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Forecast and analysis assessment through skill scores in the Mediterranean sea.

M. Tonani (1), N. Pinardi (2), C. Fratianni (1), J. Pistoia (1), and S. Dobricic (3)

(1) Istituo Nazionale di Geofisica e Vulcanologia, Bologna, Italy, (2) University of Bologna, Corso di Laurea in Scienze Ambientali, Ravenna, Italy, (3) Centro Euromediterraneo per i Cambiamenti Climatici, Bologna, Italy

This work describes the first evaluation of the quality of the forecast and analysis produced at the basin scale by the Mediterranean ocean Forecasting System (MFS) (http://gnoo.bo.ingv.it/mfs).
The system produces short term ocean forecast for the next ten days and since September 2005 the production is on a daily basis. The analysis is done weekly using a daily assimilation cycle. This means that in order to produce an analysis the model is run for 24 hours in combination with the assimilation scheme in order to assimilate all the data available in that time window. The daily analysis cycle is done once a week, each Tuesday, producing 14 past analyses and the present day analysis. Each day a 10 days forecast is produced starting on Tuesday from an analysis and each of the successive six days from a model simulation.
The analyses are compared with indipendent data from buoys, where they are available, and with the data that are going to be assimilated into the MFS system. The rmse between analyses and data has been computed at selected depth for temperature and salinity.
The forecast evaluation consist of root mean square error differences between forecast and analysis, analysis and persistence and forecast and persistence where the persistence is defined as the average of the day of the analysis corresponding to the first day of the forecast. The bias and the anomaly correlation length have been computed for all the considered period at different depths. The skill score SS is defined as percentage values that take into account the rate between FA and AP and gives therefore an estimate of the increase in accuracy with the forecast respect the persistence.
In this work we have considered all the 53 ten days forecasts produced from the 16th of August 2005 to the 15th of August 2006. All the statistical scores have been done for the Mediterranean basin and for 13 regions in which the Mediterranean sea has been subdivided. The statistic has been done over all the period considered and for each month.
The SS shows that at 5 and 30m the forecast is always much better than the persistence but down to 300m it could be for the first days of forecast also worst. This result could be related to some instabilities introduced by the data assimilation that assimilate data down to 600m. From region to region there are a lot of differences in the values of SS, much more than from month to month. This could be an effect again of the data assimilation due to the fact that the data, both in situ and satellite are not homogeneously distributed in all the Basin. In regions with no data the differences between forecast and analysis are mainly due only to the atmospheric forcing and the rmse of Forecast-Analysis is consequently less then in region where the model is significantly corrected by data assimilation. This point out that the SS used should be interpreted taking into account also the number of data assimilated in the area considered.