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Global atmospheric climate simulations on the GRID. Sensitivity studies of El Niño phenomenom

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The EU-funded project "E-Infraestructure shared between Europe and Latin America" (EELA) aims at bringing the e-Infrastructures of Latin American countries to the level of those of Europe, identifying and promoting a sustainable framework for e-Science. Among other tasks, EELA aims at identifying new applications to be ported to the GRID. The present work describes the new developments achieved as a result of porting a climate application to the GRID under the EELA framework.

El Niño phenomenon is a key factor for Latin-American (LA) climate prediction. El Niñoo has a special interest due to its direct effect in the Pacific coast of South America and, in particular, in Peru and Chile. Moreover, research institutes from Peru and Chile (EELA LA partners) run global and regional climate models and need to compare their results with other simulations performed by international centres in the El Niño area.

For this reason, the climate applications in EELA were designed around this phenomenon with the main objective of developing a simulation and analysis tool especially useful for LA partners.

In order to analyze the atmospheric part of the global climate system, we have ported to the GRID the Community Atmosphere Model (CAM). CAM is the latest in a series of global atmosphere models developed at NCAR for the weather and climate research communities. CAM is a numerical model that uses the equations governing the atmosphere to simulate the global state of the atmosphere at a given time. CAM can be run for short (hours, days) or long periods of time (decades, centuries) to inves-

tigate the present or past climate variability. A great percentage of the world climate total variability (70-90\%) is obtained when an atmospheric model is forced with the oceanic fluxes; say the sea surface temperature and ice cover. Therefore, we use the CAM model with initial grid-point values and also lower boundary conditions at the surface (sea surface temperature).

This port of a GCM needs to be done in close collaboration with other middleware services, since it requires an efficient use of the middleware due to the special features of the workflow of the application, experiments lasting beyond proxy certificates lifetime, control of jobs not supplied by the middleware, ... Based on the existing middleware solutions we have developed a new workflow management system to run the GCM in the GRID with a specific workflow solving most of the problems encountered.