Emplacement conditions and post-intrusive rotation of the Biella pluton, Sesia-Lanzo Zone, Austroalpine, Western Alps

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This work presents new microstructural data and thermobarometrical estimates to constrain the emplacement depth of the Ruppelian Biella pluton within the eclogitic internal Sesia-Lanzo Zone, western Austroalpine domain. This zone with the autochthon andesitic volcaniclastic cover is separated from the Southalpine Ivrea Zone by the western segment of the Periadriatic Line. By thermobarometry, 710 and 750°C, and 0.9 and 2.3 kbar are estimated for the final emplacement conditions and depths of 3 and 8.5 km are estimated for the shallower and deeper part, respectively. By 3D modeling, surface and volume distribution of emplacement pressures and temperatures are retrieved and isobaric surfaces are interpolated by means of Geomodeler software. The orientations of isobaric surfaces are consistent with a post-intrusive southeastward rotation of 69±5° about an axis trending at N 35° and thus sub-parallel to the Periadriatic Line. These results confirm previous paleomagnetic studies on andesites and are consistent with part of the andesitic volcanics fed by the outer part of the Biella pluton and with an average original thickness of the pluton of 5.5 km. In the light of the updated emplacement conditions of the Biella pluton and recent fission track data from the literature, we suggest that: (i) the crustal section above the pluton roof consisted mostly of the andesite cover that is supposed to have reached a thickness of about 2.3 km; (ii) the andesite cover experimented a depositional and tectonic burial under temperatures that reset fission tracks in apatite and zircon after magma cooling; (iii) the tectonic burial was due to a southeastward rotation before 26 Ma; iv) uplift by back-thrusting with ongoing rotation started during Chattian and Aquitanian times (24 - 19 Ma – zircon fission track ages in andesite); (v) the rotation lasted until Langhian and Serravalian times (16 - 12 Ma apatite fission tracks in pluton).

Mots-Clés : pluton emplacement, pluton 3D modeling, rigid block vertical rotation, crystallization isobaric surfaces, Periadriatic magmatism, late-collisional magmatism

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.