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Use of borosilicate suction cups as sampling strategy for investigating the inundation-induced release of organic and inorganic pollutants in a floodplain soil

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It has to be expected that the occurrence and intensity of flood events will increase as a result of the climate change, which has an impact on the discharge regime of rivers. This will increase the temporal variability with higher amplitudes between periods of intensive dryness and periods of flooding in the river basins and consequently the changes of the environmental conditions in the floodplains. Therefore, for sustainable decisions in water resources management the monitoring of changes in the possible pollutant release from regularly inundated floodplains becomes more important. The innovative technique of borosilicate suction cups, installed in the flood channel, in combination with solid phase micro extraction (SPME) was tested and allowed the determination of organic pollutants in the small water volumes gained from the suction cups. Within the integrated project of the 6th EU Framework Programme AquaTerra we investigated a possible migration of organic pollutants as well as heavy metals and As into the depth of a flood channel of an Elbe river floodplain. Additionally, the redox potential was determined in-situ. Organic pollutants like beta-HCH (hexachlorocyclohexane) and hexachlorobenzene (HCB) were increasingly released at higher concentrations of dissolved organic carbon. The measurements heavy metals and As revealed a substantial mobilization of As and partly Cd, Cu and Ni that exceeded the precaution values for the path soil - groundwater in the topsoils. While Cd, Cu and Zn were leached or immobilised, the concentration pattern of Co and Mo coincided with the increase of Mn. The release of these elements was assumed to be an interacting process with dissolution of Mn and Fe oxides and hydroxides at lower redox potentials. Also As showed a significant response to the dissolution of the ox-

ides. Ni and Cr were characterized by a continuously increasing release peaking after the end of the inundation like dissolved organic carbon (TOC, $< 1\ \mu$m). The results of in-situ redox potential measurement indicated a delay of 4-5 weeks for the release of the redox-sensitive metals. The results of the tested and successfully used suction cup technique clarified whether the contrasting effects on the movement of pollutants due to inundation events lead to an increased release of the pollutants or not and therefore contribute to a sustainable management of floodplains. The measurements furthermore showed the importance for detailed investigations in the periods when the floodplains are inundated but also revealed that the monitoring can be predominantly emphasized on these periods when an inundation can be expected.