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Spatial and temporal variation links between nitrate and dissoved organic carbon in a German forested mountainous headwater catchment

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The spatial and temporal variability of the concentration of dissolved organic carbon (DOC) and nitrate (NO_3-) with was studied by means of weekly grab samples over a 4-year period (2009-2013) in a forested headwater catchment (Wuestebach, Germany).
Stream water DOC values varied between 0.8-7.4 mg/l, with a mean value 2.7 mg/l, with nitrate ranging 2.8 to 12.2 mg/l, with a mean value of 5.7 mg/l. The DOC values were closely correlated, but negatively to nitrate concentrations (r=-0.56). High DOC in summer and high nitrate were measured in Wuestebach streamwaters. Generally, Surficial water exhibit high DOC, low NO_3, high variability and ground waters were characterised by low DOC, high NO_3-, and low variability. Within the whole catchment, clear spatial differences in annual trends in DOC and NO_3- concentrations in site streams and various superficial components were found. This feature most likely reflected the localized (soil, hydrological and bedrock conditions) difference in the relative contributions of surface and ground water contributions to the streamwater, probably in response to prevailing weather conditions.