

**EVOLUTION OF LOW-TI AND HIGH-TI ROCKS OF THE JURASSIC FERRAR LARGE IGNEOUS PROVINCE, ANTARCTICA: PETROGENETIC CONSIDERATIONS FROM CRYSTALLISATION EXPERIMENTS**

R. Hanemann, L.G. Viereck-Goette

*Institut fuer Geowissenschaften, Universitaet Jena, Jena, Germany*

The 3000-km-long Ferrar province includes two compositionally distinct rock types of a tholeiitic magma series, the Mt. Fazio and the Scarab Peak chemical type, here referred to as the low-Ti and high-Ti series, respectively. Due to the uniformity of their significant trace element and isotope characteristics, a single region of magma generation within the subcontinental lithospheric mantle has been postulated for both rock types and thus, a model of long-distance magma transport over thousands of kilometers has been discussed.

Based on newly investigated samples from northern Victoria Land (NVL), the chemical differences of both magma types, shown by generally higher concentrations of incompatible elements (e.g. Ti, Fe, Y, Zr, REE) of high-Ti rocks compared to low-Ti rocks at given SiO<sub>2</sub> contents, are suggested to be controlled by distinct conditions during differentiation. In order to prove this assumption, crystallisation experiments were carried out in an internally heated pressure vessel at 1100 °C and 2 kbar at different oxygen fugacities (fO<sub>2</sub>) and water activities (aH<sub>2</sub>O). As starting material, a fused glass of a chilled margin from a low-Ti sill was used.

The experimental results indicate that fO<sub>2</sub> and aH<sub>2</sub>O have a small but significant effect on the generated phase assemblage and the chemistry of the crystallised phases and the residual melts. The compositional variation trends obtained with varying run conditions compared to natural rock compositions indicate that the low-Ti magmas underwent a differentiation at higher fO<sub>2</sub>, aH<sub>2</sub>O and pressure than the high-Ti magmas. A preliminary model is proposed assuming the low-Ti magmas differentiated at upper-mantle to lower-crustal conditions whereas the high-Ti magmas possibly stagnated at lower- to mid-crustal level to further differentiate under lower fO<sub>2</sub> and aH<sub>2</sub>O consistent with their higher degree of differentiation and higher TiO<sub>2</sub> and FeO contents.

Considering the experimental results and newly reported local occurrences of olivine-bearing Ferrar occurrences within NVL (probably of cumulus origin), the proposed petrogenetic model for the two magma types will be discussed in the light of the long-distance transport model.