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High-resolution simulation of an intense cold Bora outbreak: Importance of SST initialization

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Winter 2012 over the Mediterranean basin was characterized by a persistent cyclonic circulation, associated with an exceptional cold anomaly. This atmospheric pattern was responsible for extremely strong and persistent Bora winds over northern Adriatic area, during the period between 25 January and mid of February, producing large energy losses in the Adriatic Sea. Moreover, low temperature and intense precipitations (mainly snowfalls), affected northern and central Italy, being particularly severe along the Apennine chain exposed to Bora wind.
In the framework of the Italian flagship Project “RITMARE”, high-resolution simulations were performed to analyse the entire period. The atmospheric modelling chain, based on BOLAM hydrostatic and MOLOCH non-hydrostatic mesoscale models, has been initialized and driven by both GFS-NCEP and IFS-ECMWF global model data. Also satellite retrieved SST data have been used as initial analysis. Validation of model results has been carried out mainly in terms of variables of interest for oceanographic applications, such as turbulent surface (latent and sensible) heat fluxes, Sea Surface Temperature (SST), air temperature at 2-meters and surface wind field. Several observations sites available in the northern Adriatic area (platforms and buoys), together with Synthetic Aperture Radar (SAR) products, allowed for a detailed verification.
Results suggest the importance of a correct initialization of the SST field at least in this semi-enclosed basin during extreme events in terms of heat fluxes and short-range precipitation forecast.