



Sea surface temperature trends in the Mediterranean Sea: from interannual to decadal variations

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Satellite SST data permit to analyse SST trends from the beginning of the 80's to today. Within this time window it is possible to investigate either the high frequency variability or the interannual variability but the analysis of lower frequency variations is not feasible due to the relatively short time period. The study of decadal or longer periods variability requires a longer time series not yet available from satellite data only. This low frequency analysis can be carried out using historical in situ data available, at lower spatial and temporal resolution, from the ICOADS database. Our strategy was to use the higher quality and space-time resolution satellite POISST (Pathfinder Optimally Interpolated Sea Surface Temperature) to investigate recent high frequency variability at basin and sub-basin scale and to use 2 degree resolution monthly ICOADS to study the lower frequency variability and to contextualize in a larger time window the more recent satellite estimate.

The Pathfinder Mediterranean Forecasting System Toward Environmental Prediction (MFSTEP) OISST have been produced on a daily basis in the framework of the MFSTEP project. This time series consists of a validated daily series of optimally interpolated SST maps over the regular grid of the operational MFSTEP OGCM model of the Mediterranean basin from 1985 to today. The validation showed that satellite POISST is able to reproduce in situ measurements with a mean bias of less than 0.1 °C and RMSE of about 0.5 °C and that errors do not drift with time or with the percent interpolation error (Marullo et al. 2006)

Focusing on the more recent decades (from 1982 to 2005) it results that all the two datasets (Satellite and ICOADS) show an increasing of the mean SST from the 19.4

°C of the second half of 80' (the mean Mediterranean SST in the period 1961-1990) to the 19.8-20.0 °C of the beginning of the new century. The analysis of the full ICOADS time series permits to divide the analysed period in three distinct intervals: before 1940 when the filtered SST was between 0.5 °C and 1.0°C lower than the 1961-1990 reference mean SST, from 1945 to 1990 when the filtered SST oscillates between +0.3 °C and -0.1 °C respect to the 1961-1990 reference mean SST and after 1990 when a continuous increase of the SST is observed. The zonally averaged SST shows a tendency of isotherms to move northward. This northward shift of isotherms was particularly evident from about 1910 to 1950. During this time period the 19 °C isotherm (for example) moved from 35 N to 39 N. After 1950 this isotherm continued to oscillate around 35 N. Zonally averaged temperatures below 17 °C are observed only before 1935. A second period of northward shift of the isotherms is observed after 1995.