P02

Assessing the Effect of Land Use Change on the Amazon Basin River Discharge

○ Roberto Valmir DA SILVA, Yosuke YAMASHIKI, Kaoru TAKARA

Land use change has received attention from society due to its direct influence on rivers water quantity and quality. Recent studies on this theme have focused on analyzing the effect of land use change by means of distributed hydrological models application. Various land use scenarios, usually based on satellites images and future projections according to the land use evolution in the watershed, are simulated in the model. Although satellites images are a powerful tool with spacial resolutions increasing day by day, they fail to represent a satisfactory temporal resolution when compared to the temporal resolution of discharge and other model inputs. In addition, satellites images are scarce in representing of past times in some locations. Few studies have focused on analyzing the effect of land used using only the observed discharges. This fact can be explained through poor and/or scarce data and difficulties to implement experimental catchments. A hydrological model can be used in order to compare observed discharge to calculated discharges. Through this comparison is possible to find evidences about the effect of land use change. This study has the objective of analyzing the effect of land use on discharge in a sub-basin of the Amazon basin, Brazil. This sub-basin is called Humaita and has roughly 1 million km^2. It is located in the southwestern part of the Amazon basin. The city of Porto Velho is inserted in this basin and it is one of the most important cities in the north of Brazil. The data set for this study consists of precipitation and climate variables derived from a global re-analysis with a resolution of 50 km. Discharges data were acquired from a brazilian government agency. The daily data set encompasses a period of 26 years (1980 – 2006). The hydrological model TOPMODEL was chosen as a hydrological model due to its simplicity and efficiency. The methodology consists basically of: (1) model calibration against a period of five years; (2) model validation and effect of land use identification against a period of 21 years. Figure 1 depicts the two periods. The effect of land use was analyzed using the model efficiency to simulate the discharges for each year during the period of validation and re-calibrating the model for each year. After the re-calibration, the temporal variation of the model parameters values was analyzed. It was observed variations in model parameterization and this may be associate to land use change.

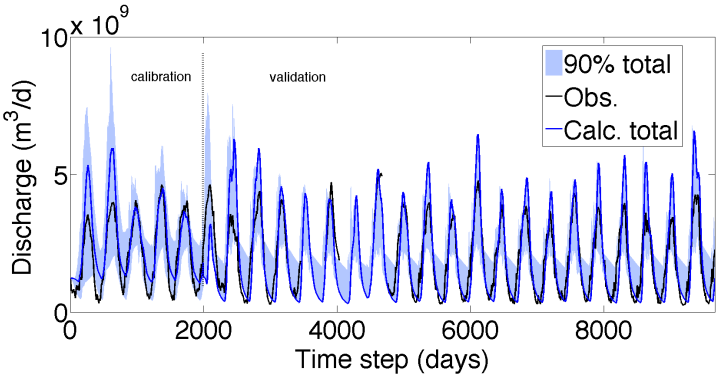

Figure 1. Calibration and validation periods. Uncertainty bounds, observed and calculated discharges.