Geophysical Research Abstracts
Vol. 12, EGU2010-7301-1, 2010
EGU General Assembly 2010

New frontiers in coral geochronology: advancing the state of the art

William G. Thompson
Woods Hole Oceanographic Institution Woods Hole, MA, USA (wthompson@whoi.edu)

New developments in mass spectrometry and a better understanding of open-system processes are ushering in a new era of precision and accuracy in coral geochronology. An effort is underway to develop a uniform set of reference materials and reporting standards to assure age comparability between laboratories and eliminate inter-laboratory and age interpretation biases.

PALSEA is a PAGES/IMAGES working group that aims to extract information about ice sheet response to temperature change by examining the history of sea during past interglacials. As reef-building corals are one of the primary archives of past sea levels, the U-series coral dating community is well represented in this group. During workshop discussions, it became clear that further progress on the sea level problem requires engaging the coral dating community in a cooperative standardization effort.

Improvements in analytical precision continue to extend the potential precision and range of the U-Th chronometer. As a result, assuring comparability of ages reported by different labs becomes a crucial issue. Ideally, all measurements should be traceable to the same set of reference standards. Unfortunately, internationally recognized standards are not currently available. A widely used U/Th uraninite standard, HU-1, is no longer be suitable, as different aliquots have different isotope ratios and the assumption of radioactive equilibrium no longer appears valid when measured at current levels of precision. The time is ripe for the development of new reference standards. A strategy for their production and distribution has been initiated in collaboration with the NERC Isotope Geosciences Laboratory, UK, and drawing on the experiences of the EARTHTIME initiative (http://www.earth-time.org).

Quaternary sea level data is presently scattered across the scientific literature with widely varying reporting formats, screening and correction criteria, and decay constants. Stratigraphic information is often incomplete, and elevations are not tied to consistent benchmarks. It would be highly desirable to compile existing data in a uniform format that can be made available to the wider community, and to adopt a uniform set of standards for future data reporting. While best practices for sample screening and/or age correction are still keenly debated, reported ages depend heavily on assumptions about the $^{234}U/^{238}U$ history of seawater over the last 800 thousand years. A standard history of ocean $^{234}U/^{238}U$ for quality and correction criteria, with associated error estimates, would make ages reported by different labs more directly comparable. Data reduction and archiving software has been developed as part of the EARTHTIME project, and discussions are underway to adapt this software for the U-Th chronometer. Standardized reporting through data reduction and databasing software has great potential to make U-series dating of coral sea-level indicators more useful and accessible to the wider paleoclimate community.