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U-Pb zircon ages on metasomatic and magmatic events from deep to surface: constrain on the Triassic-Middle Jurassic evolution of Southern Alps.

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Triassic geodynamic evolution of Southern Alps is long-time debated. Structural, petrologic and geochemical evidence led to the formulation of different scenarios, alternatively involving long-standing rift stages preceding the Jurassic opening of the Neo-Tethys, the development of subduction zones and/or back-arc basins, a mantle plume activity.
A fundamental key case study to provide valuable new insights into the petrologic processes and geodynamic settings of the Southern Alps in Triassic times is represented by the Finero Complex, located in the northernmost part of Ivrea-Verbano Zone (IVZ).
The Finero Complex shows an antiform structure, with a strongly-metasomatised mantle unit at the core, which is in tectonic contact with a surrounding intrusive Mafic Complex. The latter intruded the bottom of the continental crust of the Adria plate before the opening of Neo-Tethys.
Unlike the central and southern sectors of the IVZ, geochronological data suggest that magmatic and metasomatic events affected the lithologies of the Finero Complex over a time span covering Paleozoic to Lower Jurassic.
To provide a comprehensive geochronological reconstruction, U-Pb SHRIMP and LA-ICPMS zircon ages were obtained from zircons separated from relevant lithologies, among which: i) amphibole gabbroic rocks from the Finero Mafic Complex; ii) massive chromitite layers from the dunite bodies of the Finero mantle unit; iii) tuffitic layers occurring in the Triassic sedimentary sequence, collected from outcrops of the Strona-Ceneri zone and boreholes of the Villafortuna-Trecate oil system (Po plain).
Geochronological U-Pb zircon data point to a Middle Triassic intrusion age for the Finero Mafic Complex. Consistent ages have been documented for zircons from the tuffitic layers, thus indicating that the plutonic activity was associated to volcanism on surface. The hydrous tholeiitic to transitional geochemical affinity argued for the parent melts, the ubiquitous occurrence of amphibole throughout the intrusion and the early precipitation of garnet amphibolites are considered as evidence that the intrusion of the Finero Mafic Complex took place in a supra-subduction setting.
Conversely, U-Pb zircon data from the chromitite layers from the Finero mantle unit are significantly younger, i.e. Lower Jurassic. This indicates that the Mafic Complex and the mantle unit experienced different thermal and structural evolution until Lower Jurassic, and therefore they were juxtaposed during the opening of the Jurassic Neo-Tethys or later. On the other hand, the relatively young age of chromitite zircons and the K-Mg-LILE-rich, Al-poor composition of the metasomatic agents that induced the pervasive recrystallisation of the mantle unit, can be interpreted with the upward migration of lamproitic melts in post-collisional setting.