Holland et al. (2018) W144 benchmark attempt (Dec 8, 2024).

Configuration:

1) The input file for the Perple_X calculation presented here is at www.perplex.ethz.ch/perplex/examples/example_holland_et_al_2018_melt_model/w144.dat

2) The data used for this benchmark was copied in late April 2019, from www.esc.cam.ac.uk/research/research-groups/research-projects/tim-hollands-software-pages/thermocalc-1/mantle-melting-files. This data was modified after the 2018 publication was finalized and then again in March 2019. The data files actually used for the calculations in Holland et al. (2018) are not available and certainly not identical to the data used here and currently in THERMOCALC.

3) The above-mentioned data files indicate changes to the White et al. (2014) biotite model that are otherwise undocumented. Calculations with a biotite model that accounts for these changes (Bi(HGP)) lead to larger discrepancies than obtained with original White et al. (2014) model. Therefore, the calculations reported here were made with Bi(W).

Results (depicted on page 2 of this document):

1) The agreement between the dashed phase boundaries depicted for the W144 composition depicted in Figure 12 of Holland et al. (2018) and obtained with Perple_X is generally good and appears to confirm the Perple_X implementation of the melt(HGPH) and Aqfl(HGP) (siliceous aqueous fluid) models.

2) Holland et al. (2018) indicate that their computed (at 6 - 12 kbar) solidus is coincident with that of White et al (2014). This implies that the solidus computed with Perple_X is discrepant by <5 K. This discrepancy appears insignificant given the uncertainty concerning the benchmark configuration.

3) Holland et al. (2018) describe modifications to the White et al. (2014) cordierite model (Crd(W)). The modified cordierite (Crd(HGP)) and biotite (Bi(HGP), see configuration note 2) models result in substantial displacements of the phase boundaries depicted by White et al. (2014). It seems probable that the Bi(HGP) model variant was used for the calculations depicted in Figures 10 and 11 of Holland et al. (2018), but not in the calculations mentioned re Figure 12.

Figure 4a, suprasolidus, White et al 2014a, published HGP boundaries in red.

The Perple_X calculation depicted here was done with X/Y_nodes set to "40 80" and all other options set to default.