M. Vargas-Yáñez, F. Moya, M.C. García-Martínez, E. Tel, P. Zunino, F. Plaza, J. Salat, J. Pascual, J.L. López-Jurado and M. Serra, (2010). Climate change in the Western Mediterranean Sea 1900–2008 . Journal of Marine Systems Volume 82, Issue 3, August 2010, Pages 171-176.

Abstract: The deep waters in the Western Mediterranean (> 600 m) are the result of mixing between the two water masses above it (Atlantic Water, 0–200 m and Levantine Intermediate Water, 200–600 m) and heat and buoyancy losses in late winter. Deep waters in the Western Mediterranean have undergone a continuous warming during the second half of the twentieth century and initially it was hypothesized that this had been caused by the warming of the contributing water masses, very likely linked to global warming. Nevertheless, no clear signals of warming have been detected in the intermediate layers and no warming trends were detected in the upper layer before the 1980s. This fact suggested that the cause of deep water warming could be linked to river damming and the consequent salinity increase, instead of to an increase of the heat absorbed by the upper ocean, as in other parts of the world ocean. In this work we use the data base MEDATLAS and data from more recent monitoring programs to construct the longest temperature and salinity time series ever analysed in the Western Mediterranean (1900 to 2008). These time series show that both the upper and intermediate layers have warmed throughout the twentieth century. Long term and decadal variability in the upper layer correlate with surface air temperature in the northern hemisphere and heat absorbed by the upper North Atlantic Ocean, suggesting that the time series analysed in this work reflect the present heat absorption of the oceans in the context of global warming. The present data set highlights the importance of monitoring programs and provides a proxy for the study of climate change.

Keywords: Western Mediterranean, Climate change, Monitoring systems, Time series, Trend detection