

PRELIMINARY RESULTS OF VECTOR OCEANOGRAPHIC CRUISES - HYDROLOGY OF THE SOUTHERN TYRRHENIAN

P. Falco, E. Zambianchi

Department of Environmental Sciences – Parthenope University of Naples (Italy)

pierpaolo.falco@uniparthenope.it



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Abstract

In the framework of the research line number 8 – activity number 2 (Time series from a fixed station in the Southern Tyrrhenian), 5 oceanographic cruises were carried out since November 2006. The main targets of the cruises consisted in collecting data in order to characterise: 1) the processes, occurring along the water column during the different seasons; 2) the carbon cycle in the pelagic area of the Tyrrhenian Sea. For these purposes, a fixed measurement point (VECTOR-TM station in Fig. 1) was selected in the southern sector of the Tyrrhenian Sea; the point coordinates are 39°30' N in latitude and 13°30' E in longitude, the depth is about 3450 meters and the distance from the coast is approximately 90 nm. The sampling plan was improved adding 5 further stations aligned along a NE/SE oriented transect (Fig. 1). Moreover, during the third cruise (April 2007), a mooring was deployed in order to create time series of the main physical parameters (current, temperature and salinity) at fixed points of the water column. Also, two sediment traps were fastened to the mooring line at a depth of about 200 and 1600 meters. The complete mooring scheme is reported in the box 3 (Panel g).

In this work, preliminary results of the first three oceanographic cruises are shown. In particular, vertical sections of the main physical parameters (temperature, salinity and density) are reported. Furthermore, particular attention was paid both to the geostrophic current fields associated with the vertical structure of the mass field and to the double diffusion processes occurring at the most offshore station of the transect

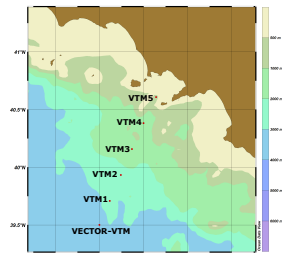
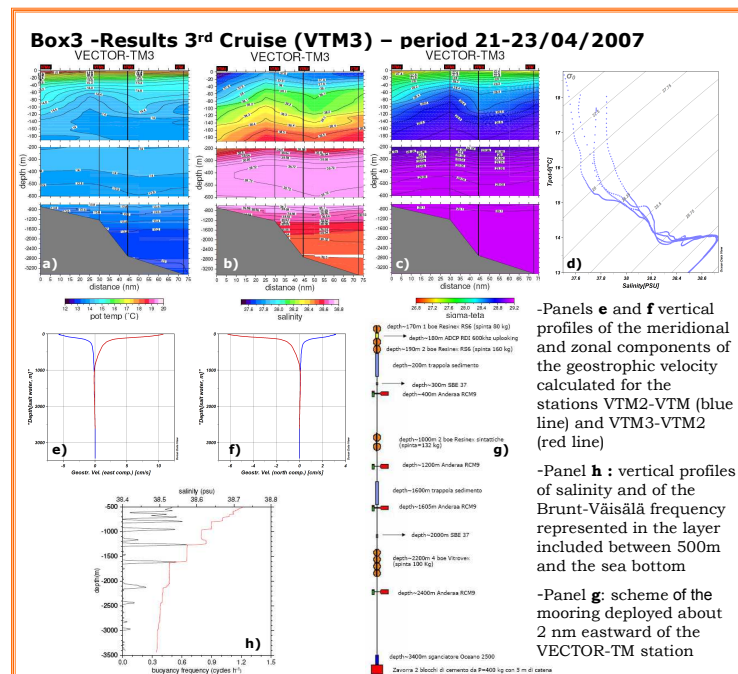
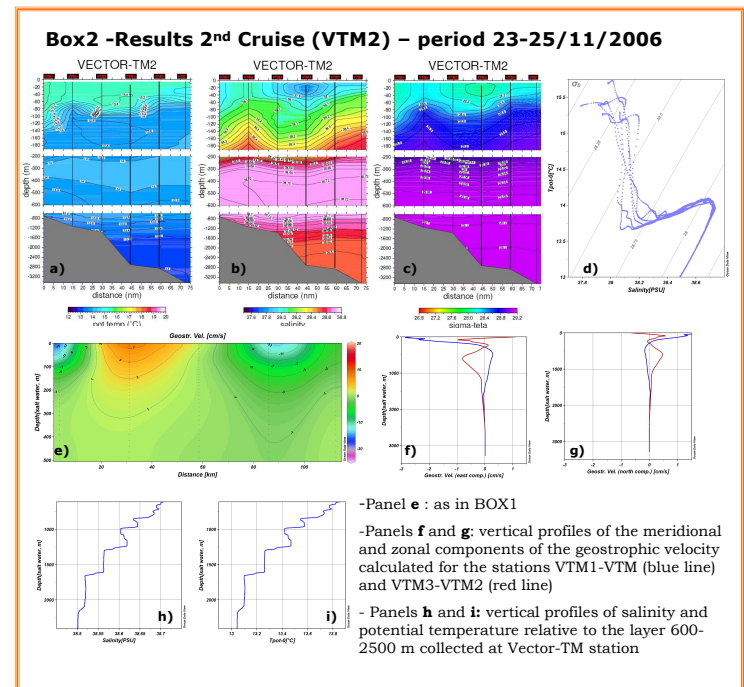
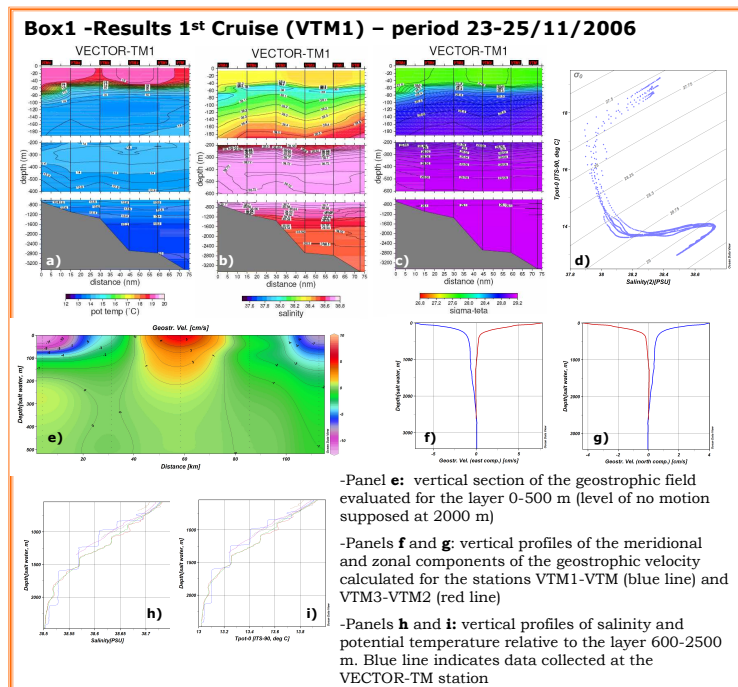


