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Elemental and isotopic composition of River water during a flood event in agricultural watershed: Insight into pathways of water and sources of terrestrial derived matter.

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Flood event in agricultural watershed represents 64% of annual water discharge but up to 71% of dissolved organic carbon and 94% of total suspended matter export. It therefore constitutes a key period to assess change in surface water contamination and quality. While during base flow conditions, most of river discharge is supplied by groundwater input, during storm period surface and subsurface runoffs contribute to stream flow. Integration of water pathway complexity and spatial heterogeneity of contaminants inputs in the watershed can be assessed by biogeochemical proxies measured at watershed outlet in the main river channel. Objective of the study is to improve our comprehension of water, terrestrial matter, contaminant sources and fate in agricultural watershed. To decipher these sources we measured several isotopic proxies (13C, 15N,18O, D) in several matrices (bulk, particular and dissolved fraction) within the water column of the Save River, draining a typical agricultural watershed of the South West of France. We sampled the Save river during May 2010 spring flood event in order to characterize the flux of water and particulate and dissolved matter. Intensive sampling strategy allowed us to sample at high-resolution the change in elemental and isotopic composition of several environmental matrices. 18O and D have been measured to trace the origin of water (surface runoff (SR), delayed subsurface flow (SSF) and groundwater flow (GF)) during the flood event. Source of terrestrial matter is explored through 13C, 15N isotopic analysis along with total C and N elemental analysis. Preliminary results show a specific isotopic response depending on hydraulic flow considered. Elemental and isotopic compositions remain constant during base flow conditions, however they fluctuate a lot during the flood event. C/N(POC) ratios vary from 6 to 4 from base flow to peak flow respectively. δ18O values vary from -7.5‰ to -10‰δ13C(DIC) vary from -12‰ to -10‰Ċ/N(POC) variation may be explained by an increasing contribution of terrestrial derived organic matter washed by surface and subsurface run-off. Decrease in δ18O values betray a change in water reservoir participation to river flow and indicate a greater participation of upper watershed precipitation (higher altitude) at lower temperatures. Finally, δ13C(DIC) increase may be associated with an increasing leaching of soil carbonate during the storm event. Ongoing analyses of river sample include deuterium (δD), δ13C(POC), δ13C(DOC) δ15N and specific biomarkers analyses (lignin biomarkers). These complementary analyses will improve our comprehension of terrestrial matter transfer and source. These results will be compared to several contaminant dynamics in order to better understand their fate in agricultural watershed during flood event.