Magnetostratigraphy of the Milan subsurface

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Four cores have been taken from the surroundings of the city of Milan, in the framework of the Milan CARG project. The northernmost drillings (Milano Triulza RL10, Milano Parco Nord RL11) were drilled to 100-m depth; the southernmost drillings (Peschiera Borromeo RL8, Gaggiano RL9) reached a depth of 180 m and 150 m, respectively. A total of 530 m of sediments was recovered.

The overall core lithostratigraphy is composed by three superimposed lithologic sequences, consisting, from the bottom, of alternated silt and medium- to fine-grained sand, arranged in fining-upward cycles, interpreted as meandering alluvial plain; the central sequence develops with coarse-grained sand, pebbly sand and subordinated gravel, interpreted as distal braidplain. Medium- to coarse-grained, poorly sorted, massive sand and pebbly sand, and clast-supported gravels with sandy matrix, interpreted as proximal braidplain, characterize the upper sequence. As a whole, the central and the upper sequence can be regarded as a prograding braidplain, composed by severall small-scale fining-upward cycles.

Paleomagnetic properties were studied on a total of 79 samples collected from cohesive fine-grained sediments with a common average sampling frequency in the order of one sample every 3/4 core-meters. The intensity of the NRM (measured at the Alpine Laboratory of Paleomagnetism) was in the order of 10^{-3}–10^{-4} A/m and orthogonal projections of demagnetization data typically indicated the existence of a lower unblocking temperature component, superimposed to a higher unblocking temperature component. The higher temperature component was removed to the origin of the demagnetization axes mainly in the magnetite and hematite temperature ranges between ~350 and ~680 °C and it is interpreted as the characteristic component. This characteristic component bears either positive (down-pointing) or negative (up-pointing) inclinations with overall mean values of 60° ± 15 and -54° ± 16, respectively, and is regarded as acquired at or shortly after sediment deposition (DRM or pDRM).

At least a magnetic polarity reversal has been recognized in each core, in the depth range of 60–80 m, and it has been interpreted, by means of the available pollen biostratigraphy and the regional framework reported in Carcano & Piccin (2002), Muttoni

et al. (2003), Scardia et al. (2006), as the Brunhes/Matuyama boundary; in cores RL 8 and RL9 also the Jaramillo Subchron was recognized.

The major lithologic change observed in each core, produced by a depositional switch from distal meandering alluvial plain to a prograding braidplain, occurs during a reverse polarity period, interpreted as Subchron Late Matuyama, and it is well constrained between the Subchron Jaramillo and the Brunhes/Matuyama boundary in cores RL8 and RL9; the same age constrain can be inferred in cores RL10 and RL11. This episode, already observed by Carcano & Piccin (2002), has been correlated by Muttoni et al. (2003) to an important Pleistocene climatic event, related to the onset of the major glaciations at the southern foothills of the Alps occurred at ~0.87 ka, during the Subchron Late Matuyama.

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