Geophysical Research Abstracts
Vol. 17, EGU2015-3328, 2015
EGU General Assembly 2015

Combining multiple dissolved organic matter characteristics to an indicator of its diagenetic status in Baltic Sea estuaries

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Transformation of dissolved organic matter (DOM) was followed along the salinity gradient in three boreal estuaries opening to the Baltic Sea. We used multiple chemical and optical analyses to characterize the changes in DOM pool occurring during the transport from river mouths to coastal sea. Evidently, there is a significant difference in DOM quantity and quality between river and sea end members, caused by mixing and various transformation and removal processes in estuaries. Microbial degradation, photodegradation and salt-induced flocculation all contribute to the progressive degradation of the DOM pool towards less reactive composition. The high correlation between five quality variables (r^2 = 0.6–0.9), DOC-specific UV absorbance ($SUVA_{254}$), absorption slope coefficient between 275–295 nm ($S_{275-295}$), humic-like DOM fluorescence (peak A), stable isotope signal δ^{13}C-DOC and apparent molecular weight (AMW) allowed us to formulate a proxy for DOM diagenetic status along the estuarine gradient. This proxy, degradation index, is independent from salinity and DOC concentration, which typically are used to estimate the diagenesis (or reactivity) in estuarine environments. From this follows, that the degradation index can be used to estimate the position of the bulk DOM along the reactivity continuum from land to sea.