Proterozoic VanDieland in central Victoria: ages, compositions and source depths for Late Devonian silicic magmas

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SUPPLEMENTARY PAPERS
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Supplementary papers
Paper 1. Pseudosection calculations using the Domino program of the TheriaK/Domino software suite.
Paper 2. Table SP1. Calculation of the compositions for use in the TheriaK-Domino modelling.
Paper 1 Pseudoosection calculations using the Domino program of the Theriak/Domino software suite

Pressure–Temperature (P–T) and isobaric Temperature–H₂O content (T–Mᵢₑₒ) pseudosections were calculated using the Domino program of the Theriak/Domino software suite (de Capitani & Petrakakis, 2010), using an unpublished, updated version of the internally-consistent thermodynamic database of Holland and Powell (1998). Pseudosections were calculated in the Na₂O–K₂O–CaO–FeO–MgO–Al₂O₃–SiO₂–H₂O–TiO₂ (NCKFMASSH) system. Fe₂O₃ was not considered, due to the lack of Fe₃⁺-rich oxide phases in the samples of interest, and MnO was omitted due to its negligible effect on phase relationships at hypersolidus temperatures (White, Powell & Clarke, 2007). Prior to calculations, whole-rock bulk CaO contents were modified by assuming that the P₂O₅ content of the bulk rock was accommodated in apatite. The modified bulk composition was then recast as atomic % of the cation of interest and the oxygen content was balanced automatically by the program Domino. Table SP1 shows these calculations.

The following activity–composition (a–X) models were used to calculate the P–T and T–Mᵢₑₒ pseudosections: plagioclase (Pl C1; Holland & Powell, 2003), garnet (White et al., 2007), biotite (White et al., 2007), chlorite (Holland & Powell, 1998, as modified by Tinkham, Zuluaga & Stowell, 2001), white mica (Coggon & Holland, 2002, as modified by Tinkham et al., 2001), ilmenite (White, Pomroy & Powell, 2005), hercynitic spinel (White, Powell & Clarke, 2002), orthopyroxene (White et al., 2002), cordierite (Holland & Powell, 1998), staurolite (Holland & Powell, 1998), chloritoid (Holland & Powell, 1998), olivine (ideal mixing on sites), haplogranitic silicate liquid (White et al., 2007) and H₂O (Holland & Powell, 1998).

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Table SP1. Calculation of the compositions for use in the Theriak-Domino modelling.

|       | Mol wt | Mol/ 100 g | Apatite | Apatite-corrected | Mass fraction | Renormalised | Atom % |
|-------|--------|------------|---------|------------------|---------------|--------------|--------|
| S9    | 67.95  | 60.08      | 1.1310  | 1.1310           | 67.95         | 68.23        | 64.50  |
| SiO2  | 72.74  | 60.08      | 1.2107  | 1.2107           | 72.74         | 72.99        | 68.66  |
| TiO2  | 0.39   | 79.87      | 0.0049  | 0.0049           | 0.39          | 0.39         | 0.28   |
| Al2O3 | 14.28  | 101.96     | 0.1401  | 0.1401           | 14.28         | 14.33        | 15.89  |
| FeOT  | 3.02   | 71.85      | 0.0420  | 0.0420           | 3.02          | 3.03         | 2.38   |
| MnO   | 0.02   | 70.94      | 0.0003  | 0.0003           | 0.00          | 0.00         | 0.00   |
| MgO   | 1.04   | 40.31      | 0.0258  | 0.0258           | 1.04          | 1.04         | 1.46   |
| CaO   | 1.49   | 56.08      | 0.0233  | 0.0233           | 1.31          | 1.31         | 1.32   |
| Na2O  | 2.76   | 61.98      | 0.0445  | 0.0445           | 2.76          | 2.77         | 5.05   |
| K2O   | 4.12   | 94.2       | 0.0437  | 0.0437           | 4.12          | 4.13         | 4.96   |
| P2O5  | 0.14   | 141.94     | 0.0101  | 0.0101           | 0.14          | 0.14         | 0.14   |
| Totals| 100.00 | 100.00     | 100.00  | 100.00           | check         | 100.00       |        |

9446

|       | Mol wt | Mol/ 100 g | Apatite | Apatite-corrected | Mass fraction | Renormalised | Atom % |
|-------|--------|------------|---------|------------------|---------------|--------------|--------|
| SiO2  | 73.00  | 60.08      | 1.2150  | 1.2150           | 73.00         | 73.25        | 68.80  |
| TiO2  | 0.42   | 79.87      | 0.0053  | 0.0053           | 0.42          | 0.42         | 0.30   |
| Al2O3 | 13.82  | 101.96     | 0.1355  | 0.1355           | 13.82         | 13.87        | 15.36  |
| FeOT  | 3.12   | 71.85      | 0.0434  | 0.0434           | 3.12          | 3.13         | 2.46   |
| MnO   | 0.07   | 70.94      | 0.0010  | 0.0010           | 0.00          | 0.00         | 0.00   |
| MgO   | 0.43   | 40.31      | 0.0107  | 0.0107           | 0.43          | 0.43         | 0.43   |
| CaO   | 0.51   | 56.08      | 0.0091  | 0.0026           | 0.51          | 0.51         | 0.51   |
| Na2O  | 3.05   | 61.98      | 0.0492  | 0.0492           | 3.05          | 3.06         | 5.57   |
| K2O   | 5.46   | 94.2       | 0.0580  | 0.0580           | 5.46          | 5.48         | 6.55   |
| P2O5  | 0.11   | 141.94     | 0.0008  | 0.0008           | 0.11          | 0.11         | 0.11   |
| Totals| 99.99  | 100.00     | 100.00  | 100.00           | check         | 100.00       | 100.00 |

* The original oxide wt% values are normalised to 100 wt%, volatile-free and with all Fe expressed as FeOT