

Supplementary Text S1. Analytical methods.

Whole-rock major and trace elements were analyzed at Activation Laboratories Ltd. (Ancaster, ON, Canada). An inductively coupled plasma–optical emission spectrometer was used for the analysis of major elements, whereas trace element contents were determined with the use of an inductively coupled plasma mass spectrometer. Based on analytical results obtained from international standard rocks, the analytical precision and accuracy were typically better than 5% for major elements and better than 10% for trace elements.

Supplementary Text S2. Saturation temperatures.

Zircon, monazite and apatite saturation thermometry

Saturation temperatures of zircon, monazite and apatite in the ongonites can provide information on magma temperature, which can be useful in deciphering petrogenesis and thermal histories, particularly as the high contents of fluorine in the magma are indicative of protractive fractional crystallization. For zircon, the calibrations of Boehnke et al. (2013) [53] were applied. Another accessory mineral that can provide a useful saturation temperature is apatite. The saturation temperature for apatite was calculated using the method of Harrison and Watson (1984) [54,55]. Finally, monazite saturation temperatures were calculated by relating the concentration of LREEs to the bulk composition of the magma. The calculations were based on Montel (1993) [56] and yielded an average temperature. The results are consistent with a prolonged fractional crystallization of magma due to the high contents of fluorine. Twenty-one analyses reported by Dostal et al. [42] were used for the calculations.

References

- 42 Dostal, J.; Chatterjee, A.K. Origin of topaz-bearing and related peraluminous granite of the Late Devonian Davis Lake Pluton, Nova Scotia, Canada: Crystal versus fluid fractionation. *Chem. Geol.* **1995**, *123*, 67–88.
- 53 Boehnke, P., Watson, E.B., Trail, D., Harrison, T.M., Schmitt, A.K. Zircon saturation revisited. *Chemical Geology*, **2013**, *351*, 324–334, <https://doi.org/10.1016/j.chemgeo.2013.05.028>.
- 54 Watson, E.B., Harrison, T.M. Zircon saturation revisited: Temperature and composition effects in a variety of crustal magma types. *Earth and Planetary Science Letters*, **1983**, *64*, 295–304. [https://doi.org/10.1016/0012-821X\(83\)90211-X](https://doi.org/10.1016/0012-821X(83)90211-X)
- 55 Harrison, T.M., Watson, E.B. The behavior of apatite during crustal anatexis: Equilibrium and kinetic considerations. *Geochimica et Cosmochimica Acta*, **1984**, *48*, 1467–1477.
- 56 Montel, J.M. 1993. A model for monazite/melt equilibrium and application to the generation of granitic magmas. *Chemical Geology*, **1993**, *110*, 127–146.