Magnesium Isotope Analysis of Biogenic Carbonates. Rodney Ballard[1] and Johnnie Chamberlin[2],University of Arkansas at Pine Bluff[1], University of Arkansas[2], Department.of Geosciences

Introduction: Stable isotopes, such as δ13C and δ18O, coral, sclerosponges, and lake marine sediments as proxies for temperatures, light intensity, vegetation type, precipitation, growth rates, and glacial volumes. Biogenic carbonates are made or precipitated by biological organisms in the form of aragonite, dolomite, calcite, and magnesium carbonates. Due to concerns about climate change and a scarcity of historical data there is a need for a more long- term observation of climate. The most recent isotope of interest is the prominent magnesium isotope, which is present in biogenic marine calcium carbonate, with magnesium carbonate abundances up to 30%mol. Hopefully through the analysis of magnesium isotopes in coral, we will be able to give an account of dependable paleoclimate(climate of the past) data in order to predict the climate of the future.

Methodology:

While still under development, our preliminary methods for analyzing magnesium isotopes are: 20mg of powdered and homogenized sample is weighed and placed in clean sample vial. 2ml of 0.6M hydrochloric acid is then added to the sample to remove much of the carbon and oxygen. After roughly fifteen minutes, when the sample has dissolved completely, it is placed on a hot plate to dry. Once dry, the sample is then resuspended in distilled hydrochloric acid and run through a cation exchange resin column twice to separate magnesium from calcium and other constituents. The pure magnesium sample is dried and resuspended before being analyzed by the MC-ICP-MS(Multicollector-Inductively Coupled Plasma-Mass Spectrometer).

Results: Due to the inconsistencies of the MC-ICP-MS, we were unable to get data from the samples we collected through the columns. If we were able to yield data, we may have seen that the magnesium isotopes can be a more efficient determinate of paleoclimate in coral.

Conclusion: Environmental proxies based on isotopes in biogenic carbonates are useful in building a climate history of the Earth. These records are important for predicting future changes in climate, examining impacts of human activity, and predicting future climate impacts on sea level, water availability, food production, and species survival.

Future Research and Acknowledgements:

Our efforts of investigating isotopes that give us a good prediction of past climate will continue. We will eventually analyze more isotopes that are found in coral, sclerosponges, etc. We gratefully acknowledge the National Science Foundation for sponsoring this work under grant.No 1157002. We would also recognize NASA for the sponsorship as well.

References:

Cerling, T. E., Harris, J. M., Macfadden, B. J., Leakey, M. G., Quadek, J., Eisenmann, V., & Ehleringer,
J. R., 1997. Global vegetation change through the Miocene / Pliocene boundary. *Nature*, 153-158.

Chamberlin, Johnnie 2012. A review of stable isotope review in biogenic carbonates.

Deng, W., Wei, G., Li, X., Yu, K., Zhao, J., Sun, W., Liu, Y., 2009. Paleoprecipitation record from coral
Sr / Ca and δ18O during the mid Holocene in the northern South China Sea. *The Holocene*, *6*,
811-821.

Eakin, C., Grottoli, A. 2006. Chapter 2. Coral Reef Records of Past Climatic Change. *Coral Reefs*, 33-
54.

Emiliani, C., 1955. Pleistocene temperatures. Journal of Geology 63, 538-578.

Eiler, J. M., 2007. "Clumped-isotope" geochemistry—The study of naturally-occurring, multiplysubstituted
isotopologues. *Earth and Planetary Science Letters*, *262*(3-4), 309-327.

Grottoli, A. G., 2006. Monthly resolved stable oxygen isotope record in a Palauan sclerosponge
Acanthocheatetes wellsi for the period of 1977-2001. *In Situ*, *579*, 572-579.

Grottoli, A. G., Eakin, C. M., 2007. A review of modern coral δ18O and Δ14C proxy records. *Earth-
Science Reviews*, *81*(1-2), 67-91.