



Holocene Sedimentation in the Ångermanälven River Estuary, the northern Baltic Sea

Aarno Kotilainen (1), Outi Hyttinen (2), Stephen Obrochta (3), Thomas Andréén (4), Daria Ryabchuk (5), Ian Snowball (6), and The IODP Expedition 347 Science Party (7)

(1) Geological Survey of Finland, Land Use and Environment, Southern Finland Office, Espoo, Finland, (2) University of Helsinki, Department of Geosciences and Geography, Finland, (3) Akita University, Faculty of International Resource Science, Japan, (4) Södertörn University, School of Natural Sciences, Sweden, (5) A.P. Karpinsky Russian Research Geological Institute (VSEGEI), Russia, (6) Uppsala University, Department of Earth Sciences, Natural Resources and Sustainable Development, Sweden, (7) The International Ocean Discovery Program (IODP)

In the IODP Expedition 347 – “Baltic Sea Paleoenvironment” - two sites in the Ångermanälven River estuary were drilled. Sites M0061 and M0062 are located at about 62°47'N, in an area which was deglaciated ca. 10 ka ago. It has long been known that varve deposition is an ongoing process in Ångermanälven estuary, and that it has continued so several thousand years back in time. It has also been shown that a correlation exists between maximum daily discharge and mean varve thickness at least AD 1901-1971 in the Ångermanälven River (Sander et al. 2002). Studying varve thickness and sediment geochemistry potentially yield estimations on past changes in precipitation and sedimentation processes in the estuary.

In this presentation, the preliminary results from site M0062 are shown. The core recovery was approximately 36 m and the sediment sequence was divided into two lithological units (Expedition 347 Scientists, 2014). The lowest Unit 2 (17.09-35.9 mbsf) consists of well-sorted sand, deposited by a (glacio)fluvial system. Unit 1 (0-17.09 mbsf) showed transition from glacial lake varves to brackish marine couplets. The uppermost 18 metres were analysed for grain-size and elemental geochemistry every 0.3-0.5 m. From selected intervals, a 1mm-resolution XRF-scanning of the split core surface was done to compare changes in the relative abundance of light elements. Results from Ångermanälven were compared with measurements from glacial varved sediments, retrieved from the eastern Gulf of Finland.

This work is also part of “Climate - ice sheet - sea interactions – evolution of the Baltic Sea Basin over the past 60000 years (CISU)” which is a new joint research project with The Academy of Finland and The Russian Foundation for Basic Research. The CISU project is coordinated by Geological Survey of Finland and the other partners are Helsinki University and A.P. Karpinsky Russian Geological Research Institute (VSEGEI), Russia. The project bases on the IODP Expedition 347 material and new sediment core material from the eastern Gulf of Finland.

Expedition 347 Scientists, 2014. Baltic Sea Basin Paleoenvironment: paleoenvironmental evolution of the Baltic Sea Basin through the last glacial cycle. IODP Prel. Rept., 347. 102 pages. doi:10.2204/iodp.pr.347.2014. http://publications.iodp.org/preliminary_report/347/

Sander, M., Bengtsson, L., Holmquist, B., Wohlfarth, B., and Cato, I., 2002. The relationship between annual varve thickness and maximum annual discharge (1909–1971). *J. Hydrol.*, 263(1–4):23–35. doi:10.1016/S0022-1694(02)00030-6.