

# What's Wrong with Deep Time Geology?

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One explanation for the broad range of views of what constitutes a philosophy of science is that there's no such thing. Geochemistry came of age ~60 years ago when it was popular to imagine that a definable "scientific method" separated what we do from other rational avenues of human endeavor. But geologists of that time lacked the intellectual infrastructure to prevent inspired speculations from ossifying into accepted wisdom. This is increasingly true as we look progressively further back in geologic time through a profoundly incomplete rock record strewn with preservation biases. Several features stand out in the dozen or so papers published since the beginning of the plate tectonic era that sought to portray Earth's first half-billion year evolution, including the stature of the authors, their seeming confidence in opinions for which little evidence then existed or has since arisen, and that not one of them imagined a role for mobile lid tectonics in that eon. Over the past 20 years, evidence from lithic fragments as old as nearly 4.4 Ga have suggested that our planet supported Hadean oceans, life, continents, and plate boundary interactions. Thus it's worth asking how essentially unconstrained speculations become cemented into community conventions and how this process could represent a 'scientific method'. Although the limitations imposed by the biased and fragmentary rock record might have been ameliorated by a greater emphasis on multiple working hypotheses, a community practice tailored to the paucity and type of evidence available is needed to prevent future lapses into Deep Time groupthink. Specifically, the importance of minimalism – giving weight to simpler models that are more easily refutable – suggests that the base level tectonic evolution model (the null to be disproved before more complex models are invoked) is continuous plate tectonics since global silicate differentiation. A community-derived, ethically sound approach would help balance the sometimes rival competitive and cooperative aspects of scientific research and provide a more uniform and satisfactory style of communication to the general public than, say, presently encouraged by weekly, international science publications.