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# Spatial variation and modelling of Organic Matter in Swedish Watercourses

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Environmental monitoring is usually conducted on large catchments or very small ones. In order to quantify the spatial variation in headwaters, the chemistry of water at all mapped stream confluences in six Swedish catchments were grab sampled during the autumn of 2007 during a low discharge situation, for a total of 324 sites. Catchment size ranged between 0.03-1109 $km^2$, with a median size if 1.6 $km^2$ and a mode (most common value) of 0.52 $km^2$. There is little overt human influence beyond low-intensity forestry. The dominant forest types are mixed stands of Norway spruce (Picea abies) and Scots pine (Pinus silvestris) with a minor contribution of deciduous trees, mainly birch (Betula spp.). The forest comprises (all values in median) 83% of the catchments, lakes 3%, wetlands 6% and open field 1%. The dominant soil type is nutrient poor till. The most southerly catchment is at latitude N 57º 10' and the most northerly catchment is at N 64º 28'.

Three measurements of organic mater were analysed, total organic carbon (TOC) and true absorbance (filtered 0.45 $\mu$m) at 254 and 420 nm. As a measure of the quality of the natural organic matter (NOM), specific absorption ratio (SAR) was used, this is the ratio between the absorbance coefficient at 254 and 420 nm. The degree of the organic matter aromaticity can be estimated by the specific ultraviolet absorbance (SUVA), 254 nm is normalised by TOC. Specific visible absorbance (SVA) is 420 nm normalised by the TOC. Median values, with 5 and 95 percentiles, in brackets are given: TOC 15 mg $l^{-1}$ (5-35), SAR 12 (10-15), SUVA 4.1 (3.0-4.8), SVA 0.78 (0.28-2.6). There was less variation in all analyzed variables when catchment size was larger than 3 $km^2$. All catchments had a decrease in TOC with increasing catchment

size, but no systematically change in the character of NOM.

Water chemistry was modelled from land use information by partial least square regression (PLS) and general linear models (GLM). Initially, all physical parameters were included, but non-significant variables ($\alpha$ = 0.05) were removed. Principal axis factoring (PAF), common factor analysis, with different rotation techniques were used to check if it was plausible factors for that variable.

Despite difference in latitude, and climate, for all modelled variables the altitude of the sampling site and lake coverage% had the strongest impact on the models. For TOC and SUVA the altitude had a positive sign (+) while lake coverage had negative sign (-). The opposite pattern was observed for SAR and SVA. Wetland coverage and forest coverage usually comes in at the third or fourth place. Wetland coverage was (+) to TOC, while (-) to SAR and SVA (not significant for SUVA). Forest coverage was (+) for SAR and (-) for SUVA. The best models (based on max 3 factors) could explain ($r^2$ adjusted) approximately 43% of the variation in TOC, 32% for SAR, 68% for SUVA and 49% for SVA. These preliminarily results, indicate the importance of lakes in estimating the spatial variation of organic matter in watercourses, compared to the amount of wetlands or forest coverage in the catchments during this low flow situation.