Geophysical Research Abstracts, Vol. 7, 07477, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07477

1 Potential climate changes and their impacts on the response of an endoreic hydrological landscape in the Dantiandou Kori

T. Vischel (1), T. Lebel (1), S. Massuel (2)

(1) Laboratoire d'étude des Transferts en Hydrologie et Environnement IRD, Grenoble, France, (2) Maison des Sciences de l'Eau IRD, Montpellier, France (theo.vischel@hmg.inpg.fr / Fax: +33 (0)4 76 82 50 01 / Phone: +33 (0)4 76 82 52 82)

West Africa has suffered from a continuous drought since the 1970s leading to tragic consequences on food security and water resources. The water balance was severely affected, particularly the large Sahelian river basins for which the discharge deficit was twice the rainfall deficit. There is thus a serious need to investigate potential future climate changes over the region and to evaluate their impact on water resources. Both the variability of the climate and the high sensitivity of catchments to the rainfall pattern make the creation of scenarios at suited fine time-space scale indispensable. However the output of general circulation models (GCMs) is still not able to simulate rainfall variability at regional scale.

An alternative method is proposed here to assess how climate changes can affect the runoff of typical Sahelian endoreic catchments. The turning band method is used to generate rainfields corresponding to various rainfall regimes. These rainfields are then used as forcing fields for a SCS-type hydrological model which reproduces the runoff at the outlet of a series of small endoreic catchments in the Dantiandou Kori (800 km^2 Niger). The method retained for elaborating scenarios is partly inspired by those exposed in Vieux et al., (1998). It consists in modifying the characteristics of rainfall time series. The major difference is that their local approach at the raingauge scale of one small watershed is here extended up to the rainfield scale applied on a large

landscape. Five different sensitivity scenarios are created. First the number of events is changed at the beginning and the end of the rainy season (S1) and at the core of the rainy season (S2). Then less intense events (S3) and more intense events (S4) are gradually removed. Finally the magnitude of rain events is changed in the simulations (S5).

The non linearity of the hydrological response is clearly apparent from the results obtained. The impact on the runoff of the studied area is more or less amplified depending on the type of applied scenario. The two rainfall scenarios S4 and S5 have a particularly strong impact on runoff characterized by an amplification of changing runoff by a factor of two compared to the changes applied to the rainfall. This study gives more insights into the impact of climate variability on the response of Sahelian catchments. It confirms also the necessity to pursue the development and the use of disaggregation techniques to allow large scale climate output to be used as forcing for small scale hydrological models.