Deep water variability and inter-basin interactions in the Eastern Mediterranean Sea

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Eastern Mediterranean CTD data distribution 1912-2012 (100 years)
58751 CTD profiles
Eastern Mediterranean Analysis Areas

Eastern Mediterranean Analysis Depth Ranges:
- 450-550m (0.5km)
- 900-1100m (1 km)
- 1900-2100m (2 km)
- 2900-3100m (3 km)
- 3900-4100m (4 km)

Data Coverage: 1912 – 2012

Data Sources:
- Israel Marine Data Center, IOLR, Israel
- POEM (1985-1991)
- NODC, Washington
- National data archives

Data quality checks:
- Data with quality flag value ≥ 2 excluded
- Data were collected in half-year time bins
- Average, standard deviation and confidence limits calculated in each bin
- 95% confidence intervals estimated based on Student’s t-test (Emery and Thompson, 2001), using Numerical Recipes functions (Press et al., 2007).
Levantine and Ionian Basins (2900-3100m)

Northwest Levantine and Central Ionian Basins (3900-4100m)
Comparison of 0900-1100m Temperature in Levantine Sub-basins

Comparison of 1900-2100m Temperature in Levantine Sub-basins
Comparison of 0900-1100m Temperature in Ionian Sub-basins

Comparison of 1900-2100m Temperature in Ionian Sub-basins
Some conclusions:

decadal variability dominates the evolution of the deep waters.

the abrupt Eastern Mediterranean Transient (EMT) dwarfs everything else in time evolution

there is precursory evolution, especially of the salinity before the EMT

the largest inter-decadal variability is observed in the Aegean and Adriatic Basins,

the abrupt increase of salinity and density with an associated drop in temperature starting From the Aegean Basin marks the start of the in the early 1990’s.

In the deep Levantine Basin the EMT event starts at the same time, particularly after the 1992-93 cooling event, but lasts throughout the 2000’s for about two decades, with stepwise increases in temperature, salinity and density, attributed to cascading out of the southern Aegean Sea into the adjacent area, where the signal spreads over the years

In the deep Levantine and Ionian basins, salinity changes dominate the inter-decadal variability

large changes in deep water properties occur between the 1970-1990 and 1990-2012 epochs
and, thanks!