A Close Look at a Classic UHP Locality: Phase Equilibrium Modeling and Observations of Dora Maira Whiteschist from Case Ramello, Italian Alps

Seminario
Data: Tuesday, 20 November, 2012 - 12:00
Aula: Aula 2M
Relatore: Prof. Robert Tracy
Abstract:

Thorough examination of a sample of coesite-bearing whiteschist (aluminous quarztite) from the noted Case Ramello outcrop in the Doras Maira Massif using a variety of techniques including petrography, electron microprobe analysis and imaging, and LA-ICPMS analysis has yielded information that characterizes the peak metamorphic conditions, reaction history, and timing of metamorphism. All silica in the rock matrix is now quartz, but coesite surrounded by quartz rims is preserved inside pyrope-rich garnet porphyroblasts. The primary rock assemblage includes quartz (and coesite)(see below), garnet, kyanite, rutile, Mg-phengite, talc, jadeitic clinopyroxene (65% jd), monazite, zircon; secondary minerals include paragonite, Na-biotite and pargasite. Using novel techniques of image processing on EMP WDS chemical maps of whole thin sections, we have been able to estimate sufficiently accurate bulk chemistry to enable Perple_X pseudosection calculations that constrain metamorphic P and T as 3.5 GPa and 775 °C. Preservation of a Ca-enriched band in one garnet also provides convincing evidence of the earlier presence of lawsonite in the rock prior to its being completely reacted away near peak P-T conditions (see below). Diffusional modeling of the Ca-band provides useful constraints on the timing of exhumation and cooling. Attempts at EMP dating of Th- and U-rich monazite produced ages of ca. 65 Ma for Y-poor cores and 56 Ma for Y-enriched rims. However, isotopic analyses at the University of Arizona MC-LA-ICPMS reveal a significant portion of the Pb is common Pb, invalidating simple application of EMP ?chemical? dating. Unresolved issues regarding this rock that will be discussed include possible structural modifications of monazite crystal structure at UHP conditions that would allow normally impossible incorporation of common Pb, and the discovery of micron-scale compositional waves of Mg and Fe in pyropic garnet that may indicate diffusion driven by non-ideality in the Mg-rich end of the pyrope-almandine binary system.
Afferenza: Virginia Tech University
Tipo seminario: Arduino Lecture
Proponente: Bernardo Cesare

Attachment	Size
figure.jpg	294.28 KB

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