3rd International Conference on Earth System Modelling
Vol. , 3ICESM-354-1, 2012
3rd International Conference on Earth System Modelling


# Brazilian Integrated Model of Land Surface Processes - INLAND

G. Sampaio (1), M. H. Costa (2), M. Cardoso (3), M. Sanches (4), and C. Nobre (5)

(1) Brazilian Institute for Space Research-INPE, Center for Earth System Science, Cachoeira Paulista, Brazil (gilvan.sampaio@inpe.br), (2) University of Viçosa, Viçosa, Brazil (mhcosta@ufv.br), (3) Brazilian Institute for Space Research-INPE, Center for Earth System Science, Cachoeira Paulista, Brazil (manoel.cardoso@inpe.br), (4) Brazilian Institute for Space Research-INPE, Center for Earth System Science, Cachoeira Paulista, Brazil (marcos.sanches@inpe.br), (5) Brazilian Institute for Space Research-INPE, Center for Earth System Science, Cachoeira Paulista, Brazil (carlos.nobre@inpe.br)

During the last decade, biosphere models have been successfully coupled to comprehensive ocean–atmosphere general circulation models and used to investigate the two-way biogeophysical and biogeochemical interconnections between terrestrial ecosystems and the climate (e.g. Cox et al., 2000; Foley et al., 2000; Delire et al., 2002, 2003; Friedlingstein et al., 2006). Recent trends in the development of land components of Earth System models point in the direction of integrating all terrestrial processes that are relevant to the global change problem, as evidenced by the new versions of the NCAR-CLM and JULES land model.

In the development of the Brazilian Model of the Global Climate System (BMGCS), it is our objective to develop an integrated land surface module that can be applied globally and represents substantial improvements of the representation of biosphere-atmosphere interactions over South American biomes. The name of this module is Integrated Model of Land Surface Processes – INLAND. This module is strongly based on the dynamic vegetation model IBIS (the Integrated Biosphere Simulator, Foley et al. 1996, Kucharik et al. 2000), with the ability to simulate land surface processes, physiology, phenology and dynamics of the vegetation, the complete terrestrial carbon cycle and a specific fire dynamics sub-model, which will parameterize the probability of occurrence of fires and will further impact on the carbon cycle, fraction of vegetation disturbed and vegetation composition. Also, it will incorporate two compatible modules, one for agriculture crops (AGRO-IBIS, Kucharik et al. 2008) and the other for floodplains (Terrestrial Hydrological Model with Biogeochemistry – THMB, Coe et al. 2008). The INLAND model will focus on a better representation of processes relevant in the tropics and particularly in South America and Brazil.

A fundamental goal on the development of the INLAND model is to design it to be fully coupled to the other components of the climate model. The representation of the biosphere-atmosphere interaction in the BMGCS should account explicitly for the feedbacks between climate and the biogeophysical and biogeochemical processes of the land surface. A better knowledge of the vulnerability of tropical forests to more frequent and severe droughts, either through a direct effect on tree mortality or through an indirect effect, via increased probability of vegetation fires, is key to understand the potential for a large-scale tropical forest dieback and its implications for the global carbon cycle and future climate.