INTEGRATING REMOTE SENSING AND HYDROLOGICAL MODELING TO STUDY HYDROMETEOROLOGICAL EXTREMES IMPACTS IN LARGE WETLANDS OF THE BOLIVIAN AMAZON

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Abstract

The Wetlands of the Bolivian lowlands, in the southwestern portion of the Amazon Basin, are of great importance for hydrological and biogeochemical cycles for the whole basin: The proximity and influence of the Andes mountain range determines a high spatial and temporal variability of floods; the great proportion of herbaceous floodplains, the highest among the Amazon, defines a wide floodable area that retains different types of water an sediments from upstream. In addition, these extensive wetlands may play a role in climate regulation since they are relevant to energy fluxes and carbon cycle. Environmental change, mainly land use change, infrastructure projects and climate change-variability, are threatening the complex hydrological cycle in this area, where periodic flooding is crucial for human populations and ecosystems. Extreme climatic events have derived in great economic impacts while further damages in ecosystems and local populations are still undetermined. There is a lack of knowledge about wetlands and their functions. This, together with the disparity between perception and scientific evidence of environmental change impacts, are leading to null or inadequate responses. Thus, there is a growing demand to understand the functioning and dynamics of these wetlands. In this study, we integrate remote sensing with hydrologic modeling to represent flood processes in the Mamore and Itenez-Guapore basins. This approach make possible to study interactions between wetlands and the hydrometeorological regime of the watershed in an integral way and to provide elements for inferring the impacts of environmental change. This research contemplates different phases: flood mapping using remote sensing techniques, with passive and active systems (MODIS and ALOS-PALSAR), that will assist the parameterization of numerical routines for floodplains simulation in a hydrological model (MHD-INPE model); the simulation and analysis of the model outputs in terms of hydrometeorological processes and its influences on flood dynamics. This study will provide relevant information to ongoing scientific initiatives that seek to understand the landscape fragmentation processes during the Holocene and to delineate water resources management strategies in the Bolivian Lowlands.