Vertical distribution and fractionation of dissolved organic carbon in a deep Korean reservoir, Lake Soyang

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With 9 figures and 1 table

Abstract: Vertical and seasonal distributions of dissolved organic carbon (DOC) were investigated in a deep reservoir, Lake Soyang, considering the fractionation and optical properties of DOC. DOC samples from epilimnion, metalimnion, hypolimnion, and from the main inflowing tributary were fractionated into four fractions by using resin adsorbents: hydrophobic acids (same as aquatic humic substances; AHS), hydrophilic acids (HiA), hydrophilic bases (HiB), and hydrophilic neutrals (HiN). Before the monsoon, in spring and early summer, DOC concentration was consistently low (ca. 1.5 mg/l). Heavy rains associated with the summer monsoon had substantial impact on the distributions and characteristics of DOC in the lake. The fractional composition of DOC and the specific ultraviolet absorbance (SUVA) varied with sampling dates and depth. AHS and HiA were major fractions of DOC in both Lake Soyang and the inflowing river, except in the bottom layer of the lake. In the inflowing river water HiA (50.2 ± 4.9 %) was larger component than AHS (38.7 ± 0.8 %) in pre- and post-monsoon seasons, whereas AHS (58.1 ± 2.7 %) prevailed over HiA (37.4 ± 0.8 %) during the summer monsoon. In the epilimnion of the lake, HiA (36–63 %) was more abundant than AHS (34–38 %) in all fractionation samples. In the metalimnion the proportions of AHS was higher with the effect of allochthonous DOC inputs during the summer monsoon. The HiN fraction was negligible in the epilimnion and the metalimnion, but it was sometimes major portion at the anoxic bottom layer (up to 78 %). SUVA of each fraction of DOC was in the order of [AHS > total DOC > hydrophilic fraction] in both lake water and inflowing river water.

Key words: DOC, fractionation, distribution, characteristics, deep reservoir.

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