Challenges in measuring and characterizing SPM in estuaries

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The bottom waters of the Lower St-Lawrence estuary (LSLE), Canada, exhibit a significant temporal trend in oxygen depletion (hypoxic conditions). This trend has been attributed in part to changes in the relative proportion of water masses entering the Laurentian channel but also to microbial degradation (respiration) of organic matter leading to concomitant production of CO_2 and decrease of pH (acidification). According to recent numerical simulations, pelagic respiration appears to be the main cause of oxygen demand in these deep waters. However, the impact of suspended particulate matter (SPM) on these biogeochemical changes has not been thoroughly investigated. Yet, an increase of SPM (inputs or production) in the LSLE would enhance degradation/mineralization processes of SPM which would increase O_2 demand and CO_2 production in deep waters leading to hypoxia and acidification, respectively. Archived and recent data on SPM are available to assess temporal trends on concentrations and composition of SPM which should help to clarify their role in the O_2 and H^+ trends in deep waters of the LSLE. However, comparing SPM data is a challenging task considering that various protocols were used to measure and characterize SPM in the SLE estuary. This work focuses on 1) comparing concentrations of SPM using different filters, including the importance of blank correction and 2) applying different rinsing protocols to eliminate the salt retained on filters, and their impact on the determination of %C, %N, C/N ratio, $\delta^{13}C$ and $\delta^{15}N$ stable isotope ratios. The results indicate that concentrations of MPS are not significantly different within the range of porosity of investigated filters. Blank correction for each lot of filters is recommended. Rinsing with ammonium formate (AF) appears to be efficient in removing the salt accumulated on filters but results in a contamination that affects $\delta^{15}N$ but has a minor effect on $\delta^{13}C$. It is recommended to rinse the filter with AF to determine SPM concentration and used this value and the volume of water filtrated to determine the weight of SPM retained on the filter (without rinsing) used to determine $\delta^{13}C$ and $\delta^{15}N$ and to calculate the %C and %N and C/N ratio.