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**Evaluation of multiple thermodynamic modeling protocols on metabasites: using the Tso Moriri UHP eclogite as a case study**

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### Abstract Text:

The development of thermodynamic modeling techniques and availability of updated thermodynamic databases and activity-composition (*a-X*) relations, call for an evaluation of modeling pressure-temperature (*P-T*) paths of metabasites. In this study, eclogite from the Tso Moriri UHP terrane, NW India, is used as a representative metabasite to compare *P-T* paths generated from the widely used THERMOCALC (TC) and Theriak-Domino (TD) programs. We also evaluate the effect of using the most updated thermodynamic database ds 62 (Holland and Powell 2011) relative to an older version ds 55 (Holland and Powell 1998), and the most updated garnet *a-X* relations of White *et al.* (2014) (W14) relative to an older version of White *et al.* (2007) (W07), while accounting for the effect of garnet fractionation. The following modeling protocols were assessed: (1) TC33: TC v3.33 with ds 55 and garnet *a-X* relations of W07; (2) TC47: TC v3.47 with ds 62 and garnet of W14; (3) TDG: TD with ds 62 and garnet of W14, and (4) TDW: TD with ds 62 and garnet of W07. TC47 and TDG modeling protocols yield a similar peak metamorphic *P-T* of  $34 \pm 1.5$  kbar at  $544 \pm 15$  °C and  $551 \pm 12$  °C, respectively; while TC33 and TDW modeling yield similar peak *P-T* results:  $26 \pm 1$  kbar at  $565 \pm 8$  °C and  $28.5 \pm 1.5$  kbar at  $563 \pm 13$  °C, respectively. Results indicate that all four modeling protocols generally provide consistent thermodynamic simulations regarding metamorphic compositional and temperature evolution; however, the pressure generated by protocols using W14 (TC47 and TDG) is 5–8 kbar higher than that predicted by protocols using W07 (TC33 and TDW). The difference in peak pressure results for the modeling protocols (TC47 and TDG vs. TC33 and TDW) are beyond the suggested uncertainty using mineral isopleth thermobarometry in pseudosections:  $\pm 50$  °C and  $\pm 1$  kbar at  $2\sigma$  (Powell and Holland 2008). This study illustrates that the choice of garnet *a-X* relations can affect predictions of peak pressure regardless of program choice, as well as the need of comparison between modeling predictions and petrological observations.

### References

- Holland & Powell *J Metamorph Geol* **16**, 309–343 (1998)  
Holland & Powell *J Metamorph Geol* **29**, 333–383 (2011)  
Powell & Holland *J Metamorph Geol* **26**, 155–179 (2008)  
White *et al.* *J Metamorph Geol* **25**, 511–527 (2007)  
White *et al.* *J Metamorph Geol* **32**, 261–286 (2014)

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