Impacts of the Soyang dam on sedimentary organic matter composition in its reservoir (South Korea)

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The construction of dams has direct impacts on the biological, chemical and physical properties of rivers and riparian environments. The Soyang Dam was constructed in 1973, resulting in the deepest and largest artificial reservoir in South Korea. Its surface area is 45 km^2 with the maximum water depth of 110 m. The reservoir, called Lake Soyang, has the total watershed area of 2675 km^2 and the Soyang River contributes 90 % of the inflowing water. In this study, we investigated how the dam construction affected the sedimentary organic matter (OM) composition in Lake Soyang. We collected soils (n=7), lake surface sediments (n=9) and a 50-cm sediment core at near the dam for the analysis of total organic carbon (TOC) and total nitrogen (TN) contents, stable isotopic composition of TOC and TN ($\delta^{13}C_{TOC}$ and $\delta^{15}N$), and glycerol dialkyl glycerol tetraethers (GDGTs). The age model of the sediment core is based on ^{210}Po analysis. Our bulk and GDGT-derived geochemical data indicate that C_3-derived soil OM is the dominant OM contribution to the surface sediments in the upper part of the lake while an aquatic contribution increased in the lower part of the lake. The sediment core shows a distinctive shift in all parameters considered at 15 cm core depth, which corresponds to the age of ~1970 AD. Accordingly, our study indicates that the Soyang dam construction caused a drastic change in sedimentary OM composition from a more terrestrial to an aquatic origin.