

Pre-rifting volatile-rich melts and asthenosphere influxes: The alkaline-carbonatitic lamprophyres of the Southern Alps (NE Italy)

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The opening of major magmatic cycles is often anticipated by the extrusion of alkaline and volatile-rich magmas. Lamprophyres are of particular interest in this context, since they represent alkali-, H₂O and CO₂-bearing melts generated in deep enriched Sub-Continental Lithospheric Mantle domains.

The camptonitic dykes cropping out in the Dolomitic Area (NE Italy) are among the oldest lamprophyres in Italy, and were historically related to the orogenic-like magmatism that shaped the Southalpine domain during Middle Triassic (~238 Ma). Petrological, geochemical and geochronological data show that these rocks emplaced at ~220 Ma, and were likely produced by low partial melting degree of a garnet-amphibole-bearing mantle source interacting with asthenospheric components. We hypothesize that the lamprophyres of the Dolomitic Area belong to the alkaline-carbonatitic pulse that infiltrated several portions of Southalpine lithosphere between 225 and 190 Ma.

These new findings led us to interpret these lamprophyres as the geochemical/geochronological connection between the orogenic-like Middle Triassic magmatism and the rifting phase related to the opening of the Alpine Tethys. This study underlines the role played by the volatiles during large-scale geodynamic processes.