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Nd and Sr isotope geochemistry of plutonic rocks from Ottana (central Sardinia): implications for granite petrogenesis and crustal evolution

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Major- and trace-element contents and Sr–Nd isotope ratios were determined in late-Variscan granitoid samples from Ottana plutonic complex (central Sardinia, Italy). The pluton covers an area of 90 $Km^2$and hosts one of the most important mining districts in Sardinia, which produces high-quality albite and talc. The studied rocks ranging from monzogranite to granodiorite show a mineral assemblage consisting of plagioclase, quartz, K-feldspar and biotite. Common accessories are allanite, apatite, amphibole, zircon, titanite and magnetite. The samples are peraluminous and exhibit interesting interelement correlations. In terms of REE, the Ottana granitoids are characterized by variable contents (ΣREE = 127-385) and patterns (La/LuN = 10.2- 72.2) and show slightly negative Eu anomalies (Eu/Eu* = 0.088-0.286). Measured Sr-isotope ratios exhibit a large range from 0.7146 to 0.7401, whereas Nd-isotope ratios display a restricted range from 0.5121 to 0.5124. A Rb—Sr wholerock errorchron (MSWD = 11.3) yields an age of emplacement of the granitoids of 274 $\pm$ 19 Ma and initial $^{87}Sr/^{86}Sr$ = 0.71063 $\pm$0.00097. This age falls within the range of reported ages from other Variscan granitoid complexes in Europe (Castorina and Petrini, 1989; di Vincenzo et al., 2004 Carrigan et al., 2005). The small variation in the $^{147}Sm/^{144}Nd$ ratio makes inapplicable the Sm –Nd geochronology to the studied rocks. As a whole, the initial Sr and Nd isotopic ratios calculated at 270 Ma as well as the chemical characteristics are consistent with an origin of the granitoid magmas by partial melting of a sedimentary source, subsequently affected by fractional crystallization of feldspars.

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