glider based monitoring missions across the Ibiza Channel (the main exchange channel in the Balearic Basin), combined with ship and contemporaneous satellite data, indicate surprisingly high and rapid changes in the flows of surface and intermediate waters imposed on the broad seasonal cycle. To date the data suggests that there are three potential ‘modes’ of water volume transport, generated from the interplay between basin and mesoscale circulation. We will review the concept of transport modes as seen through the earlier seasonal ship based studies and demonstrate that the scales of variability captured by the glider monitoring provides a unique view of variability in this circulation system, which is as high on a weekly timescale as the previously identified seasonal cycle.