**Data Management Plan**

**Expected Data Products**

1. *P. zelandica* ring width chronologies and δ18O from 4 distinct sites
2. A multi-proxy New Zealand SST reconstruction spanning the past 300 years
3. A multivariate reconstruction of the Interdecadal Pacific Oscillation (IPO) index

***P. zelandica* proxy records** – Four growth increment chronologies will be developed from live-collected geoduck at 4 distinct collection sites. The original and detrended measurements will both be maintained. These chronologies are expected to be sensitive to ambient water temperature. They will be distributed in rwl format. The crossdated shells will also be sampled for δ18O, which is also expected to serve as a proxy of water temperature. This data will be distributed in comma-separated-values (csv) format. This collection of proxy records will be uploaded to the NOAA National Centers for Environmental Information (NCEI, formerly NCDC) paleoclimate archive at <https://www.ncdc.noaa.gov/data-access/paleoclimatology-data>, available in both the csv/rwl formats and the standard NOAA text format. This dataset will constitute the first paleoclimate archive from *P. zelandica* and allow for further research into new potential uses.

**New Zealand SST reconstruction** – This reconstruction will be derived from extending one *P. zelandica* record with dead-collected geoduck samples. The collection is likely to result in a discontinuous record, with continuous coverage for ~3 centuries and intermittent data at earlier times. The early, discontinuous portion of the record will provide valuable snapshots of SST range and variability, dated with radiocarbon. The multi-proxy reconstruction will be developed from a ring-width chronology and annual δ18O data. All these data will be formatted into a standard paleoclimate data format, the Linked PaleoData format (LiPD; Emile-Geay and McKay, 2016; McKay and Emile-Geay, 2016), to facilitate analysis and intercomparison by the paleoclimate community. LiPD is a flexible format which allows for the storage of both data and metadata, and code is being developed in R, python, and Matlab for use with LiPD data, so considerable analysis of these records will be possible with little additional effort. This collection of proxy records will be uploaded to the NOAA National Centers for Environmental Information (NCEI, formerly NCDC) paleoclimate archive at <https://www.ncdc.noaa.gov/data-access/paleoclimatology-data>, available in both the LiPD format and the standard NOAA text format. This dataset will provide a valuable resource for the paleoclimate community, facilitating future research and encouraging novel paleoclimate exploration.

***IPO* reconstruction** – The IPO will be reconstructed by three independent reconstructions of SST anomalies in regions of interest which are described in the project description. The three regional reconstructions, as well as the overall IPO index will be made available in LiPD and NOAA formats in the NCEI archive.

Emile-Geay, J., and Mckay, N. P. (2016). Paleoclimate data standards. *PAGES MAGAZiNE*, *24*(1), 47. Retrieved from http://pastglobalchanges.org/download/docs/magazine/2016-1/PAGESmagazine\_2016(1)\_47\_Emile-Geay.pdf

McKay, N. P., and Emile-Geay, J. (2016). Technical note: The Linked Paleo Data framework - A common tongue for paleoclimatology. *Climate of the Past*, *12*(4), 1093–1100. https://doi.org/10.5194/cp-12-1093-2016

A large collection of Holocene proxy records will be curated and standardized throughout this research project. These proxy archives—including lake and marine cores, tree rings, ice cores, and more—are largely temperature or moisture sensitive and will be accompanied by rich metadata to facilitate interpretation. They will be formatted into a standard paleoclimate data format, the Linked PaleoData format (LiPD; Emile-Geay and McKay, 2016; McKay and Emile-Geay, 2016), to facilitate analysis and intercomparison by the paleoclimate community. LiPD is a flexible format which allows for the storage of both data and metadata, and code is being developed in R, python, and Matlab for use with LiPD data, so considerable analysis of these records will be possible with little additional effort. This collection of proxy records will be uploaded to the NOAA National Centers for Environmental Information (NCEI, formerly NCDC) paleoclimate archive at <https://www.ncdc.noaa.gov/data-access/paleoclimatology-data>, available in both the LiPD format and the standard NOAA text format. This readily-accessible database of Holocene proxy records in a standard format will be a valuable resource to the broader paleoclimate community, facilitating scientific discovery and eliminating the need for time-intensive proxy data gathering by other research groups.

As described in the project description, data assimilation will be employed to create a physically robust multi-proxy reconstruction of climate changes over the past 10,000 years. This reconstruction will include surface air temperature, sea surface temperature, precipitation, and a variety of other climate quantities at annual resolution on a regularly-spaced globally-complete grid. The data will be stored in NetCDF format, a standard format for gridded climate data, enabling analysis by the wider paleoclimate community. As with the Holocene proxy database, the Holocene Reconstruction will be uploaded to the NOAA NCEI paleoclimate archive, as a long term archive and freely available for use in paleoclimate research. In addition to this well-documented Holocene Reconstruction, the data assimilation code used to create the reconstruction will be made available through GitHub. As more proxy records are acquired, new proxy system models are developed, or new model priors are completed, the data assimilation code can be run to produce updated results. Also, research groups will be able to run sensitivity experiments where specific factors are changed to further investigate the data or the data assimilation methodology.