LAND SURFACE PROCESSES

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J. A. Marengo - P. L. Silva Dias

1. Introduction.

This working group includes studies and operational activities regarding the land-surface processes theme. Observational and modeling studies were presented and discussed rearding the role of land use and change in the climate and hydrology of the basin, studies on surface hyrology and river runoff variability, soild moisture observations and modeling, and the use of regional and global models for analyses of the closure of the water balance, the modeling of the hydrological cycle in the La Plata basin, and the impact of land use changes in the basin. Studies were also discussed regarding observational micrometeoro-logical observations in Sao Paulo, and preliminary results were presented.

2. Studies presented and discussed during the workshop.

These were some of most relevant studies presented and discussed at the workshop, including title, authors and a summary of the main topics discussed.

Modeling the surface hydrology of the La Plata river basin using the CPTEC/COLA AGCM. **J.** A. Marengo and Collaborators. CPTEC/INPE. São Paulo, Brazil.

-Studies on closure of the atmospheric water balance in the basin.
-Modelling surface runoff of the Amazonia and Parana-La Plata River Basin.
-Medium-lower predictability of rainfall and runoff in the Parana-La Plata Basin. Sensitive to strong warming due to El Niño while in normal years predictability is lower.

Climate change impacts on the vegetation of Argentina using a Biogeographical Model. Nazareno Castillo and Mario Nuñez. CIMA/UBA, Argentina

-The main objective of this research is to predict changes in vegetation (particularly vegetation distribution and NPP) as a result of climate change and CO2 atmospheric increment.
The research includes three stages: 1- Calibration of the model: the biogeographical model is driven by observed monthly mean climate data and the vegetation distribution output is compared to observations. 2- Assessment of climate change impacts on vegetation: the biogeographic model is driven by future climate scenarios, derived from GCMs or RCM nested in GCMs. 3- The new vegetation distribution (2) is contrasted with the control distribution generated in the stage (1).

Application of a soil water storage model to the Mercosur area. J. Tomasella, J. A. Marengo, CPTEC/INPE, São Paulo, Brazil. M.Doyle, UBA, Buenos Aires. Argentina. G. Coronel, Universidade Nacional de Asunción, Paraguay.

Studies suggest a strong interaction between atmospheric processes and soil moisture, either on a local, regional and global scales.

The lack of soil moisture information on a regional scale in South America affects studies on interaction between climate and soils moistureàsoil water storage is usually estimated using soil water balance of the top soil layer.

Experiences of CPTEC for NE Brazil (PROCLIMA) is used in producing real time soil moisture estimations to support economic activities like agriculture in MERCOSUR area.

An example of interaction between surface processes and the atmosphere: biomass burning in South America. P.L. Silva Dias, S. Freitas, K. Longo, D.S. Moreira and M.A. Silva Dias. USP/IAGAC, São Paulo, Brazil, Graziela Ulke (UBA), Marcelo Correa (USP), Genaro Coronel (Paraguay).

The role of biomass burning on the surface processes is currently under investigation. Development and implementation of an operational system for monitoring and prediction of the displacement of the smoke plume produced by biomass burning in the tropical sector of S. America.

The next step in to introduce: (a) a more complex aerosol dynamical model which considers the process of aging of the suspended material, (b) more sophysticated wet removal processes, (c) more accurate interaction between aerosols and short wave radiation.

Specific actions were taken in improving the measurements of the effect of biomass burning on the energy balance at the surface through UVB measurements in several areas including Asuncion.

3. Preliminary actions on surface energy balances.

-Improvement of surface parameterizations:

•Significant effort was devoted to the improvement of the surface parameterization of the RAMS model at USP. Data collected at the micrometeorological towers operated at Sertãozinho (SP) at a sugar cane site and at a natural Cerrado were useful to adjust vegetation parameters such as root and leaf resistances, root depth, vegetation albedo and others. Operational results on the surface energy balance are available twice a day (forecasts initiated at 00 and 12 UTC). The results are public and available at the site www.master.iag.usp.br under the page on regional forecasting. Appropriate acknowledgment to PROSUR and IAI are made.
•Collaboration with UBA, Matilde Nicolini and S. Freitas, Interactive atmospheric dynamic vegetation model.

Interactive atmospheric/dynamic vegetation model:
Brazil: P. Silva Dias, M. Silva Dias, D. Moreira.

The SIB model with carbon is in the process of installation in RAMS. A preliminary version of the model is available for the sequential version of RAMS. Validation of the model is under way, using data collected at the micrometeorological towers in the State of São Paulo. The paralelization of the code is under way. A significant change was done in the original structure of the code in order to allow for patches of different vegetation types in each model grid point. An important activity was accomplished in the last year: the development of a 1 km resolution vegetation file over S. America which is a combination of the IGBP file and updated information over the tropical sector of S. America. This is a product of the interaction of USP, INPE and the Federal University of Parana in Brazil. This file is available for any user of PROSUR.

4. Things that deserve some attention (for PROSUR and ideas generated from PROSUR for future research)

-Predictability of the water cycle in the La Plata River Basin (locals versus remote forcing).
-Multidecadal variability and trends of the components of the hydrological cycle in the basin (causes, impacts).
-Possible impact of decadal variability on climate predictability.
-Possible effect of land use changes in climate and hydrological variability in the basin (is this part of “local forcing”?).
-The impacts of Pantanal on climate predictability in the region (is this well represented in global models?).
-Field observations of soil moisture for model validation and assimilation purposes (hydrological, regional, global).
-Need of a unique rainfall data set for the basin.
-Extreme weather events (cold fronts, dry spells, storms, frost) interannual and long-term variability.
-Climate Change and downscaling of climate change global scenarios for the La Plata Basin.
-Changes in climate extremes in the La Plata basin.