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Role of Flash Floods as Triggers of Legacy Pollutant Release in an Intensive Agricultural Catchment

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Flash floods are increasingly recognized as key drivers of hydrochemical variability in agricultural catchments, yet their role in mobilizing legacy contaminants remains insufficiently understood. This study investigates the response of nutrients, dissolved organic matter, veterinary antibiotics, and pesticides to two seasonal flash flood events occurring in a small intensive agricultural headwater catchment, in Brittany, France (Kervidy–Naizin, ORE AgrHys). High-frequency sampling (2-hour resolution over 24 hours) was conducted during each event to capture rapid hydrochemical dynamics. Concentrations of major nutrients (nitrates, phosphates, sulfates), dissolved organic and inorganic carbon, 19 antibiotics, and 30 pesticides were analyzed to characterize coupled hydrological and biogeochemical responses. Preliminary results reveal pronounced concentration–discharge patterns, with various correlations suggesting potential remobilization of compounds stored in soil and sediment. In contrast, several hydrophylic compounds, including selected pollutants and metabolites, exhibited diluted or delayed responses consistent with groundwater release. These observations indicate that flash floods act both as flushing mechanisms and as triggers or amplifiers for the release of legacy contaminants accumulated in soils and groundwater. The contrasting behaviors between hydrophobic and hydrophylic compounds highlight the importance of physicochemical properties in controlling pollutant partitioning and transport pathways for event-scale export dynamics under increasing extreme rainfall events in agro-intensive regions.