Fig.1 – Map of the station



Discussion:

The analysis of the vertical sections (box 1, 2 and 3 panels a,b,c) permits to identify the three main Tyrrhenian water masses (MAW, LIW and the Tyrrhenian Deep Water-TDW) even if there are sensible differences between the current values of the measured parameters with respect to their typical value. Surface (between the sea surface and the depth of 60 m) salinity values were particularly high during the first cruise (box 1 - panel b), when the surface layer was saltier of about 0.6-0.7 psu than the typical values of the MAW for this area. This anomaly can be found at slightly higher depth too. The temperature of the surface layer (box 1 panel a) is relatively high and it points out a gyre with a diameter of about 80 km. The gyre dimensions are greater than expected for this area (Rossby radius of deformation ~ 20 km) and looking at the geostrophic velocity section, it is anticyclonic. This structure is confirmed by data collected during the second cruise (box 2 – panels e, f and g).

Bottom temperature values are slightly higher than values collected during previous oceanographic cruises (Sparnocchia et al., 1999, JMS). The lowest value measured during VECTOR cruise is 12.987 °C whereas temperature values around 12.7-12.8 °C should be expected at a depth of 3000 m (Astraldi and Gasparini, 1994). The salinity maximum too is higher than historical values: in the past, the core of the LIW in this sector of the Tyrrhenian Sea, was marked by salinity less than 38.7 psu (Aliverti et al., 1968, Atlas of the Tyrrhenian Sea); the highest salinity measured during VECTOR cruise is 38.73 psu.

Finally, it is worth noticing the step like structure of the salinity and temperature profiles found at the VECTOR station. The step increases of the measured parameters occur in a layer thick some dozens of meters and characterised by salinity and temperature jumps respectively of 0.1 psu and 0.3 °C. Double diffusion processes occur in a layer which starts from the base of the LIW (at about 600 m) up to 2000 m.