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Zircon Hf isotope systematics and U–Pb geochronology, whole-rock Sr–Nd–Pb isotopes and geochemistry of calc-alkaline Çaltı Pluton (Eastern Taurides, Türkiye)

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The Eocene was a critical era for the geodynamic evolution of the eastern part of the Tauride-Anatolide Platform. To better understand the magmatic processes, we present new whole-rock Sr-Nd-Pb isotopes, in situ zircon U–Pb ages and Hf isotope data, and geochemistry data of plutonic rocks. The Çaltı Pluton is generally represented by granite, granodiorite, granodiorite porphyries and mafic microgranular enclaves (MMEs). The studied rocks generally exhibit a character ranging from calc-alkaline to high K-calc-alkaline, showing an I-type composition. The negative Nb and Ta anomalies in the trace element diagrams of the Çaltı Pluton rocks normalized to the primitive mantle indicate a relationship with subduction and/or crustal contamination. The studied rocks generally fall into the post-collisional granite field with volcanic arc granites. Zircon U–Pb dating of four samples yielded crystallization ages of 43.51-47.5 Ma, respectively. Dated zircons show negative to positive $\varepsilon_{Hf}(t)$ values (−17.2 to +2.3), yielding model ages (T_{DM2}) from 0.97 to 2.63 Ga. They show a narrow range of $^{87}Sr/^{86}Sr_{(i)}$ (0.705486-0.705798), $^{143}Nd/^{144}Nd(i)$ (0.512471-0.512485), and $\varepsilon_{Nd}(t)$ values varying from −1.9 to −2.1, yielding model ages (T_{DM}) from 0.87 to 1.02 Ga. The $^{206}Pb/^{204}Pb_{(i)}$, $^{207}Pb/^{204}Pb_{(i)}$ and $^{208}Pb/^{204}Pb_{(i)}$ values of the rocks belonging to the Çaltı Pluton vary in the ranges of 18.5063-18.5870, 15.6322-15.6426 and 38.3903-38.5310, respectively. The geochemical signature, whole-rock Sr–Nd–Pb, and zircon Hf isotopic composition of the Çaltı Pluton reveal that a heterogeneous magma source formed the magma of the studied rocks.