Geophysical Research Abstracts
Vol. 13, EGU2011-12687, 2011
EGU General Assembly 2011


# Diffuse radiation and its effects on ecosystem-level water use efficiency

Antje Maria Moffat (1,3), Markus Reichstein (1), Alessandro Cescatti (2), Gitta Lasslop (1), and Sönke Zaehle (1)
(1) MPI for Biogeochemistry, Jena, Germany, (2) Joint Research Centre, Ispra, Italy, (3) amoffat@bgc-jena.mpg.de

The importance of diffuse radiation for terrestrial net carbon exchanges is widely recognized. However, effects on terrestrial water cycling are still largely unknown. In this study, we investigate the influence of light quality on ecosystem-atmosphere carbon and water exchanges using an inductive approach based on artificial neural networks. The functional relationships between meteorology and ecosystem fluxes, such as the hierarchy of the climatic controls or their multivariate dependencies, are identified directly from half-hourly observations.

We find that higher fraction of diffuse light have a bigger effect on gross primary production (GPP) than on the latent heat (LE) fluxes. This leads to an overall enhanced ecosystem-level water use efficiency (WUE = GPP/LE) of photosynthesis. To check the generality of the obtained relationships, the approach is applied to a wide variety of ecosystems covered by the FLUXNET data set. The differences between vegetation types give an indication of the potential underlying mechanisms. As an outlook, we will discuss the implications of these findings for ecosystem carbon and water fluxes under changing environental conditions.