Abstract The Humr Akarim and Humrat Mukbid plutons, in the central Eastern Desert of Egypt, are late Neoproterozoic post-collisional alkaline A-type granites. Humr Akarim and Humrat Mukbid plutonic rocks consist of subsolvus alkali granites and a subordinate roof facies of albite granite, which hosts greisen and Sn–Mo-mineralized quartz veins; textural and field evidence strongly suggest the presence of late magmatic F-rich fluids. The granites are Si-alkali rich, Mg–Ca–Ti poor with high Rb/Sr (20–123), and low K/Rb (27–65). They are enriched in high field strength elements (e.g., Nb, Ta, Zr, Y, U, Th) and heavy rare earth elements ($La_n/Yb_n = 0.27–0.95$) and exhibit significant tetrad effects in REE patterns. These geochemical attributes indicate that granite trace element distribution was controlled by crystal fractionation as well as interaction with fluorine-rich magmatic fluids. U–Pb SHRIMP zircon dating indicates an age of ~630–620 Ma but with abundant evidence that zircons were affected by late corrosive fluids (e.g., discordance, high common Pb). εNd at 620 Ma ranges from +3.4 to +6.8 (mean = +5.0) for Humr Akarim granitic rocks and from +4.8 to +7.5 (mean = +5.8) for Humrat Mukbid granitic rocks. Some slightly older zircons (~740 Ma, 703 Ma) may have been inherited from older granites in the region. Our U–Pb zircon data and Nd isotope results indicate a juvenile magma source of Neoproterozoic age like that responsible for forming most other ANS crust and refute previous conclusions that pre-Neoproterozoic continental crust was involved in the generation of the studied granites.

Keywords U–Pb zircon dating · A-type granite · Neoproterozoic · Nd isotopes · Arabian-Nubian Shield