Workflow for creating virtual datasets and testing reconstruction approaches

1. Input
(“True” SST and $\delta^{18}O_w$ values in time domain)

- All virtual cases
  - artificial growth rate
  - measured SST
  - artificial SST
  - artificial $\delta^{18}O_w$
  - measured SSS
  - salinity mass balance

Subsampling based on artificial sampling resolutions

2. “True” SST and $\delta^{18}O_w$ values in sampling domain

- Convert SST and $\delta^{18}O_w$ data to carbonate $\delta^{18}O_c$ and $\Delta_{47}$ values based on empirical relationships in Kim and O’Neil (1997) and Bernasconi et al. (2018) and add analytical noise to simulate measurement

3. Artificial $\delta^{18}O_c$ and $\Delta_{47}$ records in sampling domain

4. Reconstructed SST and $\delta^{18}O_w$ values in time domain

- Apply reconstruction approaches on artificial datasets and group result in monthly time bins

5. Accuracy and precision of reconstructions of MAT, SST seasonality, mean annual $\delta^{18}O_w$ and $\delta^{18}O_w$ seasonality

- Compare reconstructed SST and $\delta^{18}O_w$ data with “true” values to calculate accuracy and precision for all cases and all reconstruction approaches