

Data Management Plan

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Institution: Woods Hole Oceanographic Institution

Project Title: Temperature and variability of the Atlantic Warm Pool during and since the Little Ice Age

NSF Program: P2C2

1. Products of research

Data to be generated: Coral skeletal Sr/Ca, U/Ca and growth and calcification rates at sub-seasonal resolution. We will simultaneously collect Mg/Ca, Li/Ca, B/Ca and Ba/Ca. Data will be generated using a benchtop quadrupole Thermo Fisher Scientific iCAPq ICP-MS housed at WHOI. Samples will be introduced to the iCAP using a New Wave Research UP 193 nm eximer laser ablation sampling device. We expect to generate ~15000 raw measurements. One Excel spreadsheet with two tabs will be submitted for each coral core that used either for our calibration (see below) or for our downcore reconstructions. One tab will include all raw data vs coral core depth and band-age, and the other average coral depth and band-age, Sr-U values, and Sr-U-based SST estimates and errors. We estimate 4-5 spreadsheets will be submitted. We estimate storage needs will be less than 200 Mbytes.

Existing data and samples: Existing data Caribbean corals were used to develop our calibration. These data are included in an *in preparation* manuscript and will be submitted to WDC-Paleoclimatology when the manuscript is published, or within two years of its generation, whichever occurs first. A link to the url at WDC housing these data will be provided in the files containing the submission of new data. Data will be generated on three coral cores already scanned and archived at WHOI. Data will be generated on at least one new core, which will be collected and CT-scanned.

2. Data and metadata formats and standards

File formats: All data will be provided in Microsoft Excel, .xlsx and .csv files.

Quality control and assurance: Quality flags will denote bad or suspicious data. Analytical procedures and precision on consistency standards will be documented.

Metadata and data standards: The World Data Service for Paleoclimatology will provide data archiving, access services, and long-term preservation for our project. WDS-Paleo is a member of the World Data System, archiving all forms of paleoclimate data and following international data and metadata standards. We will describe our data in accordance with WDS-Paleo standards using the existing WDS-Paleo data submission template and processes detailed at: <https://www.ncdc.noaa.gov/data-access/paleoclimatology-data/contributing>. The template tracks metadata including investigators, site information, funding agency, associated

publications, chronology information, and variable information.

We will provide complete metadata on all variables measured using the WDS-Paleo standardized variable vocabularies. We will also provide the source identifiers (e.g. WDS-Paleo study identifiers, DOIs, etc.) for pre-existing data utilized in our research product. Ingest of the data submission template by the WDS-Paleo will create metadata that are in compliance with ISO 19115, NASA DIF, and other standards.

Responsible personnel: A. Cohen will be responsible for data storage and archiving.

3. Access and policies for data reuse

Data accessibility: The most likely users of our data are other investigators developing calibrations, and investigating climate of the last millennium, including modelers simulating forced climate change of the last millennium. This project will submit data files and documentation to WDS-Paleo. Following data ingest and public release, WDS-Paleo provides datasets through their website and associated web services. These datasets are then discoverable and accessible through multiple searches based on site information, authors and contributors, proxy and reconstruction types, scientific keywords, and other metadata elements.

Policies for data reuse: There will be no restrictions on the use of data and products created by this project provided that the data product is cited. WDS-Paleo offers a recommended formal citation and assigns a persistent identifier to all submitted data set(s).

Release date for products: All data and models produced with support from the NSF will be submitted the earlier of the following two dates: within 2 years of generation or upon publication.

Plans for long-term archiving and preservation of access

Long-term data repository: The WDS-Paleo is a long-term archive sanctioned by the International Council for Science - World Data System (ICSU-WDS). ICSU-WDS principles include open data sharing, data and service quality, and data preservation. The WDS-Paleo archives metadata and data submissions in non-proprietary formats and has a formal agreement with NOAA's National Centers for Environmental Information for long-term archiving. Data products will be submitted in accordance with the WDS-Paleo guidelines (described in section 2) thus facilitating preservation and sharing of data.

Products to be submitted to WDS-Paleo: Records and compilations of documented elemental ratio (Sr/Ca, U/Ca), Sr-U, and SST and error estimates will be submitted to WDS-Paleo. To our knowledge the Excel files we submit do not need transformation for preservation and data sharing.

- 1) Calibration and verification chronologies
 - Puerto Rico, Pinacles Reef,
 - Martinique, Grande Cai
 - Yucatan, Jardin A, Puerto Morales Reef Park
 - Yucatan, Jardin C, Puerto Morales Reef Park

- 2) Pre-instrumental records
 - Bahamas, Gingerbreads Shoals
 - U. S. Virgin Islands, Hans Lollick Island
 - Yucatan, Jardin A, Puerto Morales Reef Park
 - Yucatan Punta Maroma - corals to be collected