

## **Abrupt warming and salting of the Western Mediterranean Deep Water after 2005: atmospheric forcings and lateral advection**

Schroeder K., Josey S.A., Herrmann M., Grignon L., Gasparini G.P., Bryden H.L.

### **Abstract**

The recent major production of anomalously warm, salty deep water in the northwestern Mediterranean Sea (winters 2004/2005 and 2005/2006) is linked to extreme winter air-sea heat and freshwater forcing of the basin. Fields of heat and density fluxes are determined both from the NCEP/NCAR reanalysis and a daily highresolution downscaling of the ECMWF reanalysis and analysis dataset, ARPERA. In the deep water formation region, during winter 2004/2005, the net heat loss exceeds  $300 \text{ Wm}^{-2}$  compared with typical values of  $200 \text{ Wm}^{-2}$ . The relationship between the deep water formation episodes and large-scale atmospheric patterns is investigated and found to be more closely related to the East Atlantic Pattern than the North Atlantic Oscillation. The contributions of atmospheric forcing and lateral advection of anomalously warm, salty water to the convection region are discussed in order to determine their relative roles in causing massive renewal of the western Mediterranean Deep Water and its anomalous properties. The main result shows that the net evaporation during winter 2004/2005, even if very high compared to the climatology, could have induced only 49 % of the actual observed increase in the salt content of the deep layer. Thus the lateral advection played a major role in setting the new deep water properties.

Citation: Schroeder K., Josey S.A., Herrmann M., Grignon L., Gasparini G.P., Bryden H.L., 2010. Abrupt warming and salting of the Western Mediterranean Deep Water after 2005: atmospheric forcings and lateral advection. *J. Geophys. Res.*, doi: 10.1029/2009JC005749.

**For a full-text copy, please contact me at [katrin.schroeder@sp.ismar.cnr.it](mailto:katrin.schroeder@sp.ismar.cnr.it)**