



Accounting of Black Carbon in continental shelf sediments around Sweden

L. Sánchez-García (1), Ö. Gustafsson (1), I. Cato (2)

1. Stockholm University, Dept. of Applied Environmental Science (ITM), 10691 Stockholm, Sweden.
2. Geological Survey of Sweden (SGU), 75128 Uppsala, Sweden

(laura.sanchez@itm.su.se / Phone: +46-8674-7339)

Black carbon (BC) is the highly condensed carbonaceous residue from incomplete combustion of biomass and fossil fuel. BC is involved in several important processes in the biogeosphere (e.g. Earth's radiative heat budget and climate change, sedimentary carbon burial, sequestration of organic pollutants in soils and sediments, and even human respiratory health). Its high recalcitrance suggests a high preservation potential in sediments. While BC is commonly found to constitute several to 20% of total sedimentary carbon, there is not yet any comprehensive assessment of the broader-scale distribution and abundance of BC in marine sediments.

The objective of this study is to make a start on this by assessing BC in 120 well-characterized sediments dispersed over the Swedish continental shelf. Among a wide variety of techniques developed for the isolation of BC, a commonly applied method in biogeochemical studies of soils and sediments, the chemothermal oxidation at 375°C in air (CTO375), was employed for this purpose.

Along the ≈ 2000 km stretch of the Swedish shelf from the Skagerrak to the Bothnian Bay, the BC concentration ranged from 0.6 to 17.7 mg/g dw (mean of 2.4 mg/g dw), which represented between 2 and 47% of TOC (mean of 6%; for 50 out of the 120 samples). There was an evident enrichment of BC in the southern portion of the Baltic Sea (2.91 ± 2.43 mg/g dw), nearer the most populated metropolitan areas, important

industrial activity and traffic density. The spatial distribution of BC was also statistically correlated with molecular combustion markers such as polycyclic aromatic hydrocarbons (PAHs). In contrast, sediments from Northern Baltic Sea registered lower concentration of BC (1.26 ± 0.43 mg/g dw), consistent with less anthropogenic activity and less influence of continental Europe. The region-specific BC concentration database is now combined with other geophysical and geochemical properties of the sediments, including matching ^{137}Cs -derived sedimentation rates within a GIS modeling framework, to constrain the BC burial fluxes in the Swedish portion of these continental shelf seas.