Geophysical Research Abstracts
Vol. 12, EGU2010-11948, 2010
EGU General Assembly 2010

Drift diatoms: A new tracer for assessing geographic sources of water?

S. Wrede (1,2), L. Pfister (1), J.J. McDonnell (3), J. Frentress (2), D. Hlúbiková (1), S. Uhlenbrook (2,4), L. Ector (1), and L. Hoffmann (1)

(1) Department Environment and Agro-Biotechnologies, Centre de Recherche Public - Gabriel Lippmann, Belvaux, Luxembourg (wrede@lippmann.lu / Fax: +352 47 02 64), (2) Water Resources Section, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, (3) Department of Forest Engineering, Resources and Management, Oregon State University, Corvallis, USA, (4) Department of Water Engineering, UNESCO-IHE, Delft, The Netherlands

Over the past decades, new environmental and isotope tracer techniques effectively changed the understanding of time- and geographic sources of water in catchment hydrology. However, over the years, inherent limitations and assumptions of these techniques, such as unrealistic mixing assumptions, unstable end-member solutions and temporally varying input concentrations became apparent and have hampered further progress in this field.

In a proof of concept study in the experimental Attert watershed in the Grand-Duchy of Luxembourg (Europe) we now explore the potential of living organisms as tracers. Specifically we assess the use of drift diatoms, as a complementary tracer for geographic source and hydrological connectivity during rainfall-runoff events.

With most species measuring between 10 and 200 μm, diatoms are easily transported by flowing water. Diatoms are present in most aquatic ecosystems and also occur in moist terrestrial habitats, such as soils, rock surfaces or epiphytes, where they adapt to prevailing ecological niches. The strongly diversified diatom species distributions are largely controlled by physio-geographical factors and water quality.

Our preliminary investigations suggest that the so-called drift diatoms thus can help to detect the onset/cessation of surface runoff connected to the river and hence represent a new way to quantify geographical sources of surface runoff at the watershed scale. This new type of information can be used by hydrologists to confirm or reject the existence of a surface runoff component in total runoff and eventually to constrain assumptions on a potential surface runoff component in conventional tracer based hydrograph separations.