

Akilia - earliest life and its abode?

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Continuing debates concerning amphibolite-granulite facies Eoarchaean rocks from Akilia (SW Greenland) are to establish what is reliable evidence for the start and extent of Earth's sedimentary (oceanic) and life record.

We interpret siliceous, iron-rich rocks interlayered with amphibolites and ultramafic rocks on Akilia to contain (variably metasomatised) chemical sediments [1]. Contrary to this [2], all the Akilia siliceous rocks were interpreted as metasomatised mafic rocks, with no sediments present. We show that our original (1991) Akilia sample G91/26 from a magnetite-bearing layer with 27 wt% FeO has the same REE+Y trace element pattern as ca. 3.7 Ga undisputed banded iron formation from Isua [2] and Phanerozoic sediments deposited from seawater. Thus ancient (chemical) sedimentary rocks are present on Akilia and are a potential habitat for early life.

¹³C-depleted signals from Akilia G91/26 apatites (UCLA ion-probe) were attributed to graphite inclusions [3]. The C was interpreted to have been trapped in the apatites prior to metamorphism, and the ¹³C-depleted signals were used as evidence for ancient life [3]. Neither us nor others [4] can find what were reported [3] to be "frequent" graphite inclusions (sensu stricto) in these apatites. Where is the C associated with the apatites? IR-spectroscopy of Akilia apatites shows the presence of carbonate substituting for phosphate, which may explain the C-signal. Furthermore, Akilia G91/26 apatites are depleted in HREE, compared with those in (lower grade) Isua banded iron formation, despite the Akilia and Isua rocks showing similar whole rock REE patterns. This suggests the Akilia G91/26 apatites grew and equilibrated with garnet during metamorphism. Clearly the apatite C-inclusion proposed evidence for ancient life in Akilia sample G91/26 requires further scrutiny.

References

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