Long-term trends in coastal hypoxia in the Archipelago Sea of Finland – is it a natural phenomenon?

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Human-induced spreading of coastal hypoxia is currently a growing global problem that has deleterious effects on marine ecosystems. Although long-term spatio-temporal trends in hypoxia in the offshore areas of the Baltic Sea have been widely studied, coastal areas have received less research interest so far. In addition, the conventional environmental monitoring programmes of the Archipelago Sea were not initiated until 1970s, when human impact in the area was already significant, denoting a lack of long-term information on environmental conditions predating the recent eutrophication. Therefore, we use a multiproxy approach combining sedimentology, ichnology, microbiology, mineral magnetic measurements, and mineral-specific *in situ* microanalyses of long sediment cores to assess bottom water redox shifts in the Archipelago Sea coast over the past 2000 years, encompassing the most recent climatic fluctuations of the Medieval Warm Period (950–1250 AD) and the Little Ice Age (1350–1850 AD).

Our preliminary results suggest that the most recent shift to at least episodically hypoxic conditions occurred around 1910s at the study sites. Such multidecadal oxygen deficiency, characterized by the lack of bioturbation by macrobenthic fauna, seems to be unprecedented in the studied cores, although a complete chronology is yet to be constructed. Interestingly, we found significant magnetic enhancement in the laminated sediments deposited under hypoxic conditions during the past 50 years. Based on the acquirement of strong positive rotational remanent magnetization, relatively low coercive force of $\sim$ 13 mT, and high interparametric ratio of SIRM/K this enhancement could be ascribed to biogenic greigite (Fe_3S_4) produced by obligatory anaerobic magnetotactic bacteria. Identification of such enhancements, could provide a proxy for past occurrences of hypoxia.