



On dense water formation in shelves of the Aegean Sea during the year 1987

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We here investigate the role of the rather virgin year 1987, when some modern data are available but before the main EMT event. A combination of field, satellite and numerical model temperature and salinity data from PROTHEUS, as well as a coupled ocean-atmosphere model, are used to implement theoretical models. After its formation over a sloping shelf of some important points in the Aegean Sea, due to the strong cold winter winds, a dense water patch can either have a dramatic downflow or can start a slow geostrophic descent along shelves and then following isobaths, best described by streamtube models. The most important, among these shelves characterized by a strong air sea interaction, have been identified from satellite data. The Northernmost shelves are those north of the island of Samothrace and in the Northern Thermaikos Gulf. In agreement with the field measurements of Georgopoulos et al. (1987) also the shallow shelf between Limnos and Goceada was a source of very dense water, as well as the shelf between Lesbos and the Turkish coast. Most probably also the shelves around the Cycladic Plateau were affected by strong winds and contributed to the Aegean Sea deep water formation. In addition, other theoretical models of wind-induced coastal upwelling allow to infer temperature and salinity information of dense water dynamics along the shallow coasts and shelves of the Aegean Sea. All this allows a heuristic application of classical T/S diagrams to estimate Northern Aegean dense water evolution and spreading, that nicely supports the early ideas of Zervakis et al. (2000). A complex situation about the Cycladic Plateau dynamics is also analyzed in correlation with sediment locations. Indeed seismic-reflection profiles confirm the presence of a contourite location along the northeast Cyclades Plateau shelves. All this interestingly opens novel prospective about the dense water coastal formation shelves.

In synthesis such field, numerical and satellite data embedded in theoretical models allow a novel viewpoint on the Aegean dense water evolution just before the EMT, supported by existing data and also suggesting other possible contourite dynamics. Therefore all this can be seen as kind of challenge for investigating Aegean Sea dense water dynamics, and contourite locations as well.