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The southern Svalbard Margin sedimentary system: preliminary results from EGLACOM cruise 2008

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The Storfjorden sedimentary system (South-western Svalbard margin) was investigated during the EGLACOM cruise between 8th July and 4th August 2008 on board R/V OGS-Explora. EGLACOM (Evolution of a GLacial Arctic COntinental Margin: the southern Svalbard ice stream-dominated sedimentary system) project is the Italian contribution to the International Polar Year (IPY) Activity 367 (Neogene ice streams and sedimentary processes on high-latitude continental margins – NICE STREAMS) in combination with the IPY-Spanish SVAIS project.

Four EGLACOM sediment cores were collected from the slope and shelf areas and were scanned for radiographs and multi-sensor core logger for physical properties. Sediment samples were collected every 10 cm, and analyzed for textural and compositional characteristics including the biogenic components. Paleomagnetic and rock-magnetic investigations were carried out at high-resolution along the core's length. Both data sets contributed to develop a high-resolution age models in combination with the palaeostratigraphy (using foraminifera, diatoms and nannoplankton) and AMS dating.

On the upper slope, coarser-grained sediments containing abundant pebbles (IRD-rich facies), overlain a sequence of laminated mud interbedded with silt layers (laminated facies), having scarce, badly preserved and often reworked biogenic fraction.
On the lower slope, the uppermost sequence is formed by fine-grained bioturbated sediments with abundant planktonic and benthic foraminifera reflecting open-ocean conditions similar to present days. The dominance of the benthic foraminifera Cibicidoides wuellerstorfi indicates well oxygenated bottom waters and the calcareous nannofossil' assemblage indicates this facies deposited within the Emiliania huxleyi Acme Zone. The bioturbated facies overlay an interval of crudely laminated mud containing a peak of diatoms and sponge spiculae abundance that corresponds to a decrease in foraminifers content. Here the nannofossil assemblage contains many reworked species including Quaternary, Paleogene and Cretaceous coccolith. At the base of the siliceous-biogenic rich interval there is a layer of abundant pteropods (Limacina helicina). Their preservation within Artic sediments should imply a deepening of the ACD (aragonite compensation level) and/or a rapid burial of the aragonitic tests.
The sedimentary sequence recovered from the shelf of the Kveithola trough contains mainly IRD-rich sediments topped by 10 cm of massive sands including large clasts. The biogenic fraction is generally well preserved containing foraminifers, molluscs, ostracods and sponge spiculae. Both boreal and Arctic benthic foraminifers are present with Cassidulina teretis and C. reniforme (Arctic species) as dominant species, followed by Melonis barleeanum and Islandiella spp. Abundant presence of C. teretis at the base of the core could indicate the influence of the Atlantic Intermediate Water.
The clay mineral assemblage in the cores includes illite (over 50%), chlorite and kaolinite (usually<20%), and variable amounts of smectite having higher percentages on the sediments recovered in the lower slope. The highest values of illite were recovered within the IRD-rich facies whereas within the laminated facies lower values never exceed 50% of the assemblage. Within the laminated facies, peaks of kaolinite can be related to the silt layers whereas the laminated mud contains a higher percentage of chlorite.