Geophysical Research Abstracts
Vol. 15, EGU2013-4680, 2013
EGU General Assembly 2013

Progressive-arc- vs. strike-slip-related rotations in curved orogenic belts: a case study from the Northern Apennines (Italy).

Antonio Turtù (1), Sara Satolli (1), Rosanna Maniscalco (2), Fernando Calamita (1), and Fabio Speranza (3)

(1) Università degli Studi "G. d'Annunzio", Dipartimento di Ingegneria e Geologia, Chieti, Italy (a.turtu@unich.it), (2) Università degli Studi di Catania, Dipartimento di Scienze Biologiche, Geologiche a Ambientali, Catania, Italy, (3) Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy

A detailed paleomagnetic study has been performed in the southern sector of the Olevano-Antrodoco-Sibillini (OAS) thrust front (i. e. the southern limb of the Northern Apennines, Italy). The oroclinal/progressive-arc vs. non rotational nature of the OAS thrust is still a matter of debate, as it has been interpreted in the literature as dextral strike-slip fault, dextral transpressive fault, or as a frontal to oblique ramp complex.

We document the paleomagnetism of 52 sites from Jurassic to Eocene pelagic limestones and Messinian siliciclastic turbidites from both the OAS hanging wall and footwall. In the hanging wall, sampling was designed to follow two transects perpendicular to two thrust segments oriented roughly NE-SW and NNW-SSE. Paleomagnetic data have been integrated with biostratigraphical and structural data, in order to understand both the rotational nature of the OAS arc and the kinematics of the thrust front. All samples were paleomagnetically investigated by a 2G DC-SQUID cryogenic magnetometer at the INGV of Rome. Thermal cleaning was used throughout.

A characteristic component of magnetization was successfully isolated in 39 (over 52) sites. The tilt-corrected directions were compared to the coeval directions expected for the Adriatic-African foreland, in order to calculate rotations due to Apennine orogenesis.

On the basis of cluster analysis and tectonic constrains, we document a peculiar pattern of tectonic rotations along the OAS thrust with four rotational domains: 1. a strongly rotated clockwise (CW) domain (54.78°±5.46°) in the hanging wall, close to the NE-SW-trending segment of the thrust; 2. a less CW-rotated domain in the hanging wall (15.1°±5.8°) that includes both the NNW-SSE oriented thrust segment and sites far from the thrust; 3. a uniform counterclockwise (CCW) rotation (-30.79°±4.73°) in the footwall; 4. an approximately null rotation (-5.2°±3.8°) in the external footwall.

The strong CW domain in the hanging wall, found in the NE-SW-oriented thrust segment and strictly localized within 1 km far from the thrust front, suggests the presence of a dextral strike-slip component linked to a lateral ramp development. The slight but significant clockwise rotational domain observed in the remaining sites from the hanging wall is in agreement with previous data from the literature, and indicate that the NNW-SSE-oriented thrust segment is a frontal ramp.

Our data confirm the progressive nature of the Northern Apennines arc. Its curved shape has been strongly influenced by the architecture of the Mesozoic Adria paleomargin, accentuated by tectonic rotations, and locally complicated by transpressive structures. This study indicate that a detailed paleomagnetic sampling is fundamental to discriminate between progressive-arc- and strike-slip-related rotations in major arcs.