THE TBt-DIAGRAM. AN ALTERNATIVE TO PSEUODESECTIONS?

Stüwe, K.[1] & Schorn, S.[2]

[1]Department of Petrology and Geochemistry, NAWI Graz Geocenter, University of Graz, Universitätsplatz 2, A-8010 Graz, Austria

[2]Department of Geological Sciences, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa
e-mail: kurt.stuewe@uni-graz.at

The use of thermodynamic *PT* pseudosections to infer pressure–temperature paths of metamorphic rocks is inherently circular: While pseudosections are calculated for a *single* bulk composition (often obtained by XRF analysis), the art of inferring metamorphic *PT* paths is underlain by the fundamental premise that metamorphic parageneses respond only partially to changes in physical conditions and thus contain non-reactive parts of the overall bulk composition (i.e. *multiple* bulk compositions on the paragenesis scale). Although this conflict is increasingly recognized in the literature, there are little efforts to design tools that can be usefully employed to supersede *PT* pseudosections. In this contribution we present a new diagram that may fill this niche: The *TBt* diagram (*T* = Temperature, *B* = Bulk composition, *t* = time). In principle, the *TBt* diagram is akin to the well known *TX* diagrams where bulk composition is plotted on one axis of the diagram. However, in the *TBt* diagram, the *B* axis is not a simple linear axis (e.g. a mole fraction), but is a non-linear path through multi-dimensional compositional space that is externally controlled by processes such as fluid infiltration (sudden and dramatic increase of the equilibration volume giving the paragenesis access to a much larger bulk composition) or cooling (continuous decrease of the equilibration volume and thus decrease of the bulk composition). We argue that the *B* axis of the *TBt* diagram can be constrained by microstructural and/ or diffusion modelling and illustrate applications in the context of the Plankogel series in the southern Kor- and Saualpe.

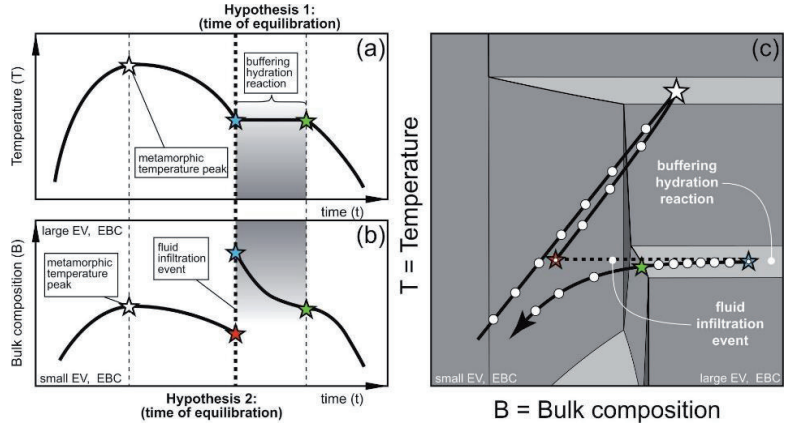

Figure 1. Schematic illustration of a *TBt* diagram. (a) Temperature (*T*) – time (*t*) diagram including fluid infiltration event that causes a hiatus in the cooling history (b) Bulk composition (*B*) – time (*t*) diagram for the same evolution. (c) The *TBt* diagram as a parametric representation of (a) and (b). White circles denote time.