

Archean to Proterozoic hard rock geochemistry: a refined database

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Archean to Proterozoic hard rock geochemistry: a refined database

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Due to the improved analytical techniques and construction of integrative geochemical databases in recent decades, statistical analysis and data mining of the growing data open an avenue to reveal the secular evolution of the crust and mantle. However, unintendedly erroneous compilation results in some mistakes of the raw data, especially for age information, which significantly reduces the credibility of time-series analysis. In this study, we have first checked age and geochemical data of ~13,000 Archean to early Proterozoic igneous samples from the EarthChem repository, where nearly 70% of the mean age of Archean samples was set to be 3.175 billion years ago (Ga), with two standard deviations (2σ) of 6.75 Ga. Such a considerable uncertainty will definitely deliver to the data statistics and impact geological interpretations. We have refined the data according to its original publications to get a high-quality geochemical dataset, particularly for geochronological information. Here we show a systematic change of mean La/Yb, Sm/Nd, Sr, and P₂O₅ of continental mafic rocks at ~2.8-2.7 Ga rather than 2.5 Ga, subsequently indicating a profound change of crust-mantle during this interval. Accordingly, this thoroughly refined geochemical dataset with more accurate ages provides higher time-resolution in revealing important evolutionary events for future studies, such as crustal composition change and exposed history of continents, etc.