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Role of climatic single events and pedohydraulic factors in the mobilization and the transport of mobile organic matter in an arable soil

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Soils are the largest terrestrial pool for organic carbon. To improve our understanding of local and global carbon cycles, factors and conditions that effect release, redistribution and transport of organic carbon should be known. Besides dissolved organic substances, organic particles with sizes up to several micrometers are mobile in soils. The aims of this work are (i) to investigate the impact of external factors (climatic, anthropogenic) and pedohydraulic conditions on the mobilization of mobile organic matter (MOM) and (ii) to characterize the MOM with focus on the particulate fraction. We monitored spatially resolved water and carbon fluxes at an agricultural site (Luvisol) with wheat and maize cultivation. Climatic and pedohydraulic boundary conditions were measured continuously with a climate station and a soilhydraulic monitoring pit. The seepage water has been collected in two depths (plough horizon and subsoil) with sixteen tension lysimeters. The results from two years observation suggest that release of MOM in soil is mainly triggered by single events like heavy rain and snowmelt. The pedohydraulic data support that preferential flow along biopores plays a major role for the MOM release during these events, whereas the hydraulic gradient was not observed as an important factor for MOM release. Owing to preferential flow, less MOM were detected in the seepage water collected below the plough pan than in the deeper subsoil′s seepage water at single events. Further, the translocation of dissolved and particulate organic substances depends on the cultivation type. With regard to probably increasing occurrence of extreme events as a consequence of the climatic change, the influence of MOM translocation should be considered in future balances of carbon cycling.