Geochemical
Perspectives
Letters

A genetic classification of the tholeiitic and calc-alkaline magma series

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Supplementary Information

The Supplementary Information includes:

➢ Supplementary Text
➢ Supplementary Information References

Supplementary Text

The Rollinson and Pease (2021) dataset includes analyses of tholeiites from Iceland (including Thingmuli), as well as calc-alkaline continental arc rocks of the Cascades, western United States; both locations have long been considered as type examples of these trends (*e.g*., Irvine and Baragar, 1971). The dataset was downloaded in 2020 from the precompiled files in the GEOROC database (Sarbas, 2008) for single ocean islands/Iceland (>10,000 analyses) and convergent margins/Cascades (>6,000 analyses). The dataset included both glass and whole rock analyses, as well as extrusive and intrusive rocks, although lavas dominate. The dataset was filtered to exclude incomplete analyses (<10 oxides), those analyses which did not report sample coordinates, those with LOIs above 3 wt. % (in order to exclude possibly altered analyses, although it is well known that arc rocks may contain up to 8 wt. % H_2O; see Zimmer *et al*., 2010), and those with inappropriate $Na_2O + K_2O$ (to exclude alkaline compositions). After all Fe was converted to FeO_T (where $FeO_T = FeO + 0.8998Fe_2O_3$), a subset of the filtered analyses within each compositional group (by SiO_2) were then randomly selected to provide a final representative dataset of manageable size for readable figures that was equally represented by basalts, andesites, dacites, and rhyolites, *i.e*. ~1000 analyses.

Supplementary Information References

Irvine, T.N., Baragar, W. (1971) A guide to the chemical classification of the common volcanic rocks. *Canadian Journal of Earth Sciences* 8, 523–548.

Rollinson, H., Pease, V (2021) Using Geochemical Data to Understand Geological Processes. Second Edition, Cambridge University Press, Cambridge.

Sarbas, B. (2008) The GEOROC database as part of a growing geoinformatics network. In: Brady, S.R., Sinha, A.K. Gundersen, L.C. (Eds.) *Geoinformatics 2008–Data to Knowledge*. USGS, Denver, 42–43.

Zimmer, M.M., Plank, T., Hauri, E.H., Yogodzinski, G. M., Stelling, P., Larsen, J., Singer, B., Jicha, B., Mandeville, C., Nye, C.J. (2010) The role of water in generating the calc-alkaline trend: new volatile data for Aleutian magmas and a new tholeiitic index. *Journal of Petrology* 51, 2411–2444.