

# Abstract

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Flow Field-Flow Fractionation (FIFFF), Cross Flow Filtration (CFF), Diffusive Gradients in Thin Films (DGT) have been used to study colloidal carriers and associated trace elements in river waters.

FIFFF – ICP-MS was used to determine colloidal and metal distributions in a natural freshwater, Delsjö Creek. The results showed that the water contains two major types of colloids, dominated by carbon and iron respectively. These colloidal carriers also dominate the colloidal fraction in the Kalix River.

Most trace elements are associated with both colloidal carrier phases, but certain elements are only associated with a specific colloidal carrier (e.g. Cu – with the humic colloids). This specificity may be different from one river to another – Pb was only associated to the inorganic, iron-rich colloids in the Delsjö Creek, but associated to both colloidal carriers in the Kalix River.

Temporal changes in the colloidal transport of elements was studied in the Kalix River. In the Kalix River the colloidal transport undergoes dramatic seasonal changes. In the winter Fe-rich colloids dominate the colloidal fraction, which rapidly shifts to humics dominating the colloidal fraction during the spring flood event. During the summer the Fe-rich phase disappears entirely and the overall colloidal concentrations decrease significantly.

Studying the temporal changes in colloidal transport of rare earth elements proved different sources of water to the Kalix River during different seasons.

Fractionation and speciation of Ca was investigated in the Amazonian and Kalix rivers. The results showed that a significant amount of Ca may be associated to colloidal material. Samples from both systems were processed and analyzed in similar ways with CFF, ICP-AES and Ca ion-selective electrodes (ISE). The presence of Ca bound to colloidal matter was confirmed by the two independent methods; CFF and FIFFF – ICP-MS.

Key Words: natural aquatic colloids, colloidal carrier phases, elemental fractionation, Flow Field-Flow Fractionation (FIFFF), Cross Flow Filtration (CFF), Diffusive Gradients in Thin Films (DGT).