UP 9: Hydrology, oceanography and miscellaneous

Zeit: Donnerstag 14:00–15:40 Raum: HS 22

Hauptvortrag UP 9.1 Do 14:00 HS 22

Hydrodynamic control of biogeochemical cycling in streams — •Andreas Lorke[1], Christian Noss[1], Christine Anlanger[1], Ute Risse-Buhl[2], and Markus Weitere[2] — [1]Institute for Enviromental Sciences, University of Koblenz-Landau, Forststr. 7, 76829 Landau — [2]Department River Ecology, Helmholtz Centre for Environmental Research UFZ, Brückstraße 3a, 39114 Magdeburg

Low-order streams form the most abundant and the largest component of fluvial networks. They transport and process particulate and dissolved substances of terrestrial or anthropogenic origin. For example, they can be strong sources of the atmospheric greenhouse gases CO2, CH4 and N2O, and they convert anthropogenic nitrate loads into N2. Biodiversity and biogeochemical cycling in streams, as well their spatial and temporal variability are ubiquitously linked to flow velocity and turbulence. Although stream flow has been modified globally by human activities, the processes by which flow and turbulence regulate biogeochemical cycling and biodiversity are poorly understood. Here we analyze the interactions between streambed and water surface roughness and their influence on stream flow turbulence and atmospheric aeration rates. By combining existing ecological and physical frameworks, we present a novel concept for quantifying physical heterogeneity in streams. The concept is applied to study the effects of physical heterogeneity on biodiversity and ecological functioning of epilithic biofilms.

Hauptvortrag UP 9.2 Do 14:30 HS 22

El Niño's little brother in the tropical Atlantic - mechanisms and impacts — •Joke Lübbecke — GEOMAR Helmholtz Centre for Ocean Research Kiel

A climate mode similar to the Pacific El Niño - Southern Oscillation (ENSO) exists in the tropical Atlantic Ocean. Sea surface temperature (SST) anomalies associated with this Atlantic Niño mode can have substantial impacts on rainfall over western Africa and northeastern South America as well as the marine ecosystem along the African coast.

Various processes have been suggested to contribute to the generation of Atlantic Niño events. In addition to the dominant Bjerknes feedback - which links the SST anomalies in the eastern equatorial basin to western basin wind stress anomalies and equatorial thermocline tilt - meridional advection of temperature anomalies, Rossby waves reflecting into equatorial Kelvin waves, and net surface heat flux can play an important role for individual events.

The strength and symmetry of the Atlantic Bjerknes feedback elements vary between decades. Consequently the characteristics of the Atlantic Niño, such as its spatial pattern and amplitude, and its impacts are not stationarity in time. The multi-decadal modulations might be related to the phase of the Atlantic multidecadal oscillation (AMO).

UP 9.3 Do 15:00 HS 22

Distinguishing Sea Ice Types in the Antarctic using Microwave Satellite Observations — •Christian Melsheimer[1], Gunnar Spreen[1], Mohammed Shokr[2], Yufang Ye[3], and Stefanie Arndt[4] — [1]University of Bremen, Bremen, Germany — [2]Environment and Climate Change Canada, Toronto, Canada — [3]Chalmers University of Technology, Göteborg, Sweden — [4]Alfred Wegener Institute, Bremerhaven, Germany

Sea ice can be classified into several types, such as young ice (YI, thin/smooth new ice), first-year ice (FYI, formed during one cold season), and multiyear ice (MYI, which has survived at least one melt season). As the physical properties of sea ice differ significantly for the different ice types, knowledge of the sea ice type is essential for properly modelling the ice-ocean-atmosphere system. Here we apply a new satellite-based retrieval of sea ice type in the Antarctic. This retrieval has originally been developed for the Arctic, where it can distinguish YI, FYI and MYI. Applying it in the Antarctic is useful because although there is MYI in the Antarctic, its distribution has not yet been investigated much, and there are sea ice types which do not occur in the Arctic. The retrieval uses input data from radar scatterometer and microwave radiometers and in addition corrects for, e.g., the effect of melt-refreeze or sea ice drift. The needed satellite data have been available since 1999 with daily coverage (but: retrieval impossible during summer melt), spatial resolution is about 25 km. We present and discuss results of this new retrieval applied to Antarctic sea ice.

UP 9.4 Do 15:20 HS 22

Testing the variability of speleothem growth in Glacial versus Interglacial climate — •Carla Roesch and Kira Rehfeld — Institute of Environmental Physics, Ruprecht-Karls-University Heidelberg, Germany

Major changes in global mean climate occurred since the Last Glacial Maximum (21 kyr ago), with a 3-8°C warming of global mean temperature, an about 120m rise in sea level and an increase of about 100ppm in CO_2. On long timescales, new evidence shows that surface temperature variability decreased globally. However, signs and magnitudes are still poorly constrained for precipitation.

Variations in growth rates of speleothems (cave deposits) have been suggested as an indicator of such global environmental changes. To further investigate the dynamics and variability of paleoclimate we investigate changes in speleothem growth rates. These are derived by modeling the accumulation process based on Uranium/Thorium radiometric point estimates of the age at different depths within the archive. The Bayesian models we apply draw accumulation rates from a Gamma-distribution.

We compare our results to reconstructions from other age-depth models to test the possibility of changing growth rates from the last Glacial to our current Interglacial.