

## Data Assimilation Experiment of meteo-marine observations from a virtual collaborative fleet

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Due to the high operating cost of instrumentation, dedicated marine weather observations are much more sparse than those on mainland. Nevertheless a huge amount of data are daily acquired on sea by meteo-stations on board vessels in navigation. Leveraging modern telecommunications and global positioning systems, such data could be collected and possibly assimilated into numerical weather prediction (NWP) models. Indeed the assessment of such a possibility was the main scope of two research and development European projects, COSMEMOS and PROFUMO. To study the possible added value provided by the assimilation of conventional (temperature, pressure, relative humidity, wind) and un-conventional (GNSS path delay) data coming from a hypothetical collaborative fleet, a limited-area Observing System Simulation Experiment (OSSE) was carried out. A Nature Run (NR, proxy true atmosphere) was produced from a free, high resolution (1 km) forecast run, using the WRF-ARW (Advanced Research Weather) model. The simulation covered the Ligurian and the Northern Tyrrhenian Sea and the reference time period of twenty days on February 2015. A virtual fleet of about 200 ships was supposed to sail in this space-time domain and was supposed to acquire meteorological data with a sampling time of 10 minutes, a process numerically mimed by the linear interpolation of NR gridded values surrounding the ship position. The set of virtual observations was then assimilated, by mean of a 3D-var technique, in a lower resolution (3 km) run, representing the operational forecast. Finally the forecast goodness of such assimilation run was directly evaluated by its difference with the NR and compared with a similar control forecast, equal in any respects except for the absence of the assimilation under study. Some positive effects on very short-term forecasts (within 6 hours) was observed, indicating that the assimilated data can provide useful information, e.g. for short routes navigation.