

Monday, 19th October 2026

at 16:15 Studer Auditorium, 2 OG

Alessio Sanfilippo

Department of Earth and Environmental Sciences,
University of Pavia & CNR –Institute of Geosciences

Is the Upper Mantle only depleted? Uncovering ancient melting events and ultra-depleted domains at ocean ridges

The classical paradigm of the Earth's upper mantle assumes a relatively homogeneous, depleted reservoir from which mid-ocean ridge basalts (MORB) are generated; the Depleted MORB Mantle (DMM). Over the past decades, this simplistic view has been challenged by the widespread identification of enriched mantle heterogeneities, leading the community to focus heavily on enriched components (e.g., recycled continental and oceanic crust, lithospheric mantle) to explain mantle evolution. This presentation demonstrates that the key to unraveling the Earth's differentiation history lies not in the transient enriched domains, but in the ultra-depleted matrix. By integrating petrological, geochemical, and isotopic studies of ultra-depleted mantle (UDM) peridotites and associated basalts across multiple oceanic settings (spanning from the Mid-Atlantic Ridge, the Arctic Ocean, and the embryonic continent-ocean transition of the Tyrrhenian Sea) we reveal that ultra-depleted domains are far more prevalent and geodynamically active than previously recognized. Re-evaluating the upper mantle through ultra-depleted peridotites shifts our understanding of mantle heterogeneity, showing that ancient melting events can be primary drivers of present-day geodynamics.