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Chemo-thermal oxidation approach to estimate black carbon budget on coastal sediments

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In the context of growing interest in understanding and quantifying the carbon budget in the environment, black carbon (BC) may represent a significant sink in the global carbon cycle (Kuhlbusch, 1998), that may play an important role in global climate change. Usually difined as the highly condensed carbonaceous residue from incomplete combustion of fossil fuels and vegetation, BC build up a significant fraction of carbon buried in soils and sediments (Masiello & Druffel, 1998). No general agreement about one suitable BC estimation methodology has resulted in a variety of protocols and accompanying values, that make it difficult to delineate the proportion of BC in sedimentary total carbon budgets (Simpson & Hatcher, 2004).

In this comunication we present the application of a chemothermal approach (Gélinas et al., 2001) to estimate the contribution of BC to total organic carbon (TOC) on a coastal region. Marine sediments were sampled from the estuarial influence area of the inner Southatlantic continental shelf of Spain, in order to quantify and characterize its BC-fraction, since it represents an interesting ecosystem as transition from terrestrial to marine environment. Refractory organic carbon was isolated removing potencial artefacts (carbonates, silicates, hydrolyzable organic matter) with acids mixture (HCl/HF/TFA) and extracting the rest of non-BC material with thermal oxidation ($375^{o}C/24\ h/O_2$) to finally estimate the residual carbon (mass difference, EA) (Gélinas *et al*., 2001). This process was carried out on both coarse sediments and non humic substances and lipids samples (*humins*) in order to compare BC amount on both matrices and to study the influence of non-BC material extraction on the final organic residue estimation.

Samples were characterized as sediment relatively poor on TOC (0.5-1.54%), with atomic C/N ratios and isotopic signatures δ^{13}C typical from marine source and indicative of anoxic depositional environment. In general, BC estimation on coarse sediments (2-15% TOC) turn out lower than those measured on *humins* (2-41% TOC). Nevertheless, there are some exceptions that, together with the high aromaticity observed in the humic acids present, suggest a possible contribution of these acids to the BC budget (Haumaier & Zech, 1995).