Hydrological Retrospective of floods and droughts: Case study in the Amazon

Sly Wongchuig Correa (1), Rodrigo Cauduro Dias de Paiva (1), Jhan Carlo Espinoza Villar (2), and Walter Collischonn (1)

(1) Institute of Hydraulic Research, Federal University of Rio Grande do Sul, Porto Alegre, Brazil, (pos@iph.ufrgs.br), (2) Geophysical Institute of Peru, Lima, Peru, (jhan-carlo.espinoza@igp.gob.pe)

Recent studies have reported an increase in intensity and frequency of hydrological extreme events in many regions of the Amazon basin over last decades, these events such as seasonal floods and droughts have originated a significant impact in human and natural systems. Recently, methodologies such as climatic reanalysis are being developed in order to create a coherent register of climatic systems, thus taking this notion, this research efforts to produce a methodology called Hydrological Retrospective (HR), that essentially simulate large rainfall datasets over hydrological models in order to develop a record over past hydrology, enabling the analysis of past floods and droughts. We developed our methodology on the Amazon basin, thus we used eight large precipitation datasets (more than 30 years) through a large scale hydrological and hydrodynamic model (MGB-IPH), after that HR products were validated against several in situ discharge gauges dispersed throughout Amazon basin, given focus in maximum and minimum events. For better HR results according performance metrics, we performed a forecast skill of HR to detect floods and droughts considering in-situ observations. Furthermore, statistical temporal series trend was performed for intensity of seasonal floods and drought in the whole Amazon basin. Results indicate that better HR represented well most past extreme events registered by in-situ observed data and also showed coherent with many events cited by literature, thus we consider viable to use some large precipitation datasets as climatic reanalysis mainly based on land surface component and datasets based in merged products for represent past regional hydrology and seasonal hydrological extreme events. On the other hand, an increase trend of intensity was realized for maximum annual discharges (related to floods) in north-western regions and for minimum annual discharges (related to drought) in central-south regions of the Amazon basin, these features were previously detected by other researches. In the whole basin, we estimated an upward trend of maximum annual discharges at Amazon River. In order to estimate better future hydrological behavior and their impacts on the society, HR could be used as a methodology to understand past extreme events occurrence in many places considering the global coverage of rainfall datasets.