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Vertical distribution and aerobic degradation at the sediment-water interface in two urbans estuaries in Normandy, France

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In the current context of climate change, the coastal area is exposed to an increasing pressure from hydrodynamic agents such as tide, flood and storm (Parry et al., 2007) and to enormous anthropogenic activities due to urbanization and industrialization of the coastline, which weakens the coastal ecosystem. In France, the Manche department presents more than a half of the Normandy coastline (330 km) and a great diversity of its shores. It is a key player in the preservation of the coastal environment. Among its conservation areas, two estuaries in Saint-Vaast-La-Hougue interested us: the Saire Estuary and Cul-de-Loup Bay, which both subjects to the impact of human activities (agriculture, shellfish farming, tourism, modification of the coastline, etc.). In order to quantify the chemical and biological exchanges in the mudflat of these two sites, we performed dissolved oxygen profiles in the sediment using a benthic microprofiler system (Unisense®). Moreover, sediment cores were collected and sliced under inert atmosphere, in order to measure diagenetic tracers (NH_4^+, PO_4^{3-}, Fe^{2+} and ΣHS^-) and trace metals levels, and to identify bacterial communities. The results of sediment cores and oxygen microprofiles taken from each of the mudflat indicate a greater dynamic degradation of organic matter in the superficial sediments of Saire estuary and in deep sediment of Cul-de-Loup Bay. The benthic microprofiler results show that oxygen penetration depth is around 1 mm and 1.4 mm respectively in Saire estuary (n=3) and Cul-de-Loup bay (n=5). This difference is marked by (i) an intense reduction of Fe (oxy)hydroxides at 4 cm of sediment depth in the Saire estuary, (ii) the appearance of ΣHS^- from ~ 12 cm of sediment depth against 5 cm of sediment depth in the Cul-de-Loup Bay and (iii) a slight Fe(oxy)hydroxide zone at 3 cm of sediment depth. Metagenomics analysis confirm major differences between the two study sites.