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Hydrosedimentary functioning of a lowland field with both surface and subsurface drainage.

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Erosion is one of the most important threats for soil. Over the long term, soil erosion can have serious on-site (e.g. decrease in agricultural yield) and off-site impacts in morphogenic zones but also important off-site (e.g. mudflow) impacts in plains. Much more efforts have been devoted to study erosion processes in morphogenic zones that have naturally higher erosion rates than plains. However, the intensification of agriculture during the latter part of the 20th century significantly altered landscapes and increased hydrosedimentary connectivity in agricultural plains. The off-site consequences are numerous: mudflows, increasement a river turbidity, siltation in rivers, transfers of pollutants associated with sediments, etc. Generally, in temperate climate, the main source of sediments is the surface runoff that occurs on fields during winter or spring but in lowland areas the subsurface drainage network is a supplementary pathway for runoff and sediments. The few studies that have quantified erosion over a complete hydrological year show subsurface drainage contribution to erosion is very variable. It is still difficult to propose a hierarchy and to quantify factors affecting soil erosion by subsurface drainage. In this study, suspended solids (SS) concentration and water flow of a lowland field have been measured during two consecutive years both at the outlets of surface and subsurface drainage networks. SS yield was 0.49 t ha^{-1} and 1.08 t ha^{-1} in 2019–2020 and 2020–2021, respectively. During 2019–2020 and 2020–2021, subsurface drainage contribution to the total runoff was 46% and 21%, respectively and its contribution to SS yield was 9% and 11%, respectively. High temporal resolution measurements of SS concentrations showed the suspended sediment concentration increased at the outlet of both surface and subsurface drains from the first to the second year. These variations and the increase of surface runoff rate suggest a shift in water and sediment connectivity at the field scale. Based on water tracing, water balance and analysis of rainfall characteristics, the main driver is likely cropping practices. This study confirms the majority of sediment exports occurs during a short period, cause by only few runoff event of winter and adds a new quantification of hydrosedimentary fluxes in a surface and subsurface drained field separating surface and subsurface drainage contribution. It also shows that in hydromorphic drained areas, despite the very slight slope, surface runoff can represent the major pathway for soil erosion. Adapted soil tillage practices must be developed to preserve the agricultural production capacity of the fields, maintaining water exports, while simultaneously reducing

sediment exports.