COMMENT TO: "VOLCANIC ACTIVITY FROM THE NEOGENE TO THE PRESENT EVOLUTION OF THE WESTERN MEDITERRANEAN AREA. A REVIEW" BY M. LUSTRINO

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In the Discussion and Conclusions of the paper "Volcanic activity from Neogene to the present evolution of the Western Mediterranean sea. A review" (Ofioliti, 25 (2): 87-101), by Michele Lustrino, mainly deals with the Neogene to present volcanic activity and it presents a "continuous" model from Hercynian time to present: the paper, particularly because it wants to be a review, must take in better and more complete consideration the present-day knowledge on bibliography, data and interpretations, about the Hercynian, Late Hercynian and post-Hercynian geodynamic evolution in Western and Southern Europe.

The Discussion and Conclusions chapter reports, in particular, some considerations about the Hercynian and post-Hercynian geodynamic evolution that do not take in consideration present interpretations developed by recent geological, structural and petrological-geochemical investigations carried out by several authors. The presentation of some main topics of this evolution is particularly inadequate for an up-to-date review published on an international bulletin.

In particular:

The trend of Hercynian subduction

The Author refers to the paper of Shaw et al., (1993), supporting that "….much evidence for Hercynian ultrapotassic and shoshonitic magmatism in Europe, related to the subduction of this oceanic crust…": The paper of Shaw et al. (1993) is referred to the "diorite question", mafic plutonic rocks (diorite, gabbro, tonalite) that crop out in the Limousin area (Didier and Lameyre, 1971; Peiffer, 1985; Faure et al., 1997) and in the South Armorica and Vosges (Faure et al., 1997). These rocks of calc-alkaline geochemistry (Shaw et al., 1993) are dated of Middle to Late Devonian (~380-370 Ma) by U-Pb method on zircon (Bernard-Griffith et al., 1985; Cuney et al., 1993) and are related with a **north-east-dipping subduction zone** (Autran and Cogné, 1980; Shaw et al., 1993). However another interpretation is at present time hypothesized by Bébien and Gagny (1981), Fluck et al. (1987), Delfour (1989), Ikene et al. (1991), Rizki et al. (1992) and Faure et al. (1997). These Authors interpreted these calc-alkaline volcanic and volcanoclastic rocks as records of a magmatic arc (Faure et al., 1997). Faure et al. (1997) propose that this magmatic arc (Mid-Variscan arc) is due to the **southward subduction** of the Rheic ocean before its complete closure (in agreement with interpretations of Faure et al., 1997, Carmignani et al., 1979, hypothesized that the Corsica basement is subducted below the Sardinian basement, during the Early Carboniferous).

This new interpretation is not mentioned in the Lustrino's review and, accordingly, not considered in the Figure 4 of the paper.

The Hercynian geodynamic interpretation in the Sardinia - Corsica basement:

At present (Elter et al., 1990; 1999) the Hercynian Sardinia-Corsica basement is considered as the southern prolongation of the Maures Massif: the Posada-Asinara shear zone (Elter, 1987; Carosi and Elter, 1990; Elter and Sarria, 1990; Elter et al., 1990; Cappelli et al., 1992; Elter and Corsi, 1995; Elter et al., 1999: these authors are not cited by Lustrino in his paper) is considered the southern prolongation of the Grimauld Fault (Onézime et al., 1999; Morillon et al., 2000). This shear zone is a late Hercynian composite shear zone (Elter et al., 1999) which separates two different metamorphic complex: the High Grade Metamorphic Complex and the low grade complex. In spite of the lack of absolute geochronological data, the Posada-Asinara shear zone is affected by both thermometamorphism related to the granite emplacement at 290 Ma (Bralia et al., 1981) and was crosscut by Permo-Triassic alkaline lamprophyre (Baldelli et al., 1987). Accordingly, the Posada-Asinara shear zone has not been involved in recent evolution, since Permo-Triassic time.

These evidence and interpretation are not taken into consideration in the revision paper by Lustrino.

The open question about the significance of the Hercynian basic rocks

The presence of a Hercynian suture zone in the Posada - Asinara shear zone is not jet demonstrated: one of the open question in the southern Hercynian chain is the geodynamic significance of the basic rocks: two interpretations are actually suggested. The first is the monocyclic model (see Faure et al., 1997 for references) which considers an Eo-Variscan stage of oceanic convergence followed by continental collision during the Devonian - Early Carboniferous times; the second polycyclic model assumes that an Eo-Variscan belt is reworked by the Hercynian orogen in Devonian - Carboniferous times (Faure et al., 1997). These two interpretations have not been taken into consideration by Lustrino, and not represented in Figure 4b, where Lustrino suggests a compressive episode between Gondwana and Laurasia during the Late Carboniferous - Early Permian.

The role of the rotation of the Sardinia - Corsica blocks

In the paper the bibliography about the influence of the rotation of the Sardinia - Corsica blocks (see Edel et al., 1981; 2000) is not reported and this problem is not discussed.

The tectonic framework in Late Carboniferous - Early Permian time

According to the whole bibliography about the Hercynian tectonic framework and geodynamic evolution in Western

and Southern Europe (see Elter et al., 1999 and related bibliography for Sardinia - Corsica - Maures; see Faure et al., 1997 for Massif Central, Vosges; see Dal Piaz and Martin, 1998 for Alps; see Cortesogno et al., 1998 for Western Alps - Sardinia; see Shelley and Bossiére, 2000 for France and Spain), an extensional event is generally accepted during this time span (see below). As for as Sardinia, Elter et al. (1999), have shown a composite metamorphic - structural shear pattern related to the uplift of the Hercynian chain dated to 344-290 Ma (Ricci, 1992) in an extensional context.

However, Lustrino doesn't mention these references and doesn't discuss this interpretation in his review, which strongly contrasts with his compressive model.

The post-collisional sinking of the lithospheric root during late Permian

Many lines of evidence (see Dal Piaz, 1993; Dal Piaz and Martin, 1998, and quoted references; Piccardo et al., 1994; Rampone et al., 1995; Romairone, 2000) indicate that, after the Variscan convergence, a long-lasting, post-Variscan extensional process was set up, by mean of the passive extension of the Europe-Adria continental lithosphere. As reported in a conspiquos bibliography, this process is recorded by the Late Carboniferous-Permian to Jurassic decompressional subsolidus evolution of the Europe-Adria lithosphere mantle (Rampone et al., 1995; Romairone, 2000) and the lower crustal rocks, the passive upwelling of the asthenospheric mantle, which underwent Permian partial melting, producing the MORB parental melts for the Permian gabbroic intrusions (e.g. the huge Permian gabbroic intrusions into the Austroalpine Units of the Western-Central Alps: see Dal Piaz and Martin, 1998, and quoted references) and Permian residual mantle (Rampone et al., 1996).

Since the proposed "delamination, detachement and sinking model" apparently refers to the post-Hercynian evolution of the whole Western Mediterranean area, other interpretations must be taken into consideration and discussed, particularly when the proposed interpretation simply presents the model but doesn't give a proper basis of data to support the hypothesis.

As a general comment, I think that, when tempting to develop a geodynamic model, simply based on petrological-geochemical data of a restricted area, which aims to be applicable to a composite geodynamic region, the model has better chances to last in time and to be useful for the scientific community if it takes into consideration the whole of the geological-structural, petrological and geodynamic knowledge on the geological context of interest and it discuss properly the state-of-the-art on the present topic.

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