

## **Petrology and phase equilibria of Ti-andradite and titanite in alkaline ultramafic rocks of the Tamazeght complex, Morocco**

IAN M. COULSON<sup>1, 2</sup>, MICHAEL A. W. MARKS<sup>1</sup> AND GREGOR MARKL<sup>1</sup>

<sup>1</sup> Institut für Geowissenschaften, Universität Tübingen, 72074, Germany (ian.coulson@uni-tuebingen.de)

<sup>2</sup> Solid Earth Studies Laboratory, Department of Geology, University of Regina, Saskatchewan S4S 0A2, Canada

The elliptical (5 × 15 km) Tamazeght (syn. Tamazert) alkaline igneous complex (High Atlas Mountains, Morocco) was emplaced during the middle Eocene and intrudes Jurassic to Cretaceous limestone. It comprises numerous intrusive phases that document a progression from ultramafic to felsic magmatism. A wide range of lithologies are present, including ultramafic rocks, shonkinites, gabbroic to monzonitic phases, and feldspathoidal syenites, which predominate. Moreover, carbonatites and lamprophyres occur as diatremes and dykes.

This study focuses on the petrology, paragenesis and phase equilibria of the ultramafic lithologies (pyroxenite and glimmerite). Pyroxenite is dominated by cumulus clinopyroxene (aluminous diopside) and garnet, with the latter locally rimmed by mica (phlogopite) and/or titanite. Olivine, nepheline, apatite and interstitial calcite are minor phases. In glimmerite, large poikilitic mica predominates ( $\leq 65\%$ ), along with minor cumulus pyroxene-I (Al-rich), garnet, perovskite (rimmed by titanite), Fe-sulphides and apatite. Ocellular textures, consisting of clinopyroxene-II (Al-poor), calcite and mica, occur throughout. Garnet occurring in the ultramafic rocks have TiO<sub>2</sub> contents of between 5 and 11 wt. %. It is therefore Ti-andradite. Where present in some of the more evolved units (e.g., syenites) garnet occurs only as an accessory phase and TiO<sub>2</sub> concentrations are uniformly lower (around 4 wt. %).

Here we present petrological, electron probe and LA-ICP-MS data, and will focus on the paragenesis, phase equilibria and stability relations between the phases present in order to track the evolution of intrinsic parameters (such as T,  $a(\text{SiO}_2)$ ,  $f(\text{O}_2)$ ) during the formation of these rocks.