Geophysical Research Abstracts
Vol. 20, EGU2018-16325, 2018
EGU General Assembly 2018

Thermal regimes, warming trends and positive temperature anomalies from high resolution coastal time series in the Mediterranean Sea: insights for the assessment of marine coastal ecosystems vulnerability to climate change.

Nathaniel Bensoussan, Joaquim Garrabou, and the T-MEDNet team
Institute of Marine Science, Marine Biology and Oceanography, Spain (nbensoussan@gmail.com)

Climate change (CC) is having an ever increasing influence on the abundance, distribution and wellbeing of living organisms worldwide. In the Mediterranean region, CC is already affecting Mediterranean surface waters and ecosystems, and much warmer and dryer conditions are anticipated during the 21st century. The increasing occurrence of mass mortality events affecting the benthic biota and increasing success of thermophilic biota colonizing the Mediterranean Sea are clear examples of ongoing consequences of environmental changes already evidenced in coastal and marine protected areas. However, assessing CC vulnerability in the highly diverse and highly dynamics coastal zones at local/regional scale is often constrained by the lack of baseline data and information at the appropriate time and space scales. In particular, regarding implications of CC on the thermal environment at depth, as surface hydrodynamics and seasonal vertical temperature stratification are strongly modulated by (sub)meso scale processes and local wind, topographic and bathymetric features.
Through international cooperation for the implementation of standard monitoring protocols, the T-MEDNet initiative is building-up long-term and high-resolution information on temperature conditions in Mediterranean coastal waters (0-40m depth, hourly sampling, generally every 5m). To date the network counts 30+ members running 40+ temperature time series in the Mediterranean Sea, since 1999 for the longest (www.t-mednet.org). The unique data set of 12+ million hourly T samples allows for the very first time to specifically address coastal thermal regimes, trends, stratification dynamics and anomalies and to evaluate uncertainties in satellite derived sea surface temperature (sst).
Here we present results from an updated analysis of coastal waters thermal environment combining high resolution T-MEDNet vertical profiles and satellite sst observations. First, satellite and in situ sst were compared at network scale, for coastal waters of the western, central and eastern Mediterranean Sea. Vertical time series and unbiased sst were then analyzed for the calculation of climatologies and trends in coastal (0-40m) marine thermal environment, highlighting contrasted conditions between and inside sub-regions and a general warming in these essential marine coastal habitats, at sometimes higher rates at depth than in surface. Seasonal stratification dynamics, mixed layer depth and temperature positive anomalies were analyzed as well for further exploitation with benthic ecology time series. Insights for climate change impacts, adaptation and vulnerability assessment in Mediterranean coastal ecosystems are finally exposed in a from local to sub-regional and regional perspective.