



Markers for geodynamic stability of the Variscan basement: case study for the Montseny-Guilleries High (NE Iberia)

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The Montseny-Guilleries High is a Miocene horst composed of Variscan basement rocks, situated in the northeastern part of the Catalan Coastal Ranges (NE Iberia). The Montseny-Guilleries High has an asymmetric profile with an abrupt faulted scarp at the southeastern margin and a smooth surface dipping to the Northwest; here Paleocene sediments of the Ebro basin margin are to some extent in onlap. The stratigraphic arrangement of the Mesozoic units in the Catalan Coastal Ranges indicate that the Montseny-Guilleries area was a relief during the Mesozoic, remaining exposed probably from the Permian to the Cretaceous [Anadón et al., 1979; Gómez-Gras, 1993]. The high subsequently has been faulted due to a rifting phase that took place during the Miocene [Anadón et al., 1979]. The geodynamic history (burial-exhumation processes and denudation rate) of the Montseny-Guilleries High can be deciphered from cooling markers, such as for example apatite fission tracks [Juez-Larré & Andriessen, 2006]. However, the cooling history of an area depends on many factors (i.e. denudation rate, variations of the geothermal gradient) that complicate interpretations [Juez-Larré & Ter Voorde, 2009]. Another solution is to search for datable paleoweathering records in order to obtain benchmarks for ancient surfaces of continental exposure. This is the case for the Permian-Triassic paleosurface, at which an extensive albitization-hematisation alteration occurred at shallow depth [Thiry et al., 2009].

Several paleoalterations have been identified in the Montseny-Guilleries High [Gómez-Gras & Ferrer, 1999]. These alterations are coupled to the smooth surface or peneplain of the northwestern margin of the high and form a paleoprofile with less altered rocks on the lower parts of the relief and more altered rocks located at the higher parts of the relief (i.e. on the peneplain). From base to top, the profile starts with weak albitization-hematisation of the facies developed mainly in the fractures; the degree of albitization-hematisation progressively increases towards the top affecting the whole rock, which acquires a characteristic pink color. Finally, the top of the profile is formed by strongly altered to hematite and kaolinite rich reddish facies. These uppermost parts of the alteration profile are formed by a relatively soft rock and are therefore usually not preserved, but the intermediate albitized parts are more resistant to surface alteration than unaltered facies and protect the peneplain from weathering and erosion.

The albitization-hematisation alterations observed in the Montseny-Guilleries peneplain are very similar to the Permian-Triassic paleoalteration profiles observed in other parts of Europe, affecting the Variscan basement [Ricordel et al., 2007; Parcerisa et al., 2009]. Dating these profiles using paleomagnetic methods will help us to identify the location of the Permian-Triassic surface in the area and deduce its geodynamic history during the Mesozoic and Tertiary periods.

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