Evidences for mantle heterogeneities in the western Mediterranean

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The complex geodynamic history of the Western Mediterranean since Oligocene has been explained with various models that can be broadly divided in three groups on the basis of the locations and dip of the subduction lithosphere: A) N-NW dipping slab extending from the Gibraltar arc to the Balearic promontory retreating in S-SE direction; B) NW dipping slab under the Balearic promontory, retreating in SE direction towards the Gibraltar strait C) two opposite-directed subductions separated by a transform fault subparellel to the Pierre Fallot Fault

The geological evolution of this part of the Mediterranean is characterized by widespread volcanic activity, associated to subductive (*orogenic*) or intraplate (*anorogenic*) settings. Two huge databases of both types of volcanism have been merged and analyzed through factor analysis, in order to reduce the large number of geochemical parameters describing each sample (i.e. major and trace elements,isotopic compositions) through a smaller number of factors.

Seven factors have been calculated accounting for ~84% of variance. Binary diagrams obtained combining these factors allow to clearly distinguish the anorogenic field from the orogenic one, except for some overlaps caused by the great number of samples included in the analysis. Anorogenic rocks usually fall in a narrow range of variation, while orogenic are characterized by a greater variability and by alignement along different trends. These different trends account for large heterogeneities of the sub lithospheric mantle due to extensive recycling of geochemically different materials through time, supporting the idea that different reservoirs are responsible for the Mediterranean volcanism [1].

The spatio-temporal evolution of the Western Mediterranean lamproites (always clearly discriminated in the diagrams) allows us to speculate a two-step evolution of the mantle beneath southern Spain. This evolution has been evaluated at the light of the three models described above.

[1] Conticelli et al. (2009). *Lithos* **107**, 68-92.