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Identifying signatures of dense water formation events over the Aegean Sea in the last fifty years

E. Tragou (1), S. Josey (2), V. Zervakis (1), V. Maderich (3) and A. Theocharis (4)

(1) Department of Marine Sciences, University of the Aegean, Greece, (2) James Renell Division, Southampton Oceanography Centre, United Kingdom, (3) Institute of Mathematical Machines and System Problems, Ukraine, (4) Institute of Oceanography, Hellenic Centre for Marine Research, Greece (tragou@marine.aegean.gr / Fax: +30-22510-36843 / Phone: +30-22510-36809)

This work is an effort to identify significant dense water formation events over the Aegean Sea for the period 1949-present. The Aegean Sea is one of the major dense water formation sites of the Mediterranean Sea. The interannual variability of its dense-water production appears to be remarkably large, ranging from being the major contributor for the bottom layers of the Eastern Mediterranean during the early nineties, to an insignificant contributor since then. Here, our aim is to determine the characteristic time scales of this variability. Hydrographic observations in the Aegean Sea have been very sporadic before 1986, thus hindering any direct assessments of deep water ventilation. However, there are data sets extending back to 1949, which may provide us with indirect evidence for conditions favorable to formation. In the Aegean Sea, major buoyancy forcing terms are the atmospheric exchanges and the Dardanelles buoyancy input. Regarding the air-sea interaction we exploit the NCEP/NCAR reanalysis fields. Regarding the Dardanelles buoyancy input we make use of the output a system of box and hydraulic models simulating the exchange between the Mediterranean and the Black Seas. The latter model is forced mainly by a climatological data base for the Black Sea maintained by the Marine Hydrophysical Institute of Sevastopol, Ukraine. Using the above a buoyancy budget of the Aegean Sea is attempted for this period. The results are compared with all available hydrographic information from the Aegean Sea. Preliminary results suggest that there have been major dense water formation periods in the Aegean before the Eastern Mediterranean transient event of the early 1990's.