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Implementation of a limited area ensemble meteorological system in a GRID and HPC environment

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At present there is an ever increasing demand for reliable probabilistic short range weather forecast. At regional scale this kind of forecast is even more valuable especially in cases of high impact weather such as violent extra tropical storms which may result in loss of lives and properties due to wide-spread flooding and gale force winds. The Multi-Analysis Multi-Model (MAMM) approach is a relatively new method of Ensemble Prediction System (EPS) in which the single deterministic forecasts are combined using specific statistical techniques to estimate the probability of a certain event to develop. MAMM simulations are very demanding in terms of computer resources, requiring CPU time and storage capacity which a single organization is hardly to provide. Moreover operational short range weather prediction at regional scale is a time critical task wich has to be completed in less than a couple of hours to be really usable.
In this presentation we will discuss the results of two project (GRIDA3: grida3.crs4.it, CYBERSAR: www.cybersar.com) financed by the Italian Ministry of Research (MIUR) in which we have implemented a MAMM EPS based on 3 limited area models (BOLAM, MM5 and WRF) fed with two different sets of Initial and Boundary Conditions (NCEP and ECMWF). The system has been ported on a PC cluster and made accessible by a specifically designed web portal (grida3.crs4.it/enginframe/premiagrid). This allows an authorized user to use the remote HPC resources behind the web portal, and to run the service (named PREMIAGRID) on demand setting only three parameter: the place in the world, the initial date and the time of integration. Results obtained with the porting of the PREMIAGRID service in the virtual grid of the CyberSAR project using the gLite middleware, will be also discussed.