from 4 to 15 may 2014

OROGENIC LHERZOLITE CONFERENCE

6th LHERZOLITE

Marrakech
MOROCCO

ABSTRACTS VOLUME

Géosciences Montpellier

Faculté des Sciences Tétouan

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4-7 May _ Pre-conference field trip to the Beni Bousera Orogenic Peridotite

8-11 May _ Conference Meeting in Marrakech (Hôtel Le Semiramis)

12-14 May _ Post-conference field trip to the Middle Atlas Volcanics and Mantle Xenoliths

12-15 May _ Post-conference field trip to the Anti-Atlas Pan-African Ophioites

Organizing committee

Conference : Jean-Louis Bodinier and Andréa Tommasi (Géosciences Montpellier, France), Amina Wafik (University Cadi Ayyad, Marrakech, Morocco), Kamal Targuisti (University Abdelmalek Essaâdi, Tetouan, Morocco), Carlos J. Garrido (IACT, Granada, Spain), Martin Menzies (Royal Holloway, Egham, U.K.), Henry Dick (WHOI, Woods Hole, U.S.A), Kazuhito Ozawa (University of Tokyo, Japan), Yigang Xu (Chinese Academy of Sciences, Guangzhou, China).

Beni Bousera field trip : Andréa Tommasi, Carlos J. Garrido, Kamal Targuisti, Jean-Louis Bodinier, Isma Amri (University Abdelmalek Essaâdi, Tetouan, Morocco).

Middle Atlas field trip : Houssa Ouali, Hicham El Messbahi (University Moulay Ismaïl, Meknes, Morocco), Jean-Marie Dautria (Géosciences Montpellier, France), Jean-Louis Bodinier, Kamal Targuisti.

Anti-Atlas field trip : Amina Wafik, Hassan Admou (University Cadi Ayyad, Marrakech, Morocco), Antoine Triantafyllou, (Mons University, Belgium), Julien Berger (Géosciences Environment Toulouse, France).

Petrophysical and seismological model of the lithospheric mantle beneath the Nógrád-Gömör Volcanic Field (Northern Pannonian Basin)

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Nógrád-Gömör Volcanic Field (NGVF) is one of the five known occurrences in the Carpathian Pannonian region (CPR) where Plio-Pleistocene alkali basalts have sampled the upper mantle, bringing upper mantle xenoliths to the surface. NGVF is located in the northern part of the Pannonian Basin.

For this study, 15 lherzolite and 2 wehrlite xenoliths were selected from the central and southern parts of the NGVF. These xenoliths represent a small volume (~4000 km^3) of the upper mantle from a depth of about 35-50 km. Xenoliths collected from the southern part of NGVF originate from shallower depth (35-40 km) than those from the central part (40-50 km) [1]. Crystal preferred orientations (CPO) of the minerals were measured by electron backscatter diffraction (EBSD). Two distinct orientation types based on the distribution and alignment of crystallographic axes were recognized, which show some correlation not only with the texture types, but also with olivine J-indexes that indicate the strength of the xenolith fabric [2]. Samples from the southern part of the NGVF are characterized by lower J-indexes (2.5-3.6) than those from the central area (3.5-10.4). In addition, samples with porphyroclastic textures showed type-A CPO, whereas the others with equigranular textures, exhibited type-D olivine orientation. The different CPO types could be the result of differences in the amount of stress and water content of the mantle portion represented by the xenoliths. Based on this assertion, the xenoliths probably originate from different domains of the lithospheric mantle [1].

The seismic properties, i.e. seismic anisotropy and velocities, of these 17 mantle xenoliths were calculated based on the CPO and volume fractions of olivine, ortho- and clinopyroxene [3]. It was found that P wave and fast split shear wave polarization direction is always close to the density maximum of the a-axis of olivine. Seismic anisotropy is higher for stronger CPO. Positive, but not linear correlation was observed between the calculated anisotropies and the J-index. Maximum P wave azimuthal anisotropy ranges are 4.5-6.9% and 5.3-11.9%, for the southern and the central area, respectively. Maximum S wave polarization anisotropy ranges are 2.92-5.31% and 3.97-7.46% for the southern area and the central area, respectively.

The anisotropy that would be measured by SKS, Rayleigh and Love waves for end-member orientations of the lineation and foliation could be predicted based on the calculated seismic properties of the xenoliths [4]. The calculated anisotropy is compared to the results of S receiver function analysis based on data recorded at 3 nearby permanent seismological stations. The goal of this study is the development of a petrophysical and seismological model for the lithospheric mantle in order to obtain a better interpretation of the measured seismological data, and hence determine the current and, if possible, the fossil lithosphere-asthenosphere boundary beneath the studied area.

[1] Liptai, N. et al. 2013. (in Hungarian) Bulletin of the Hungarian Geological Society, 143/4, 371-382.
[2] Bunge, H. J. Texture Analysis in Materials Sciences. Butterworths, London, 1982, p. 593
[3] Mainprice, D. 1990. Comp. Geosci. 16, 385-393
[4] Baptiste, V., Tommasi A. 2014. SE, 5, 45-63.

The general objective of the International Orogenic Lherzolite Conferences is to assemble specialists on mantle processes to share new findings (often resulting from recent PhD theses) that are discussed in a group setting, both on key outcrops and in room sessions.

For this 6th Lherzolite conference, we invite contributions in a large range of topics related to the physico-chemical evolution of the mantle including melting processes, melt transport, crustal recycling, significance of mafic lithologies in orogenic peridotites, metasomatism, lithosphere evolution through rejuvenation/refertilization, supra-subduction fluid/melt processes, feedbacks between deformation and melt segregation/migration, field and experimental studies on mantle rocks deformation, geophysical imaging of mantle structures and flow, mineral ressources related to mantle rocks, etc…

The conference also welcomes contributions on the mantle dynamics associated with the convergence between the African and European plates in the Western Mediterranean, including geophysics, petrology and geochemistry of mantle rocks and volcanism, and modelling.

The 6th International Lherzolite Conference is organized in Morocco in the frame of an ongoing collaborative venture between Abdelmalek Essaâdi University (Tetouan), Moulay Ismaïl University (Meknes), Cadi Ayyad University (Marrakech), Geosciences Montpellier (CNRS & University of Montpellier) and the Instituto Andaluz de Ciencias de la Tierra (CSIG and University of Granada).

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