

Feldspars in plutonic suites from northeastern Egypt and implications for orogenic and anorogenic magma evolution

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Data on feldspars in orogenic to anorogenic felsic plutonic complexes from northeastern Egypt show that the composition of K-feldspars ranges from Or91-96 in the granodiorite-adamellite orogenic suite, Or95-99 in the leucogranite, Or93-99 in the peralkaline anorogenic granites, and Or90-100 in the metasomatized granite. Results of XRD analysis indicate the prominence of low albite in these units: data points of peralkaline and metasomatized granites plot close to end-member pure albite that was adjusted to An0 during subsolidus re-equilibration, but most specimens depart somewhat from complete Al-Si order. The structural state of feldspars reflects that the granodiorite-adamellite suite contains orthoclase, whereas samples from the leucogranite are represented by low microcline. K-feldspar from the peralkaline granite main pluton is imperfectly ordered low microcline (the average value of Al in the t1O position is 0.89); values of NOr of the microcline, in the range 93.2-98.5%, indicate a range of closure temperatures between 400- and 150-C. Chilling or rapid cooling of the peralkaline granites roof facies resulted in a highly disordered K-feldspar in this unit; the K-feldspar has equilibrated to a low temperature, within the field of stability of microcline. End-member KAlSi3O8 in the metasomatized granite provides evidence of a closure temperature near 150-C. The prominence of low albite and low microcline suggests the presence of post-magmatic alkaline fluids promoting Al-Si ordering in the feldspars. The intrusion of the peralkaline granitic pluton (the youngest igneous complex in the region) cannot have been accompanied by a regional reheating, and its contact effects evidently were localized. The nature of feldspars was controlled, in part, by various physiochemical conditions prevailed during the crystallization of dry anorogenic-, versus wet orogenic magmas.