UP 4: Boden- und Agrarphysik

Zeit: Dienstag 15:45–16:30 Raum: GW2 B3009

UP 4.1 Di 15:45 GW2 B3009

Assessment of the hydrological effect of fire-induced vegetation changes on evapotranspiration at a regional scale — •Melanie Häusler[1], João Manuel Neves Silva[1], João Pedro Nunes[2], Paula Soares[1], Thorsten Warneke[3], Jan Jacob Keizer[4], and José Miguel Cardoso Pereira[1] — [1]CEF, Centro de Estudos Florestais, Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisboa, Portugal — [2]CE3C, Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal — [3]Institute of Environmental Physics, University of Bremen, 28359 Bremen, Germany — [4]CESAM and Department of Environment and Planning, University of Aveiro, Aveiro, Portugal

This study aims to understand the changes of evapotranspiration (ET) in eucalyptus stands in the Caramulo Mountain range, located around 30 km inland from the city Aveiro, Portugal. A two-source energy balance model in combination with medium-resolution imagery (Landsat 8) was used to estimate ET and its changes over time. The fire events occurred from 2011 to 2013, and their effects on fire-driven changes in ET, albedo and partial vegetation cover (Pv) were assessed for the years 2013 to 2015. Model estimates were compared to ground-based measurements, where evaporation was assumed to be equal to interception (Gash model to retrieve rainfall interception) and transpiration estimated by a water balance fed by soil moisture measurements. Results show that ET and its evolution over time was driven by fire severity and forest properties.

UP 4.2 Di 16:00 GW2 B3009

Soil moisture measurement at the hectometer scale with cosmic-ray neutrons — •Markus Köhli[1], Jannis Weimar[1], Martin Schrön[2], and Ulrich Schmidt[1] — [1]Physikalisches Institut, Universität Heidelberg, Heidelberg, Germany — [2]Helmholtz Zentrum für Umweltforschung, UFZ, Leipzig

Soil Moisture at the hectometer scale has turned out to be feasible by detecting environmental albedo neutron density. This non-invasive technique relies on the measurement of neutrons originating from cosmic particle air showers and reflected by the soil. The key characteristic of the method is the exceptionally high moderation strength of hydrogen. It slows down fast neutrons whereas other heavier elements independent of the chemical composition rather reflect them. In the recent years the interest was set to understanding neutron transport - and therefore the footprint of the method - by Monte-Carlo simulations. Meanwhile a manifold of experiments have been conducted targeting different characteristics of the method. This especially allows data interpretation for mobile applications, which is the current focus of development in Heidelberg and which will be presented in this talk.

UP 4.3 Di 16:15 GW2 B3009

Detection systems for neutron-based soil moisture measurements — •Jannis Weimar[1], Markus Köhli[1], Martin Schrön[2], and Ulrich Schmidt[1] — [1]Physikalisches Institut, Heidelberg, Deutschland — [2]Helmholtz-Zentrum für Umweltforschung, Leipzig, Deutschland

During the past years an interdisciplinary community of scientists has established a non-invasive soil moisture measurement technique using secondary cosmic ray neutrons. The method is based on the characteristic of hydrogen to effectively moderate neutrons. Consequently the amount of reflected fast neutrons strongly depends on the water content of the soil. The method has proven to be capable of closing the gap in spatial resolution between satellite and point-like measurements by providing a footprint of several hectares, which makes it a promising candidate for multiple applications in environmental science.

Neutron detection systems involve materials that convert weakly interacting neutrons into ionizing particles. For a long time such have relied on Helium-3 as an efficient agent with a high absorption cross-section. Its current scarcity demands for technological solutions with other converters. In Heidelberg a boron-10-lined detector has been designed offering lower costs at good detection rates. It is also the onset for a mobile detection system which allows for measurements on larger scales at otherwise inaccessible terrain. The talk will cover preliminary measurement results and comparisons to recent Monte-Carlo simulations.