



Long term trend in the sea surface temperature of the Black Sea

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There is growing understanding that deterioration of the Black Sea ecosystem over past decades is partly related to long-term variability in the physical environment. In this study we analyse how sea surface temperature on the extensive Western Black Sea shelf changed over the 20th century in comparison with the deep region of the sea. As a first step we produce high resolution (0.25 degree grid) non-interpolated climatologies of the sea surface temperature from individual in-situ measurements for each calendar month averaged over the entire century. Time series of temperature anomalies are calculated for all calendar months separately for the shelf and the deep sea. Evidence is presented for a complete decoupling of long -term variability between the shelf and deep sea over the spring season. It was shown with a level of confidence greater than 90% that in contrast to global trends, the deep area of the Black Sea has cooled rather than warmed over the 20th century. The variability of the shelf is more volatile, however showing some cooling. This is to the contrary to the air surface temperature at the coastal station Odessa, which shows positive trend. A potential explanation is that the NAO index has risen over the same period of time, which indicates increasing winds and hence greater losses of heat due to evaporation. However, if only the last 15-20 years of the century are taken into account, one can see a definite warming of the sea. The work has been partly funded by EU Integrated Project 036949 SESAME, NATO grant ESP.NUKR.CLG.982285 , and grant RFBR-07-05-00240.