

## Replies to Reviewer (in blue)

### Associate Editor: Virginia Toy

The reviewers have considered your revised manuscript, and as you can also read, are happy that you addressed almost all their concerns. However, I do think that you should still, as indicated by reviewer #1, add some more discussion of the connection between surface and mid-deep crustal structures of the Ivrea Verbano area based on other published geochronological data.

Re: We revised the discussion section “5.2 The Variscan-Alpine cycle transition” in the light of your recommendations. We added the following text: “Although no early Permian magmatic activity is present north of the Marzio Fault, mantle-derived basic intrusions in the adjoining Ivrea-Verbano Zone to the west cut across the lower crust, linking early Permian magmatic activity in the Southern Alps to crustal thinning, asthenospheric upwelling and magmatic underplating (e.g., Shaltegger and Brack, 2007). Unlike the shallow crustal rocks of the Varese area, the Ivrea Verbano Zone’s lower crustal rocks were exposed to the surface through stepwise exhumation and tilting from the Jurassic through the middle-late Miocene (e.g., Wolff et al., 2012) with minimal impact on the study area.”

We did a few additional minor changes through out the text including deleting additional spaces between words, correcting misspellings, and in the first paragraph of section 5.2, deleting a couple of redundancies.

### Reviewer 1: Anonymous Reviewer

Suggestions for revision or reasons for rejection

(visible to the public if the article is accepted and published)

The issues raised in the previous review have been almost completely addressed in the reply and in the revised text. However, the thermochronological dataset offers limited constraints to support the tectonic model. Only one sample provides data clearly distinct from the age of the intrusion. Anyway, the data is now well displayed and discussed.

I would also like to point out that in the discussion no mention was made of the deep tectonic structures of the Ivrea-Verbano area, which could instead provide very strong constraints. The presence of multiple geochronological constraints from both intrusives and shear zones offers the chance to link the evolution of shallow and deep crustal sections. Therefore, I suggest to improve the treatment of this connection between surface and mid-deep crustal structures.

Re: Thank you for your suggestion. The Varese area indeed exposes near-surface products of the magmatic activity that also affected the Ivrea-Verbano Zone. We have revised the discussion in Section 5.2, 'The Variscan-Alpine Cycle Transition,' to include remarks on both the connections and differences between the Varese area and the Ivrea-Verbano Zone.

### Reviewer 2: Chris Morley

No suggestions

