Appendix 1

Pseudosection modeling

Equilibrium phase diagrams (pressure–temperature pseudosections) were computed in the system Na2O–K2O–CaO–FeO–MgO–Al2O3– SiO2–H2O (NKCFMASH) for the bulk chemical composition of sample GE1501b with the following composition: Al2O3:FeO:MgO:CaO:Na2O:K2O = 12.99:6.95:2.46:4.18:1.73:0.70 (Miyamoto *et al*., 2007). The pseudosection was constructed by forward modeling using Perple\_X 6.9.0 (Connolly, 1990) utilizing the internally consistent data set of Holland & Powell (1998, updated 2002). The pressure–temperature pseudosection was calculated in the range of 1.2–3.0 GPa and 500–800 °C. SiO2 and H2O were calculated as excess phases. Sources of the selected solution models for the minerals in the pseudosection analysis are as follows: amphibole: Dale *et al*. (2005); biotite: Powell & Holland (1999); chlorite: Holland *et al*. (1998); chloritoid: White *et al*. (2000); garnet: Holland & Powell (1998); phengite: [K*x*Na1–*x*Mg*y*Fe2Al3–2(*y*+*z*) Si3+*y*+*z*O10(OH)2] parameters from THERMOCALC; pyroxene: Green *et al*. (2007).

Appendix 2

All analytical data of point analysis

Point analysis data of 236 quartz inclusions after peak fitting is provided in Appendix Table 1. The first and second line is title and heading. Column A is the inclusion ID, which is shown in the format of thin section number\_host number\_inclusion number. Column B, C, and D are peak positions of standard quartz (cm−1) for each measurement day. Column E, F, and G are peak positions of sample quartz (cm−1). Column H to L are indexes calculated from the difference of peak positions (cm−1) between the standard and the sample. Column M to P are residual pressure values (GPa) determined using each index. The definition of indexes and residual pressure calculation formula are given in “Quartz residual pressures”. Column Q and R are lengths of the major and minor axes of inclusions (m). Data for inclusions with complicated shapes are blank. The calculated grainsize () and aspect ratio (*b*/*a*) are shown in column S and T, respectively.

References

Angel, R. J., Alvaro, M., Miletich, R., & Nestola, F. (2017) A simple and generalised P-T-V EoS for continuous phase transitions, implemented in EoSFit and applied to quartz. *Contributions to Mineralogy and Petrology* **172**, 1–15.

Connolly, J. A. D. (1990) Multivariable phase diagrams: An algorithm based on generalized thermodynamics. *American Journal of Science* **290**, 666–718.

Dale, J., Powell, R., White, R. W., Elmer, F. L., & Holland, T. J. B. (2005) A thermodynamic model for Ca-Na clinoamphiboles in Na2O-CaO-FeO-MgO-Al2O3-SiO2-H2O-O for petrological calculations. *Journal of Metamorphic Geology* **23**, 771–791.

Green, E., Holland, T., & Powell, R. (2007) An order-disorder model for omphacitic pyroxenes in the system jadeite-diopside-hedenbergite-acmite, with applications to eclogitic rocks. *American Mineralogist* **92**, 1181–1189.

Holland, T. J. B., & Powell, R. (1998) An internally consistent thermodynamic data set for phases of petrological interest. *Journal of Metamorphic Geology* **16**, 309–343.

Holland, T., Baker, J., & Powell, R. (1998) Mixing properties and activity-composition relationships of chlorites in the system MgO-FeO-Al2O3-SiO2-H2O. *European Journal of Mineralogy* **10**, 395–406.

Miyamoto, A., Enami, M., Tsuboi, M., & Yokoyama, K. (2007) Peak conditions of kyanite-bearing quartz eclogites in the Sanbagawa metamorphic belt, central Shikoku, Japan. *Journal of Mineralogical and Petrological Sciences* **102**, 352–367.

Powell, R. & Holland, T. (1999) Relating formulations of the thermodynamics of mineral solid solutions: Activity modeling of pyroxenes, amphiboles, and micas. *American Mineralogist* **84**, 1–14.

White, R. W., Powell, R., Holland, T., & Worley, B. (2000) The effect of TiO2 and Fe2O3 on metapelitic assemblages at greenschist and amphibolite facies conditions: mineral equilibria calculations in the system K2O–FeO–MgO–Al2O3–SiO2–H2O–TiO2–Fe2O3. *Journal of Metamorphic Geology* **18**, 497–511.

Whitney, D. L. & Evans, B. W. (2010) Abbreviations for names of rock–forming minerals. *American Mineralogist* ***95***, 185–187.

Appendix Fig. 1. Pressure–temperature peseudosection in NKCFMASH system, with excess SiO2 and H2O, of sample GE1501b. All area contains phengite and are not show in the figure. The stability field of kyanite is represented by the blue shade. Abbreviations for minerals follow Whitney & Evans (2010): Ab, albite; Amp, amphibole; Bt, biotite; Car, carpholite; Coe, coesite; Cld, chloritoid; Grt, garnet; Ky, kyanite; Lws, lowsonite; Omp, omphacite; Pg, paragonite; Qz, quartz; Tlc, talc; Zo, zoisite.

Appendix Table 1. Analytical dataset of point analysis. See the text of the Appendix for a detailed description of each column.