Geophysical Research Abstracts
Vol. 14, EGU2012-12394, 2012
EGU General Assembly 2012

Phosphorus and dissolved organic carbon export during peak flow periods in three small homogenous catchments in eastern Germany

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Regional climate change scenarios for Central Europe predict both an overall increase in temperature and alterations in annual precipitation regimes. For large parts of Central Europe, climate change is expected to result in an increase in winter precipitation and a decrease in summer precipitation. In addition, an increase in extreme conditions, such as heat waves, prolonged drought periods, and heavy rainfall events are predicted. This research examines the potential impacts of increased heavy rainfall events on matter export from small catchment areas, and how different vegetation cover and land management options effects these exports.

In order to evaluate the export of matter from different land-use types in the Eastern Ore Mountains (Saxony, NE Germany, 50˚48'18.06" North, 13˚36'24.54" East), study sites were established in three small catchments with homogeneous land-use. These study areas are each sub-catchments of the Ammelsdorf catchment, which provides inflow to the Lehnmühle reservoir (a major water supply for the city of Dresden). Each sub catchment represents one of the three main land-use types in the catchment area of the reservoir: crops (winter oilseed rape, winter wheat), grasslands, and forests (primarily spruce). Since November 2009 the discharge from these sub catchments has been continuously measured and water quality was analyzed on a weekly basis. During peak flow events, discharge was collected using automatic water samplers, which allowed for high temporal resolution analysis of matter export during these periods to be made.

During the 2010 and 2011 hydrological years, several heavy rainfall events occurred which have been evaluated. During a 110-hour long precipitation event (P = 170 mm) between 37 and 81 water samples per sub catchment were collected and analyzed. The resulting export of dissolved phosphorus (ortho-PO_4^-) and dissolved organic carbon (DOC) from the sub catchments during this event is provided in the results. In addition, the matter export resulting from a 59-hour precipitation event (P = 39 mm, between 31 and 48 analyzed water samples per sub catchment) is presented. The contribution of these two events to the annual export of ortho-PO_4^- and DOC will be discussed.