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High Sr/Y rocks are not all adakites!

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The name of "adakite" is used to describe a far too large group of rocks, whose sole common feature is high Sr/Y and La/Yb ratios. Defining adakites only by this criterion is misleading, as the definition of this group of rocks does include many other criteria, including major elements. In itself, high (or commonly moderate!) Sr/Y ratios can be achieved via different processes: melting of a high Sr/Y (and La/Yb) source; deep melting, with abundant residual garnet; fractional crystallization or AFC; or interactions of felsic melts with the mantle, causing selective enrichment in LREE and Sr over HREE.

A database of the compositions of "adakitic" rocks – including "high silica" and "low silica" adakites, "continental" adakites and Archaean adakites—was assembled. Geochemical modeling of the potential processes is used to interpret it, and reveals that (1) the genesis of high-silica adakites requires high pressure evolution (be it by melting or fractionation), in equilibrium with large amounts of garnet; (2) low-silica adakites are explained by garnet-present melting of an adakite-metasomatized mantle, i.e at depths greater than 2.5 GPa; (3) "Continental" adakites is a term encompassing a huge range of rocks, with a corresponding diversity of petrogenetic processes, and most of them are different from both low- and high- silica adakites; in fact in many cases it is a complete misnomer and the rocks studied are high-K calc-alkaline granitoids or even S-type granites; (4) Archaean adakites show a bimodal composition range, with some very high Sr/Y examples (similar to part of the TTG suite) reflecting deep melting (> 2.0 GPa) of a basaltic source with a relatively high Sr/Y, while lower Sr/Y rocks formed by shallower (1.0 GPa) melting of similar sources.

Comparison with the Archaean TTG suite highlights the heterogeneity of the TTGs, whose composition spreads the whole combined range of HSA and Archaean adakites, pointing to a diversity of sources and processes contributing to the "TTG suite".