MAGNETIC SIGNATURE OF ADRIATIC SEDIMENT FROM LATE GLACIAL TO PRESENT: NEW INSIGHTS FOR THE BASIN EVOLUTION

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Abstract
Changes in the depositional environment of the Adriatic Sea during the late Glacial-Holocene sea-level rise have been investigated by means of magnetic measurements. Both concentration and grain size dependent parameters show a different magnetic signature that reflect differences in the source area of the sediments and diagenetic processes as well as modification in the shape of the basin.
Keywords: Adriatic Sea, Geomagnetism, Sea Level, Sedimentation

Rock-magnetic techniques applied to marine deposits provide informations about the amount, the grain size and the mineralogy of the magnetic fraction within the sediments. In a first instance, these properties are a function of the supply of the clastic fraction, but they also represent post-depositional processes occurring within the sediment. So they reflect physical changes in the depositional environment that are strictly related to paleoclimatic and paleoceanographic changes as well as human environmental impact. In this study we present the results of natural (magnetic susceptibility, X) and laboratory-imparted rock magnetic properties such as anhysteretic (ARM) and isothermal (SIRM) remanence measured from marine cores collected in the

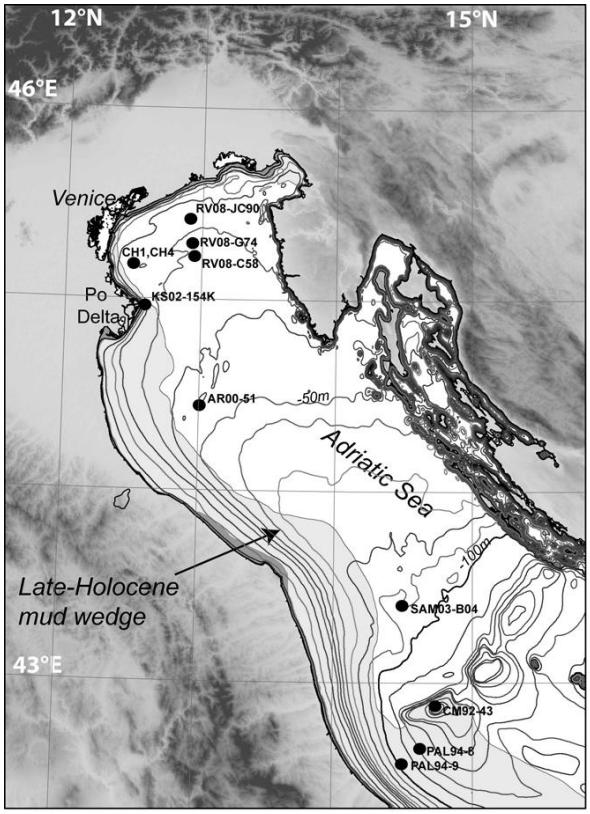

Fig. 1. Location map of the studied cores and Late-Holocene mud wedge areal distribution dated post 5.5 kyr.

Adriatic Sea from the northern shelf to the Mid Adriatic Depression (MAD) (Fig.1). The studied parameters are indicative of magnetic concentration, but they are sensitive to different grain size implying that interparametric ratios (i.e. SIRM/ARM) are indicative of change in grain-size. The Late Pleistocene-Holocene age of the cores is constrained by the stratigraphic framework of the area supported by C^{14} datings and paleomagnetic record of the secular variations of the earth magnetic field. During the Last Glacial Maximum (LGM), a wide part Adriatic shelf was subaerially exposed. The drainage network on this large alluvial plain likely comprised the paleo Po as the main river, with the Alpine and Apenninic rivers as tributaries. With the postglacial sea-level rise, the low shelf gradient (40 m/100 km), and low sediment input, favors significant landward shifts of depositional environments. The late Holocene Po delta formed after the present sea-level highstand represents a major component of the rapidly accumulated mud wedge that with the contribution of Appenine rivers stretches for 600 km along the Adriatic italian coast. In the northern part of the basin rivers from the Venetia-Friulan plain (Adige, Piave, Tagliamento) control the sedimentation. As the catchment of these rivers are different it is expected that the magnetic signature in the sediments reflect the primary signal when diagenetic processes do not introduce significant alterations. The differences are confirmed by mineralogical data showing a significant presence of dolomites in the sediments collected in the northern shelf. The results from recent sediments obtained from a core retrieved in the Po Delta were used as reference signature and compared with the results from other cores. Concentration-dependent parameters (X, ARM, SIRM) point out to an increasing contribution of ferromagnetic minerals in the sediments belonging to the Po with respect to the other sources. The magnetic properties also indicates a time-dependent signature of both concentration and grain size that represent a signature of the different physiographic conditions of the basin during the Late Glacial/Holocene times. Coarse grained detrital magnetite (high SIRM, X and SIRM/ARM values) characterizes Late Glacial deposits from Central Adriatic with an increasing contribution of fine grained magnetic materials
during the Holocene (high ARM, low SIRM/ARM values) (Fig. 2) with peak values after the maximun flooding [1]. The dominance of finer materials reflects the increasing contribution of bacterial magnetite to the remanence of the younger sediments, but could be also related to the landward shift of the source area of the terrigenous input during Holocene time.

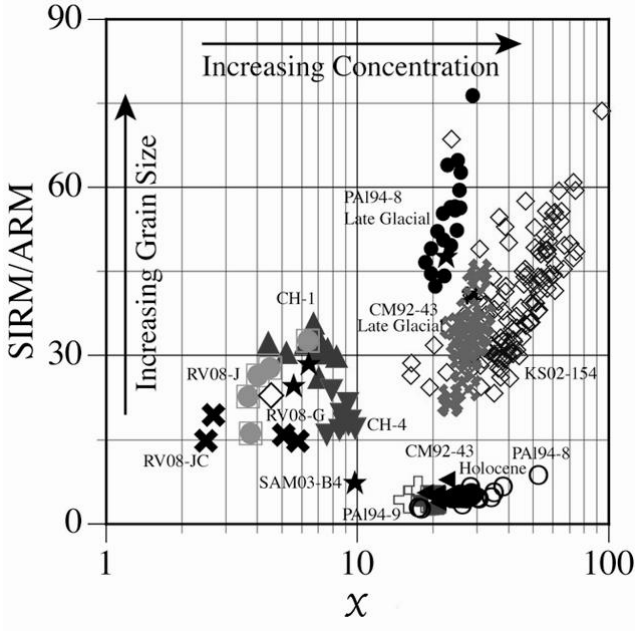

Fig. 2. Plot of mass specific magnetic susceptibility (units: $10^{-9}m^3kg^{-1}$) vs SIRM/ARM for the studied samples.

References

1 - Vigliotti L., Verosub K.L., Cattaneo A., Trincardi F., Asioli A. and Piva A.. 2008. Palaeomagnetic analysis of Holocene deposits from the Adriatic: detecting short term fluctuations in sediment supply. *The Holocene,* 18, 1, 141-152.