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Magnetic petrology of ultramafic rocks and metabasites along the Lanterman-Mariner suture (Northern Victoria Land, Antarctica)

Eleonora Strada (1), Pontus Conrad Lurcock (1), Rosaria Palmeri (2), Fabio Florindo (1), and Franco Maria Talarico (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Roma2, Roma, Italy (eleonora.strada@ingv.it), (2) Museo Nazionale dell'Antartide, Università di Siena, Siena, Italy, (3) Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente, Università di Siena, Siena, Italy

This study focuses on the integration between rock magnetism and metamorphic petrology of ultramafic rocks and metabasites, variably metamorphosed under UHP, eclogite or HP amphibolite facies peak conditions, and cropping out along the Lanterman-Mariner suture (Northern Victoria Land, Antarctica) in three different areas: the Lanterman Range, the Salamander Range and the Dessent Ridge.
The outcrops along the Lanterman-Mariner suture provide a unique opportunity to define the relationships between magnetic properties and metamorphic evolution, in a wide P-T range, of ultramafic rocks and metabasites in the paleo-Pacific margin of Gondwana, an area which is well-studied from a petrological and structural point of view but lacking a rock magnetic study.
To characterize the magnetic properties of these rocks, we performed a set of rock magnetic analyses (low-field magnetic susceptibility, natural remanence, thermomagnetic curves and hysteresis loops). We then characterized the minero-petrographical and compositional features of opaque minerals on selected samples using both the optical microscope and the Scanning Electron Microscope (SEM). The samples display a remarkable heterogeneity in the studied magnetic properties depending on both type and abundance of the carriers of magnetization (Fe-Ti oxides and sulphides). Independently of the degree of retrogression and lithology (eclogites, retrogressed eclogites, pirossenites and amphibolites), several samples contain variable amounts of both magnetite and pyrrhotite, while others show only magnetite as the main ferromagnetic mineral. The remaining samples mainly consist of paramagnetic minerals and may display small amounts of magnetite. Based on the microstructural evidence, more than one generation of ferromagnetic minerals may occur in retrogressed UHP ultramafic rocks and eclogites.
These new data and interpretations are essential 1) to characterize and to verify primary and secondary oxide and sulphide contributions to the overall magnetization, 2) to link the stability/instability of magnetic assemblages to specific metamorphic stages, and 3) to provide a preliminary regional-scale perspective on the level of magnetization in all the main metamorphic mafic and ultramafic rock units of the Ross orogenic belt in Northern Victoria Land.