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Stratigraphical division of Holocene depositional succession of Ångermanälven River estuary, Bothnian Sea

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In this study the Holocene depositional succession at the IODP Expedition 347 Sites M0061 and M0062 in the Ångermanälven River estuary, Bothnian Sea part of the Baltic Sea in northern Scandinavia was explored. Sediment cores and acoustic profiles comprise the dataset. Site M0062 is fully estuarine (69.3 m water depth) whereas Site M0061 is in a coastal offshore setting (87.9 m water depth). Three acoustic units (AUs) were recognized at the studied site. Lowermost AU1 was interpreted as a poorly to discontinuous stratified glaciofluvial deposit, AU2 as a stratified conformable glaciolacustrine drape, and AU3 as a stratified to poorly stratified mud drift. AU2 and AU3 are separated by a strong truncating reflector. From cored sediments, three lithological units (LUs) were defined. Glaciofluvial sand and silt (LU1) gradually change into glaciolacustrine varves (LU2). A sharp contact separates LU2 from the overlying brackish water mud (LU3).This contact is interpreted as a major unconformity, In the basal part of LU3, two debrites (site M0062) or one debrite (site M0061) were recognized. The LU division is supported by information yielded from sediment physical properties, geochemistry and grain size. The depositional succession was subdivided into two alloformations: Utansjö Alloformation and overlying Hemsön Alloformation. The Utansjö Alloformation was subdivided into two lithostratigraphic formations: Storfjärden (sandy outwash) and Åbordsön (glaciolacustrine rhythmite) Formation. Storfjärden and Åbordsön Formations represent a glacial retreat systems tract. Sediment deposition started at ca. 10.6 kyr BP and was mainly controlled by meltwater from the retreating ice-margin, glacio-isostatic land uplift and the regressive (glacial) lake level. Hemsön Alloformation (organic-rich brackish water mud) started to deposit possibly at ca. 9.5 kyr BP, during a period of forced regression. At around 7 kyr BP, brackish water fully reached the study area. The establishment of permanent halocline changed near-bottom currents, and increased organic deposition reduced the sediment consistency. This resulted in a sharp and erosional base of the brackish water mud. This study shows the benefits of the combined allostratigraphic and lithostratigraphic approach compared to the conventional Baltic Sea Stages scheme that is based on presumed synchronous changes in water level and salinity in the basin. This work is a part of the CISU project funded by the Academy of Finland.