The river routing scheme of ORCHIDEE and it's interactions with climate

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For the third generation land-surface scheme of the Institut Pierre Simon Laplace (IPSL), named ORCHIDEE, a fully integrated runoff routing scheme has been developed. The aim of this effort is to allow the horizontally transported water to be evaporated and interact with the surface processes. Such an integrated routing scheme allows for a proper treatment of endorehic basins, floodplains and irrigation. It's implementation poses some technical challenges as the routing scheme has to be adapted to the coarse resolution at which land-surface schemes has to run when coupled to and atmospheric models. The frequent changes in resolution imposed by the driving models requires algorithms for the automatic generation of basin maps and reservoir parameterizations which are as resolution independent as possible.

In this presentation we will demonstrate the ability of the numerical scheme of the routing scheme to cope with the constraints imposed by the choice of integrating it into the land-surface scheme. We will then compare the simulated river flows and other components of the water cycle which are obtained with the land-surface schemes in an off-line mode and coupled to the LMD atmospheric model. Special emphasis will be put on the simulation of floodplains and of the irrigation.

With the coupled integrations we will show the impact lateral transport of water and it's re-evaporation through floodplains and irrigated areas has on climate. We will study how it affects the water cycle on a continental scale and how the water transports by the atmosphere are changed. Using a multi-annual integration of the coupled model the variability of the various water reservoirs will be analyzed. It will also enable us to determine the role of climate variability in the water usage by irrigation.

Tuesday I (Talk)