



Large scale ecohydrological feedbacks and the carbon cycle

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The relation between the global water and carbon cycle is a critical issue in the Earth's climate. The response of carbon uptake to moisture availability, as well as that of carbon respiration to moisture availability determines to a large extent the sensitivity of the Earth's climate to the biosphere. This is thus a key area of ecohydrological research.

In this presentation we will start by evaluating the evidence we have from site, eddy covariance flux based observations. Of particular interest is the question how to extrapolate this information to larger scales. For this we will use both a soil moisture index and a newly developed global soil moisture data set and NDVI and modelled NPP data to test various assumptions about the relations between carbon uptake and show different biomes react different to droughts or soil moisture deficits. We emphasize the difference in relations between boreal, mid latitude and arid zone NPP and drought.

Using satellite derived soil moisture we will show the response of arid vegetation to drought. This shows typical response times of the order of a month, while an analysis focused on extremes suggest different responses in dry and wetter areas. The global patterns are broadly confirmed by analysis of the Fluxnet data, but, importantly, when trying to pin these relationships down to organized variability in parameters of photosynthesis, we find little correspondence. We speculate on the causes of this.

Most emphasis so far has been on the relation between moisture and carbon uptake. We will stress that the relation between soil moisture and heterotrophic respiration may be as important and requires much more investigation.