

**“6<sup>th</sup> TOPO-EUROPE Workshop”**  
**Thursday 4 – Saturday 6 November 2010**  
**Hotel Klækken, Hønefoss, Norway**

**1) TITLE OF THE PRESENTATION: Magnetotelluric data from the Atlas Mountains of Morocco as part of TopoMed: preliminary results**

**2) AUTHORS , AFFILIATION:** Duygu Kiyan<sup>1,2</sup>, Alan G. Jones<sup>1</sup>, Javier Fullea<sup>1</sup>, Colin Hogg<sup>1</sup>, Juanjo Ledo<sup>3</sup>, Agata Siniscalchi<sup>4</sup>, Mohamed Rouai<sup>5</sup>, Joan Campaña<sup>3</sup>, Pierpaolo Moretti<sup>4</sup>, Gerardo Romano<sup>4</sup>, and the PICASSO Phase II Team

<sup>1</sup> Dublin Institute for Advanced Studies, School of Cosmic Physics, Dublin2, Ireland

<sup>2</sup> National University of Ireland, Galway, Department of Earth and Ocean Science, Galway, Ireland

<sup>3</sup> University of Barcelona, Department of Geodynamics & Geophysics, Barcelona, Spain

<sup>4</sup> University of Bari, Department of Geology & Geophysics, Bari, Italy

<sup>5</sup> University of Moulay Ismail, Meknes, Morocco

**3) ABSTRACT OF PRESENTATION:**

The Atlas System of Morocco is an intra-continental mountain belt extending for more than 2,000 km along the NW African plate with a predominant NE-SW trend. The System comprises three main branches: the High Atlas, the Middle Atlas, and the Anti Atlas. Our paper presents the results from a recent multi-institutional magnetotelluric (MT) experiment across the Atlas Mountains region that started in September, 2009 and ended in February, 2010, comprising acquisition of both broad-band (BBMT) and long-period (LMT) MT data along two profiles. One profile is oriented N-S crossing the Middle Atlas through the Central High Atlas to the east, while the other is NE-SW oriented crossing the western High Atlas towards the Anti Atlas in the west. Along the profiles 24 LMT and 44 BBMT stations were deployed at approximately 20 km and 10 km intervals, respectively. The MT measurements are part of both the PICASSO (Program to Investigate Convective Alboran Sea System Overturn) and the concomitant TopoMed (Plate re-organization in the western Mediterranean: Lithospheric causes and topographic consequences – an ESF EUROCORES TOPO-EUROPE project) projects, aimed at developing a better understanding of the internal structure and evolution of the crust and lithosphere of the Atlas Mountains.

The MT data have been processed with robust remote reference methods and submitted to comprehensive strike and dimensionality analysis. Two clearly depth-differentiated strike directions are apparent for crustal (5-35 km) and lithospheric (50-150 km) depth ranges. These two orientations are approximately consistent with the NW-SE Africa-Eurasia convergence acting since the late Cretaceous, and the NNE-SSW Middle Atlas, where Miocene to recent Alkaline volcanism is present. Two-dimensional (2-D) smooth electrical resistivity models were derived independently for both 50° and 20° E of N strike directions. Our preliminary results from the first profile reveal a middle to lower-crustal conductive layer stretching from the Middle Atlas southward towards the High Moulouya basin. The most resistive (and therefore potentially thickest) lithosphere is found beneath the Central High Atlas. The inversion results are to be tested against other geophysical observables (i.e., topography, geoid and gravity anomalies, surface heat flow and seismic velocities) using the software package LitMod. This software combines petrological and geophysical modelling of the lithosphere and sub-lithospheric upper mantle within an internally consistent thermodynamic-geophysical framework, where all relevant properties are functions of temperature, pressure and composition.