EGU2020-17510
https://doi.org/10.5194/egusphere-egu2020-17510
EGU General Assembly 2020

Characterizing chromophoric dissolved organic matter in Guanting Reservoir Beijing using excitation-emission matrix fluorescence and parallel factor analysis

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Chromophoric dissolved organic matter (CDOM) is an important optically active substance that might be used as an indicator of water quality. The study of CDOM characteristic and source identification in reservoirs is of great importance in decision- making for water quality protection. Granting reservoir Beijing was selected as the case study, which was the drinking water source for Beijing, while it was ceased to supply water in 1997 because of water pollution. The water samples were collected from 37 sites in the reservoir. Three dimensional excitation-emission matrix (3DEEM) spectra combined with parallel factor analysis (PARAFAC) was applied to investigate the fluorescence characteristics and sources of chromophoric dissolved organic matter (CDOM) in Guanting Reservoir. The results showed that: (1) four kinds of chromophoric dissolved organic matter (CDOM) was identified, which were the tryptophan-like component (C1) autochthonously, the humic-like component (C2) in the ultraviolet zone, the tryptophan-like component (C3) caused by photolysis reaction and the humic-like component (C4) in the visible light zone. (2) The tryptophan-like was the dominant fraction of CDOM in Guanting Reservoir. For the four component, C1 and C3 belong to humic-like; C2 and C4 belong to protein-like. The humic-like increases with the river flowing into the reservoir. the fluorescence intensity of humic-like and protein-like both was the highest in July. (3) the humic-like C2 and C4 were significantly correlated which might indicate they originated from the same source, while the protein-like C1 and C3 didn't show the correlation that might indicate their source is different. (4)Fluorescence index(FI), biological index (BIX) and humification index (HIX) were also used to identify the source of different components. The FI ranged from 1.8 to 1.95 indicated that CDOM principally originated from microbially derived fulvic acids. The BIX ranged from 0.9 to 1.1 indicated that CDOM was strong autochthonous component and from biological or aquatic bacterial origin. The HIX ranged 1.3 to 3.5 indicated that CDOM was weak humic characteristic and important recent autochthonous component.