Defining the margins of a rotating allochthon: paleomagnetic data from the Oligocene to Miocene Foreland basins of Northern and Southern Alps

(Oral)

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During two FWF projects paleomagnetic investigations focused on Eastern and Southern Alps yielded 140 new paleomagnetic results, comprising 24 sites from the Northern Alpine Foreland Basin (NAFB), 16 sites from Helvetic nappes, 51 sites from the Northern Calcareous Alps (NCA), 6 sites from the eastern Central Alps (CA), 16 sites from the Southern Alps (SA) and 27 sites from the Southern Alpine Foreland Basin (SAFB).

Characteristic remanence vectors of postfolding magnetizations of Early Rupelian (34Ma) carbonates in the NCA and mesozoic carbonates from the Helvetic nappes show declination values of 40°. Primary magnetizations from Late Rupelian (29Ma) marls from the NCA show N- directed declinations. N-directed declinations also characterize the primary magnetizations of Late Rupelian to Middle Chattian (29-25Ma) marls from the Northern Alpine Foreland basin, whereas declination values of 330° are observed in marls younger than Latest Chatt (23Ma). In the SA and SAFB all results from rocks older than Late Early Rupelian times (32Ma) are rotated 40° clockwise. N-directed declination values from primary magnetizations characterize lithologies of Chattian age (25Ma). Finally, NW-directed declination values are found in primary and postfolding magnetizations from Serravallian to Messinian sediments (14- 5Ma) in the Bassano area.

Concluding, the Eastern and Southern Alps are characterized by very similar characteristic remanence directions. The declination values are changing synchronously, indicating three phases of joined vertical axis rotations in the study area.

A first clockwise rotation is active between Early Rupelian to Late Rupelian times (32-29Ma) affecting the NCA, eastern CA, SA and SAFB. This rotation can be related with the thrusting of NCA, Flysch and Helvetic units. A second clockwise rotation is dated to Middle to Latest Chattian (25-23Ma) and incorporates the southern slices of the subalpine Molasse. The youngest, counterclockwise vertical axis rotation is postdating the folding of Messinian Montello conglomerates of the northern Venetian Alps and consequently must be younger than 5Ma. This rotation is observed in the subalpine Molasse, EA, SA, SAFB and the northern parts of Adria (Marton et al., 2003). To the north the rotating units are limited by the frontal Alpine thrusts as sites with synchronous magnetization ages north of the Alpine front (tilted Molasse, Authochtonous Molasse) do not indicate any vertical axis rotation. The young counterclockwise rotation is probably related with the opening (5-3Ma) of the Tyrrhenian Sea/ Vavilov basin (Mattei et al., 2004) and the resulting young rotation of Adria (Marton et al., 2003).

MARTON, E., DROBNE, K., COSOVIC, V., MORO, A. 2003. Paleomagnetic evidence for Tertiary counterclockwise rotation of Adria. Tectonophysics, 377/1-2, 143-156.

MATTEI, M., D`AGOSTINO, N., FACENNA, C., PIROMALLO, C., ROSETTI, F. 2004. Some remarks on the geodynamics of the Italian region. Per. Mineral., 73, 7-27.