



Modeling the impact of bushfire-induced land use change on the surface energy fluxes and moisture indicators in the Volta Basin

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The fact that bushfire impacts on the land surface properties is well established. However, the extent and nature of these impacts and associated feedbacks are not well understood. The problem is more complicated in regions where intensive intentional bushfire is an integral part of the livelihoods of the population, particularly, in the Volta Basin of West Africa where over 70% of the population is involved in rain-fed agriculture and bushfire is a farm management tool. It is therefore important to investigate the impacts of the widespread use of bushfire in the region. To this end, a combination of measurements and simulations were undertaken to investigation the impacts of bushfire on the energy dynamics of the Volta Basin of West Africa. The main objective of this enquiry was to investigate whether bushfire-induced landuse change results in threshold energy changes and to what extent the surface energy fluxes and moisture indicators are affected.

A semi- arid area in northern Ghana where intensive bushfire is prevalent was selected for the exercise. A period within the dry season (February 2003) was chosen for the investigation. This period is characterized by dry conditions (typically low average humidity of 20%) with dead dry vegetative matter that enhances the occurrence of

bushfire. The well-established Biosphere-Atmosphere-Transfer Scheme (BATS) was used for simulating the land surface processes. The model was initialized with observations from a measurement campaign on bushfires under the GLOWA-Volta project. The results obtained from the study show that 1) Bushfire induces threshold changes in the energy dynamics and hydrological cycle of the area, 2) The soil hydrological parameters below the soil surface are not significantly affected by bushfire, 3) Bushfire significantly affect and 4) Bushfire significantly increases the diurnal maximum temperature and decreases the minimum diurnal temperature. The results obtained in the study are consistent with observed climatic conditions of the region of interest.