# STATISTICAL ANALYSIS OF THE SEA SURFACE TEMPERATURE IN THE GULF OF TRIESTE (NORTHERN ADRIATIC) USING SATELLITE DATA (2000-2005)

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**Abstract**
Six years of Advanced Very High Resolution Radiometer (AVHRR) satellite data were acquired to study the spatial and temporal variability of the sea surface temperature (SST) in the Gulf of Trieste between January 2000 and December 2005. Monthly, yearly and 6-yearly SST statistics (mean, median and standard deviation) were produced. The Empirical Orthogonal Function (EOF) analysis was also applied to the entire dataset. The results show that the seasonal cycle of the SST generally exhibits values ranging between 8 and 25 °C with a typical standard deviation of 1.5 °C. The first EOF mode describes more than 80% of the total signal variance and its temporal amplitude provides the seasonal SST cycle.
*Keywords : Adriatic Sea, Temperature.*

Introduction
The Gulf of Trieste [1] is located in the northeastern part of the Adriatic Sea approximately between 13-13.8° longitude East and 45.4-45.8° latitude North. The main riverine freshwater discharge is due to the Isonzo River in the northern part of the Gulf. The maximal depth of the study area is less than 25 meters. The main wind forcing in the Gulf of Trieste is through intermittent events of northeasterly cold, strong and dry wind, called Bora, that blows more frequently in winter. The spatio-temporal SST variability is studied using AVHRR satellite data between 2000 and 2005.

Data and methods
AVHRR data of the NOAA satellite constellation were acquired by the OGS receiving station and used to compute the SST. In order to exclude the diurnal warming effect in our analysis we chose one NOAA-12 nighttime pass per day. Moreover, we only considered images with cloud coverage less than 90% before performing the statistic analysis. Two steps were conducted to minimize the effect of the non-uniform temporal distribution of the data (there are less cloudy and more images in summer): (1) the images were subsampled on a monthly basis, selecting a maximum of ten images per month; (2) coastal areas with less than 45% of good data (with respect to the maximum of 914 in the open sea) were discarded. We produced monthly, yearly and 6-yearly composites of the mean, median, standard deviation of the SST and the corresponding images with the data density. The EOF analysis was then applied to the entire dataset.

Results
The seasonal cycle of the SST in the Gulf of Trieste over 6 years is well described using the monthly spatio-temporal means [Fig. 1].

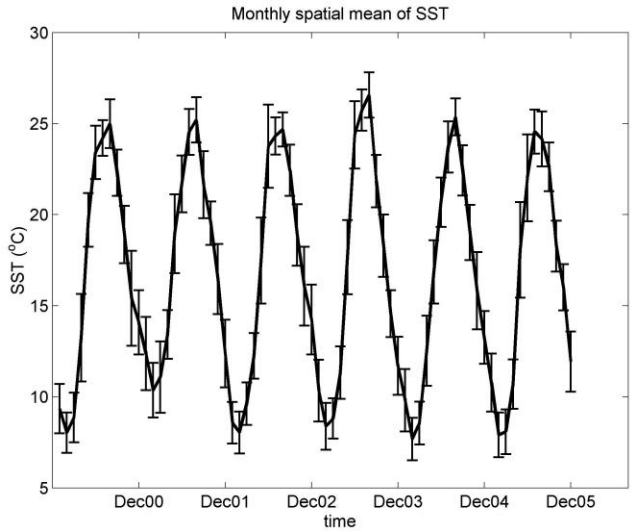


Fig. 1. Monthly mean of SST (± standard deviation) in the Gulf of Trieste versus time between January 2000 and December 2005.

The minimal (in winter) and maximal (in summer) temperature values are respectively about 8 and 25 °C, with a standard deviation of 1.5 °C. Winter 2001 and summer 2003 are warmer with respect to the other years by approximately 1.5 °C. The 6-years mean of the SST [Fig. 2] reveals a general meridional gradient of the temperature field with values ranging between about 16 and 18 °C (the standard deviation is between 5.5 and 6.5 °C). The northern portion of the area is, on average, colder than the southern part by about 1 °C. The near-coastal areas, and particularly the Grado lagoon to the north, are warmer than offshore by 1-1.5 °C. The first EOF mode describes more than 80% of the total signal variance and its temporal amplitude provides the seasonal cycle of the SST.

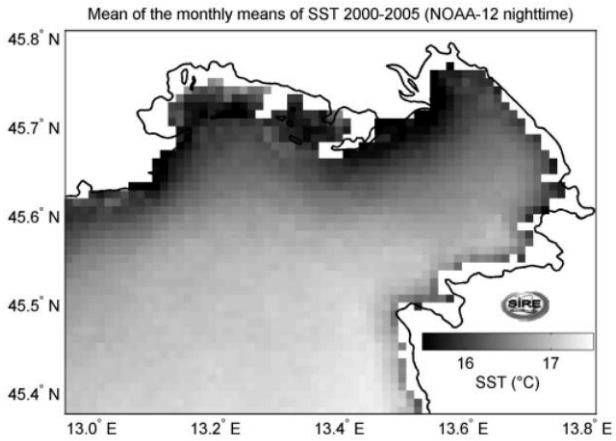


Fig. 2. SST composite (mean of the monthly means during 2000-2005) in the Gulf of Trieste.

**Reference**
1. Malacic, V., M. Celio, B. Cermelj, A. Bussani and C. Comici, 2006. Interannual evolution of seasonal thermohaline properties in the Gulf of Trieste (northern Adriatic) 1991-2003. *J. Geophys. Res.*, 111: C08009, doi:10.1029/2005JC003267.