Geophysical Research Abstracts
Vol. 12, EGU2010-6613, 2010
EGU General Assembly 2010

Instrumentation, monitoring and hydrology of an experimental small catchment in the Brazilian savannas

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Long-term watershed studies are critical in designing intervention procedures for proper resources planning and management. The objective of this paper is to describe one of these watershed studies. Instrumentation, monitoring activities and generated data base in the Buriti Vermelho experimental watershed, a sub-catchment of the São Francisco basin, in Brazil is discussed. The basin has a drainage area of 940 hectares and, is located in the eastern part of the Federal District, in the Brazilian savanna region. Agriculture is the main activity. There is a dominance of red latosols and several types of land use and crop cover can be observed in the basin. A socioeconomic survey undertaken showed the existence of both small and large scale farming enterprises. Irrigation is needed to prevent yield loss due to insufficient rain. Water usage conflicts are already occurring. The basin was instrumented to study the watershed behavior in detail and to assess the risk of water scarcity in the next twenty years by modeling using the observed data for validation. Evaluations of irrigation efficiencies, leaf area index (LAI) and root depth of crops and natural vegetation, small reservoirs evaporation and infiltration and water table depth are being carried out. The analysis of the results of the first two years showed that air temperature varied from 18 °C in July to 25 °C in October 2008, while the relative humidity varied from 84% in February to 47% in August of 2008. Wind speed was between, from 18 m/s, in November 2008, to 7.0 m/s, in February 2009, and solar radiation from 450 W/m, in October 2008, to 258 W/m in February 2009. There was no precipitation in the basin during May, June and July 2008. The greatest precipitation observed in the basin was equal to 190 mm, in January 2009. The average monthly river discharge measure in a point closed to the middle length of the river varied from 16 L/s to 138 L/s. Water table depth varied from 6.3 m to 11.8 m. LAI varied from 3.5 (regular bean) to 9.2 (wheat). Root depth varied from 0.17 m (annual crops) to 5 m (natural vegetation). To date, policymakers lack scientific evidence on the consequences for growth, poverty alleviation or environmental sustainability of alternative uses of water resources, such as the increase of water resources demand in the savannas that will probably occur due to increasing of biofuel production in the region. In the future the development of irrigation water use will increase conflicts not only between farmers but also between farmers and city dwellers. Before this occurs, a well designed strategy that optimizes sustainable water use has to be in place. Realistically this can only be accomplished when data such as collected here are available taking into account that a well instrumented basin does not imply that the basin is being well monitored.