



Long-term trends of hypoxia in the coastal zone, north-western Baltic proper

Thomas Andrén, Lena Norbäck Ivarsson, and Elinor Andrén

Södertörn University, School of Natural Sciences, Technology and Environmental Studies, Huddinge, Sweden
(thomas.andren@sh.se)

The Baltic Sea coastal zone contains over 20 % of all identified hypoxic sites worldwide and shows an increasing trend since 1950 (Conley et al. 2011). In the open Baltic Sea, hypoxia events are recorded during three time periods: about 8000-4000, 2000-800 cal. yr. BP, and from AD 1800 up to present, but in the coastal zone data on long-term trends are lacking (Zillén et al. 2008). Different views have been proposed of what caused the oscillation in the oxygen content at sea bottoms in the open Baltic Sea e.g. changes in agricultural practice, fluctuations in human population density and climate change. The role of humans and climate in driving the eutrophication and hypoxia in the Baltic Sea needs to be understood and there is an urgent need for increased knowledge of the historical extent of hypoxia and the driving forces for formation in the coastal zone.

This project aims to disentangle the role of human induced and natural climate-driven processes that have resulted in times of eutrophication and hypoxia in the Baltic Sea during the last 2000 years. Research focus is put on the coastal zone and carefully selected estuaries along the Swedish east coast, where responses to changed human land-use can be expected to be first recorded. Eight sites, from the Stockholm archipelago to Bråviken, have been cored and sediments lithologically described and dated by radiocarbon using preferably terrestrial macrofossils. Preliminary results of age models, sedimentation rates, and lithologies will be presented. Lithological descriptions using laminated sediments as a proxy for hypoxic bottom water conditions will significantly increase the knowledge on the distribution of hypoxia and the extension of areas of laminated sediments in time and space in the coastal area.

References:

- Conley, D.J., Carstensen, J., Aigars, J., Axe, P., Bonsdorff, E., Eremina, T., Haahti, B.-M., Humborg, C., Jonsson, P., Kotta, J., Lännegren, C., Larsson, U., Maximov, A., Rodriguez Medina, M., Lysiak-Pastuszek, E., Remeikaite-Nikien, N., Walve, J., Wilhelms, S., Zillén, L. 2011. Hypoxia Is Increasing in the Coastal Zone of the Baltic Sea. *Environmental Science & Technology* 45, 6777-6783.
- Zillén, L., Conley, D.J., Andrén, T., Andrén, E. & Björck, S. 2008. Past occurrences of hypoxia in the Baltic Sea and the role of climate variability, environmental change and human impact. *Earth Science Reviews* 91, 77-92.