Geophysical Research Abstracts, Vol. 9, 09302, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09302

Fluxes of carbon, water, and energy above a natural savannah in Burkina Faso, West-Africa

U. Falk (1), C. Brümmer (2), N. Brüggemann (2), R. Wassmann (2), J. Szarzynski (3),

(1) Center for Development Research (ZEF), Department of Ecology and Resource Management, University of Bonn, Walter-Flex Strasse 3, 53113 Bonn, Germany, (2) Karlsruhe Research Centre, Institute for Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU), Kreuzeckbahnstrasse 19, 82467 Garmisch-Partenkirchen, Germany, (3) German Remote Sensing Data Center (DFD), German Aerospace Center (DLR), Oberpfaffenhofen, D-82234 Wessling, Germany (Ulrike.falk@gmail.com / Phone: +49-228-731725)

The vulnerability of West African countries to climatic and environmental changes is likely to increase within the next decades as demands on resources continuously rise in association with rapidly growing populations. The conversion of tropical natural landscape to agriculturally used land is a spreading process throughout the tropical region. Besides the effects on the biological diversity and the hydrological functions, this also has an impact on the turbulent exchange processes between vegetation and atmosphere, the radiative properties of the surface and therefore on atmospheric boundary layer and local climate. From November 2004 to October 2006, fluxes of energy, water and carbon dioxide above tropical savannah in Burkina Faso, Africa, were investigated using the Eddy-Covariance (EC) technique. The EC measurements revealed that the natural savannah acted as a small C source in the dry period, whereas large amounts of CO2-C were bound during the rainy seasons, particularly from June to September. The balance of the first year of our observations indicated a C uptake of 373 g m-2 of the ecosystem, which is comparable to deciduous forests in Europe. The CO2 fluxes showed clear diurnal patterns with the highest uptake rates at noon (up to 1 mg m-2 s-1 in July and August) and a permanent slight release to the atmosphere during nighttime. Simultaneous measurements of meteorological variables and the components of the radiation budget were conducted to investigate the dependencies of the turbulent exchange processes on canopy and atmospheric boundary layer conditions. A SVAT

model (Oltchev et al., 2002) was used to compute the heat exchange between canopy and atmosphere, to apply a plausibility test to the measured fluxes, and to investigate the component fluxes.