

Testing of the Contemporaneous Degassing Rate of ^{40}Ar Over the Last 450 Million Years Using Coral and Brachiopod Archives

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Argon in the atmosphere is primarily derived from the degassing of radiogenic ^{40}Ar of the solid Earth, but the deep-time history of ^{40}Ar is based on limited observations. The rate of degassing was found to be 0.006%/Ma by Bender et al. (2008), but it is necessary to refine our knowledge of the contemporary degassing rate. Precise measurement of ^{40}Ar is of interest due to its capability to be measured in order to attribute an age to an unknown sample. In this study, we use an archive of carbonates, namely coral and brachiopod modern and fossil samples, to construct a record of $^{40}\text{Ar}/^{36}\text{Ar}$ as far back as 450 Myr, and to refine the methods of this measurement and make precise measurements. Results show that sample carbonates show promise as archives of atmospheric Ar, with only modest corrections required. Comparing the degassing rate calculated by these samples is of interest in this study, as it may be compared to previous studies and is done with more precise instrumentation.