Numerical Weather Prediction at the Italian Air Force Meteorology

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ABSTRACT: The development activities carried out at the Italian Air Force Meteorological Centre in the field of Numerical Weather Prediction are shown. First experiments with the GPU-enabled version of the COSMO model on the new hybrid CPU-GPU supercomputer of the Centre were made. Preliminary results resolution at showed a significant speedup of the ensemble-based forecasting model lead time, exploiting the GPU technology. The boost of computing capability allows to optimally compute the new model.

KEYWORDS: Numerical Weather Prediction, atmospheric models, High Performance Computing, hybrid CPU-GPU

Ingested Observations: RAOB (also 40), PILOT, SYNOP, SHIP, BUOY, Wind Profilers, AMDAR-ACAR-AIREP, MSG3-MET7 6km, Metop-A/B scatt. winds, NOAA/Metop-A/B AMSU/A/MHS and NPP ATMS radiances
Boundary Conditions: IFS global model

Data Assimilation

Data Assimilation (DA)

Cl 3D-Var LETKF

1999 2002 2011

Operational NWP System

The Italian Air Force Meteorological Centre operates a complete NWP system, including an ensemble based data assimilation system and a set of nested, limited area atmospheric and wave models, in both deterministic and ensemble configurations, providing the high-resolution forecasting fields feeding the generation of timely and accurate meteorological products for the end users.

Mediterranean Sea Forecasting (NETTUNO)

in collaboration with ECMWF

Configuration:
Lat-lon regular grid, mesh size 2° (NETTUNO-ME) / 1° (NETTUNO-IT)
Spectral discretization with 3D frequencies and 36 directions
Initial state from previous run (warm start)
Initial time of model run 00h12 UTC
Forecast range to 72 h (NETTUNO-ME) / 48 h (NETTUNO-IT)
OUTPUT FIELDS:
Significant wave height, Mean wave direction, mean wave period

New HPC cluster

The new HPC cluster of the Italian Air Force Meteorological, released in 2018, is planned to host the major part (in terms of computational cost) of the operational NWP suites. Based on hybrid CPU-GPU architecture, coupled with very high-performance network and parallel storage, it is a state-of-art, reliable and scalable system for the next generation of computing applications.