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# Assessing the impact of improved lateral and boundary conditions resolution on high impact weather events reproduction in a Mediterranean domain with WRF and MOLOCH models

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Correct reproduction of extreme meteorological events enables a more in-depth knowledge of atmospheric processes and fosters the upgrade of forecasting skills. Regional weather and climate modelling could greatly benefit from the release by ECMWF of the new ERA5 reanalysis (0.25° resolution) product, which from September 2017 is replacing ERA-Interim reanalysis (0.75° resolution).
In this study, both ERA-INTERIM and ERA5 reanalyses were used to provide initial and boundary conditions to two different non-hydrostatic numerical models, namely WRF and MOLOCH. The models simulated three recent high impact weather events in Calabria (southern Italy): 1) a highly convective summer event (11-12 August 2015); 2) a stratified autumn event (31 October 2015 - 2 November 2015), and; 3) a fairly localized autumn event (25-26 November 2016).
Given the strong dependence of all the analysed events to air masses interactions with sea surface, together with the effects of the improved GCM resolution also the impact of higher SST resolution was assessed. To this aim, in addition to the bulk estimates provided by the reanalyses, also the Medspiration L4 Ultra-High Resolution SSTfnd from the Medspiration Project by IFREMER/CERSAT (with 24 hour time resolution and 2.2 km spatial resolution) and the European Ocean-Sea Surface Temperature MultiSensor L4 Three-Hourly Observations (averaged every 6 hours and with a 2 km spatial resolution) provided by Copernicus Marine Environment Monitoring Service (CMEMS) were used.
Modelling results were mainly compared in terms of precipitation, using both point observations from ground stations and spatially distributed precipitations fields achieved by merging ground-based data and radar estimates provided by a National Civil Protection Department single-polarization Doppler radar. Results allowed a preliminary insight on the potential enhancement given by combined high resolution ERA5 lateral boundary conditions and ultra-high SST lower boundary conditions in a domain greatly affected by complex sea-atmosphere-orography connections.