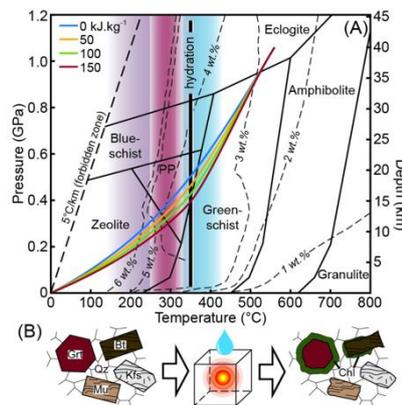


Seminario

Coupling latent heat release with reaction kinetics in metamorphic systems

Tuesday, 31 March 2026 – 16:30, Aula Arduino

Relatore: **Dr. Simon Schorn** - Institute of Geosciences & Mainz Institute of Multiscale Modeling, Johannes-Gutenberg University, Mainz, Germany.



Reactions involving latent heat exchange are fundamental in driving the dynamics of metamorphic processes. While prograde dehydration and melting drastically increase the effective heat capacity by over an order of magnitude, retrograde hydration and melt crystallization generate transient heat comparable to crustal radiogenic heating. In this presentation, I will first show the results of thermokinematic modeling, which demonstrate that the hydration of dry gneisses of about 2–4 wt% releases 80–160 kJ/kg of latent heat during active exhumation. This thermal perturbation has prominent effects: it delays cooling, enhances thermally-activated processes, and rejuvenates the apparent $^{40}\text{Ar}/^{39}\text{Ar}$ ages in micas and feldspars by up to ~10%. I will also present the application to another case study from the polymetamorphic Koralpe–Sausalpe locality (Austria). In this study, we performed multicomponent diffusion modeling of garnets in hydrated micaschists. By varying the hydration and latent heat production we constrained the temperature–time histories that led to observed garnet zoning. In the second part, I will dive into reactions that involve melting in large-scale granulite terranes, referring to two end-member heat sources: mafic underplating and lithospheric delamination. I will show that the thermal–temporal evolution is function of the degree of previous fluid/melt depletion. A fertile lower crust produces voluminous hydrous melts at lower temperature while the melting of previously depleted lower crust yields lower fractions of dry, hot melts. In this context, I will present the polyphasic metamorphism in the Namaqua–Natal Metamorphic Province (South Africa).

The speaker: Simon Schorn is a computational petrologist and Alexander von Humboldt Fellow at Johannes Gutenberg University Mainz. He obtained his BSc from the University of Padova (2012), his MSc from the University of Graz (2015), and his PhD at the University of Cape Town (2019). His PhD research focused on thermodynamic modelling of crustal anatexis and associated thermal buffering in granulite terranes. During his postdoctoral position at the University of Melbourne (2020–2021) he worked on activity–composition relationships. Then, in a stand-alone project at the University of Graz, investigating fluid–rock interaction and cross-scale links between reaction energetics, thermally activated processes, thermochronological records, and mineral zoning. His current research explores coupled thermomechanical models and experimental petrology to investigate the kinetics of eclogitization and the coupling between (de)hydration, porosity formation, and the mechanical behaviour of reactive rocks.

Proponente: **Giacomo Pozzi**