Supplementary online resources for

**Paleocene metamorphism along the Pennine-Austroalpine suture constrained by U-Pb dating of titanite and rutile (Malenco, Alps)**

Suzanne M. Picazo¹, Tanya A. Ewing¹,²* and Othmar Müntener¹

¹Institute of Earth Sciences, University of Lausanne, CH-1015 Lausanne, Switzerland
²Present address: Institute of Geological Sciences, University of Bern, CH-3012 Bern, Switzerland

*Corresponding author: tanya.ewing@geo.unibe.ch, +41 31 631 87 70


**Figure S1:** Microphotographs of rutile and titanite in plain polarised light (a-b) in chlorite-phlogopite highly sheared matrix. (c) Apatite grains in the blackwall rocks dated in this study, crossed polarised light. (d, e) SEM images of titanite grains in light grey. The grain on the right has rutile inclusions (bright light) and little zoning.

Figure S2: Rare-earth element concentrations for titanite from three samples (distinguished by colour), normalised to the CI chondrite values of McDonough and Sun (1995).
Figure S3: U–Pb data for rutile and titanite secondary standards analysed in the same sessions as our samples: (a-b) R10 rutile (Luvizotto et al., 2009); (c-d) OLT-1 titanite (Spandler et al., 2016). For OLT-1, two analytical sessions within a single day are distinguished by colour. (a, c) Conventional concordia, plotting data uncorrected for common Pb. (b,d) Individual dates, calculated uncorrected for common Pb for R10, and $^{207}$Pb-corrected for OLT-1. The weighted mean of all dates is shown as a black line and given as text. R10 rutile is free of common Pb, and gave indistinguishable ages whether or not a common Pb correction was applied.
Figure S4: Tera-Wasserburg concordia diagram for titanite from sample 19-85, with isochron anchored to $^{207}\text{Pb}/^{206}\text{Pb}_{\text{comm}} = 0.833 \pm 0.014$, which is the common Pb composition determined from a regression through data for all titanites from three samples on a Wetherill concordia (see Fig. 5 in the main text).
Bibliography

