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Mesoscale Climate Evaluation Using Grid Computing

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The CLIMARS project is focused to establish an operational environment for seasonal climate prediction for the Rio Grande do Sul state, Brazil.

The dynamical downscaling will be performed with the use of several software platforms and hardware infrastructure to carry out the investigation on mesoscale of the global change impact. The grid computing takes advantage of geographically spread out computer systems, connected by the internet, for enhancing the power of computation. The ensemble climate prediction is an appropriated application for processing on grid computing, because the integration of each ensemble member does not have a dependency on information from another ensemble members.

The grid processing is employed to compute the 20-year climatology and the long range simulations under ensemble methodology. BRAMS (Brazilian Regional Atmospheric Model) is a mesoscale model developed from a version of the RAMS (from the Colorado State University – CSU, USA). BRAMS model is the tool for carrying out the dynamical downscaling from the IPCC scenarios.

Long range BRAMS simulations will provide data for some climate (data) analysis, and supply data for numerical integration of different models: (a) Regime of the extreme events for temperature and precipitation fields: statistical analysis will be applied on the BRAMS data, (b) CCATT-BRAMS (Coupled Chemistry Aerosol Tracer Transport – BRAMS) is an environmental prediction system that will be used to evaluate if the new standards of temperature, rain regime, and wind field have a significant impact on the pollutant dispersion in the analyzed regions, (c) MGB-IPH (Portuguese acronym for the Large Basin Model (MGB), developed by the Hydraulic Research Institute, (IPH) from the Federal University of Rio Grande do Sul (UFRGS), Brazil) will be employed to simulate the alteration of the river flux under new climate patterns. Important meteorological input variables for the MGB-IPH are the precipitation (most relevant), temperature, and wind field, all provided by BRAMS. The Uruguay river basin will be analyzed in the scope of this proposal, (d) INFOCROP: this crop model has been calibrated for Southern Brazil, three agriculture cropswill be analyzed: rice, soybean and corn.