EGU21-8673
https://doi.org/10.5194/egusphere-egu21-8673
EGU General Assembly 2021
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The role of regional-scale shear zones in paleogeographic reconstructions: the case study of the Variscan belt in the Mediterranean area

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Paleogeographic reconstruction and recognition of the tectono-metamorphic evolution of ancient orogenic belt is often complex. The combination of an adequate amount of paleomagnetic, metamorphic, structural and geochronological data is necessary. Fundamental data derive from the study of regional-scale shear zones, that can be directly observed, by combining detailed field work with structural analysis, microstructural analysis and petrochronology. The Southern European Variscan Belt in the Mediterranean area was partially overprinted by the Alpine cycle (Stampfli and Kozur, 2006) and correlations are mainly based on lithological similarities. Little attention has been paid to the compatibility of structures in the dispersed fragments. A main debate is the connection among the Corsica-Sardinia Block (CSB), the Maures-Tanneron Massif (MTM) and the future Alpine External Crystalline Massifs (ECM) (Stampfli et al., 2002; Advokaat et al., 2014) and if these sectors were connected by a network of shear zones of regional extent, known as the East Variscan Shear Zone (EVSZ).

We present a multidisciplinary study of shear zones cropping out in the CSB (the Posada-Asinara shear zone; Carosi et al., 2020), in the MTM (the Cavalaire Fault; Simonetti et al., 2020a) and in the ECM (the Ferriere-Mollières and the Emosson-Berard shear zones; Simonetti et al., 2018; 2020b).

Kinematic and finite strain analysis allowed to recognize a transpressional deformation, with a major component of pure shear and a variable component of simple shear, coupled with general flattening deformation. Syn-kinematic paragenesis, microstructures and quartz c-axis fabrics revealed that shear deformation, in all the studied sectors, occurred under decreasing temperature starting from amphibolite-facies up to greenschist-facies. A systematic petrochronological study (U-Th-Pb on monazite collected in the sheared rocks) was conducted in order to constrain the timing of deformation. We obtained ages ranging between ~340 Ma and ~320 Ma. Ages of ~340-330 Ma can be interpreted as the beginning of the activity of the EVSZ along its older branches while ages of ~320 Ma, obtained in all the shear zones, demonstrate that they were all active in the same time span.

The multidisciplinary approach revealed a similar kinematics and tectono-metamorphic evolution

of the studied shear zones contributing to better constrain the extension and timing the EVSZ and to strength the paleogeographic reconstructions of the Southern Variscan belt during Late Carboniferous time, with important implications on the evolution of the Mediterranean area after the Late Paleozoic. This case study demonstrates how paleogeographic reconstructions could benefit from datasets obtained from large-scale structures (i.e., shear zones) that can be directly investigated.

Advokaat et al. (2014). Earth and Planetary Science Letters 401, 183–195

Carosi et al. (2012). Terra Nova 24, 42–51

Carosi and Palmeri (2002). Geological Magazine 139.

Carosi et al. (2020). Geosciences 10, 288.

Simonetti et al (2020a). International Journal of Earth Sciences 109, 2261–2285

Simonetti et al. (2020b). Tectonics 39

Simonetti et al. (2018). International Journal of Earth Sciences. 107, 2163–2189

Stampfli and Kozur (2006). Geological Society, London, Memoirs 32, 57–82

Stampfli et al. (2002). Journal of the Virtual Explorer 8, 77