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On the reconstruction of the geomagnetic paleosecular variation around 15 kyr BP from cores collected from the northwestern Barents Sea

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The sedimentary system of the Storfjorden, on the northwestern Barents Sea and the southwestern Svalbard margin, was investigated within the projects SVAIS, NICESTREAMS-Spain and OGS-EGLACOM - the Spanish and Italian contributions to IPY Activity N. 367 (NICESTREAMS).
The Storfjorden through was shaped by the action of paleo-ice streams that flowed periodically through it, originating from the southern Svalbard archipelago and Spitsbergen banken.
The sedimentary sequence deposited during the deglaciation phase following the last glacial maximum was sampled with 10 piston and gravity cores during the SVAIS and EGLACOM cruises. The Holocene sequence consists of continuous fine-grained sediments, having thickness of 1-2 m on the mid continental slope and 1.8 m on the outer continental shelf where, however, it contains hiatuses. This Holocene sequence shows excellent paleomagnetic properties and allowed the reconstruction of the paleosecular variation (PSV) of the geomagnetic field at high-resolution (Sagnotti et al., 2011). The two cores collected on the upper slope are, instead, characterized by a very thin (20-40 cm) Holocene interval and a thick (up to 4.5 m in core SV-03) late Pleistocene sequence of finely laminated fine-grained sediments interbedded with thin sandy layers. Radiocarbon ages obtained at the top and bottom of this facies revealed that this interval deposited in less than 2 centuries around 15 ky BP, indicating extremely high depositional rates, exceeding 3 cm/y. We studied the paleomagnetic and rock magnetic properties of this interval, by taking magnetic measurements at 1 cm spacing on u-channel samples collected from these two cores. The data show that this sequence is characterized by good paleomagnetic properties and the paleomagnetic and rock magnetic trends may be correlated at high resolution from core to core. These data therefore offer the unprecedented opportunity to investigate in detail the rate of geomagnetic PSV in the high northern latitudes at a decadal scale. Notwithstanding the paleomagnetic trends of the two cores may be closely matched, the amplitude of directional PSV is distinctly higher in one core (SV05) than in the other (SV03). This result may be partly explained by the variable proportion of two distinct populations of magnetic minerals in this interval, as suggested by the variable tendency to acquire a gyromagnetic remanent magnetization at high fields during the AF demagnetization treatment.

Sagnotti, L., P. Macrì, R. Lucchi, M. Rebesco, and A. Camerlenghi (2011), A Holocene paleosecular variation record from the northwestern Barents Sea continental margin, Geochem. Geophys. Geosyst., 12, Q11Z33, doi:10.1029/2011GC003810.