VERIFICATION OF A COUPLED AIR-SEA MODEL OVER THE ADRIATIC SEA USING SATELLITE DATA

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Abstract
A verification of the EBU-POM coupled model forecast is done by using satellite observations of SST (Aqua Modis) and surface winds (QuikSCAT) over the Adriatic Sea. The verification is done over a period of 17 days during which a strong Bora event occurred for several days. The idea was to test the model capabilities to perform simulation of such an extreme event as a Bora wind. This can be also an indirect test for atmospheric turbulent fluxes parameterizations which are one of the crucial components in the air-sea interaction modeling
Keywords : Air-sea Interactions, Adriatic Sea.

EBU-POM is a two-way coupled model [1], with Eta/NCEP [2] limited area model as its atmospheric part, and Princeton Ocean Model [3] as its ocean part. In the present case the ocean model had the same setup as AREG/INGV [4] Adriatic model, but without river runoff parameterization. The centre of the atmospheric model was at 16E, 42.5N and the horizontal resolution was 0.09 degrees.

Integration was seventeen days long without any interruptions, starting at 00UTC 11th February 2003. Strong Bora wind was present over the Adriatic during 17th, 18th and 19th. As initial conditions for the ocean part of the model we used temperature, salinity and velocity fields from the first day of AREG model simulations. These simulations are operationally produced by INGV-Bologna and they are ftp available through the ADRICOSM-EXT project activities. As initial and boundary conditions for atmosphere we used analyses of the ECMWF global model. Satellite observed SST and surface winds were provided by CNR.ISAC Rome. Exchange of these satellite data are also part of ADRICOSM-EXT activities. For verification of the model we used standard methods of evaluation such as BIAS, RMSE and correlation scores.

First we present SST verification scores. Fig.1 shows the area averaged values of the two RMSE scores (for day time and night time observations) from 11th to 27th February. The mean RMSE value, for the whole period of integration, is very close to 1 for both day/night observations. We must keep in mind that area averaged RMSE is mean value over the area where satellite observations were available, i.e. area free of clouds. High RMSE is almost always connected with small number of observations (cloudy days), especially when those observations are located close to the coast. We can also see that values of RMSE don't have tendency to increase during integration, so we can conclude that SST forecast kept the same quality for the whole period.

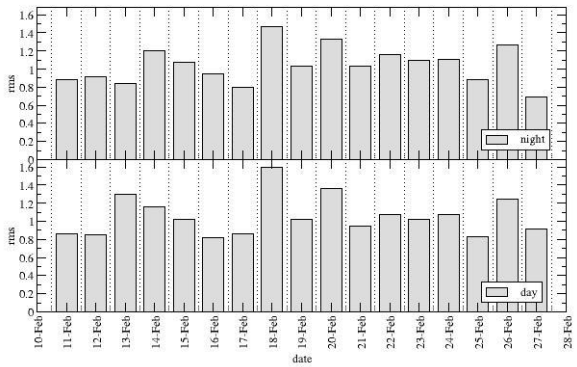

Fig. 1. Night (upper panel) and day (lover panel) daily values of area averaged RMSE for SST forecast in the period 11th -27th Feb. 2003.

Bora is a strong north-east wind that mainly affects the north-west part of the Adriatic Sea. So, for wind verification we are only concerned with the area north of 43N. The verification period was from 15th to 20th February, during which the Bora event was present. Fig. 2 shows model vs. satellite mean wind seed (upper panel) and mean wind direction (lower panel) for this area. For every day there are two observations, at 6 am and at 6 pm local time. Problems with the scatterometer measurements are not connected with clouds but with rain and also with wind speeds lower than 3m/s. All points with any rain probability and all points with low speed were excluded. We find very strong dependencies between these two parameters and the verification scores. For clear sky situations, correlation coefficients between model and observed wind speed have high values, around 0.8, while for rainy days coefficients were much lower, around 0.4. This is the reason why we have a big difference between observed and simulated wind speed for 16th February at 6 am. During that day rain occurred over almost all the Adriatic. For other days differences were not so large. The mean bias for the whole period was -0.8.

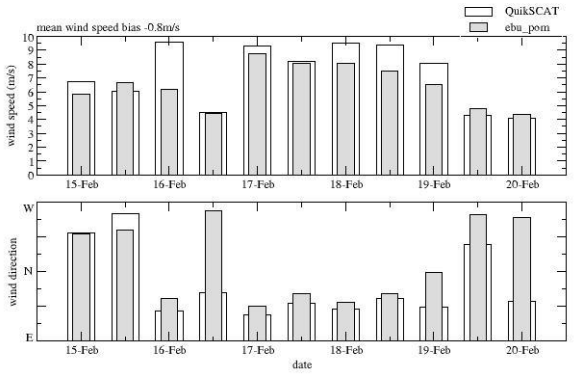

Fig. 2. Model vs. observation values of area averaged wind speed (upper panel) and wind direction (lower panel) for the period 15th -20th Feb. 2003

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References

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