CoralHydro2k

PAGES 2k Network Phase 3

Tropical ocean hydroclimate and temperature from coral archives

- Spatiotemporal **seawater $\delta^{18}O$ changes** of **tropical ocean** from **paired coral Sr/Ca and $\delta^{18}O$** records
- ***PAGES Hydro2k Consortium*** (*Clim. Past, 2017*) **compilation**
- **New analyses** provide **5 new coral seawater $\delta^{18}O$ reconstructions** (3 back into Little Ice Age)
- **CoralHydro2k session** at **EGU 2018** (Vienna) - 32 abstracts!
- **CoralHydro2k** side **meeting 2019** at 13th ICP (Sydney)

CoralHydro2k

PAGES 2k Network Phase 3

CoralHydro2k

PAGES 2k Network Phase 3

Introduction I

- PAGES Ocean2k has used available coral records to reconstruct tropical sea surface temperature for the past centuries at annual resolution
- Most records were based on $\delta^{18}O$ that reflects a combination of both the temperature and the $\delta^{18}O$ of the seawater ($\delta^{18}O_{sw}$) near the ocean surface
- The coral Sr/Ca temperature proxy has the potential to decouple the temperature and $\delta^{18}O_{sw}$ signals from coral $\delta^{18}O$ records to deliver reconstructions of $\delta^{18}O_{sw}$, but only a handful of centuries-long $\delta^{18}O_{sw}$ reconstructions exist

CoralHydro2k

PAGES 2k Network Phase 3

Introduction II

- CoralHydro2k intends to foster the generation of new paired coral Sr/Ca and $\delta^{18}O$ records as well as the dynamical interpretation of available records
- Reconstruct the spatiotemporal $\delta^{18}O_{sw}$ changes of the tropical surface ocean on seasonal, interannual, decadal to multidecadal time scales back into the Little Ice Age
- Combine $\delta^{18}O_{sw}$ reconstructions with simulations of water isotope enabled coupled AOGCMs
- Identify the dynamical drivers of $\delta^{18}O_{sw}$ changes on these timescales

CoralHydro2k

PAGES 2k Network Phase 3

Introduction III

- Resolve natural versus anthropogenic trends in the global hydrological cycle
- Resolve linkages between the marine hydrological cycle and the terrestrial hydrological cycle

CoralHydro2k

PAGES 2k Network Phase 3

Status I

- We will take the coral $\delta^{18}O_{sw}$ reconstructions compiled by *PAGES Hydro2k Consortium* (*Clim. Past, 2017*) as starting point for investigations of hydroclimate and temperature (trends, variability, spatial pattern)
- We will add new coral $\delta^{18}O_{sw}$ reconstructions to dataset (e.g., Hennekam, Zinke et al., 2018: E. Indian Oc. ->1808)

CoralHydro2k

PAGES 2k Network Phase 3

Status II

- New analyses on published records provide
  - 2 new coral $\delta^{18}O_{sw}$ reconstructions back into the Little Ice Age
    - Northern Red Sea: ->1750 (Felis, MARUM U Bremen)
    - Southwestern Pacific: ->1650 (DeLong, Louisiana State)
  - 2 new coral $\delta^{18}O_{sw}$ reconstructions back to the early 20th/late 19th century
    - Western Indian Ocean: ->1910 (Pfeiffer, RWTH Aachen U)
    - Central Indian Ocean: ->1880 (Pfeiffer, RWTH Aachen U)

CoralHydro2k

PAGES 2k Network Phase 3

Status III

- CoralHydro2k session at EGU 2018 (April, Vienna/Austria)
  - 32 abstract submissions!
- CoralHydro2k side meeting 2019
  at 13th International Conference on Paleoceanography
  (1 September 2019, Sydney/Australia) – Save the date!

Options to contribute

- Need more paired coral Sr/Ca and $\delta^{18}O$ records extending back into the Little Ice Age
- Need people interested in statistical analyses of records