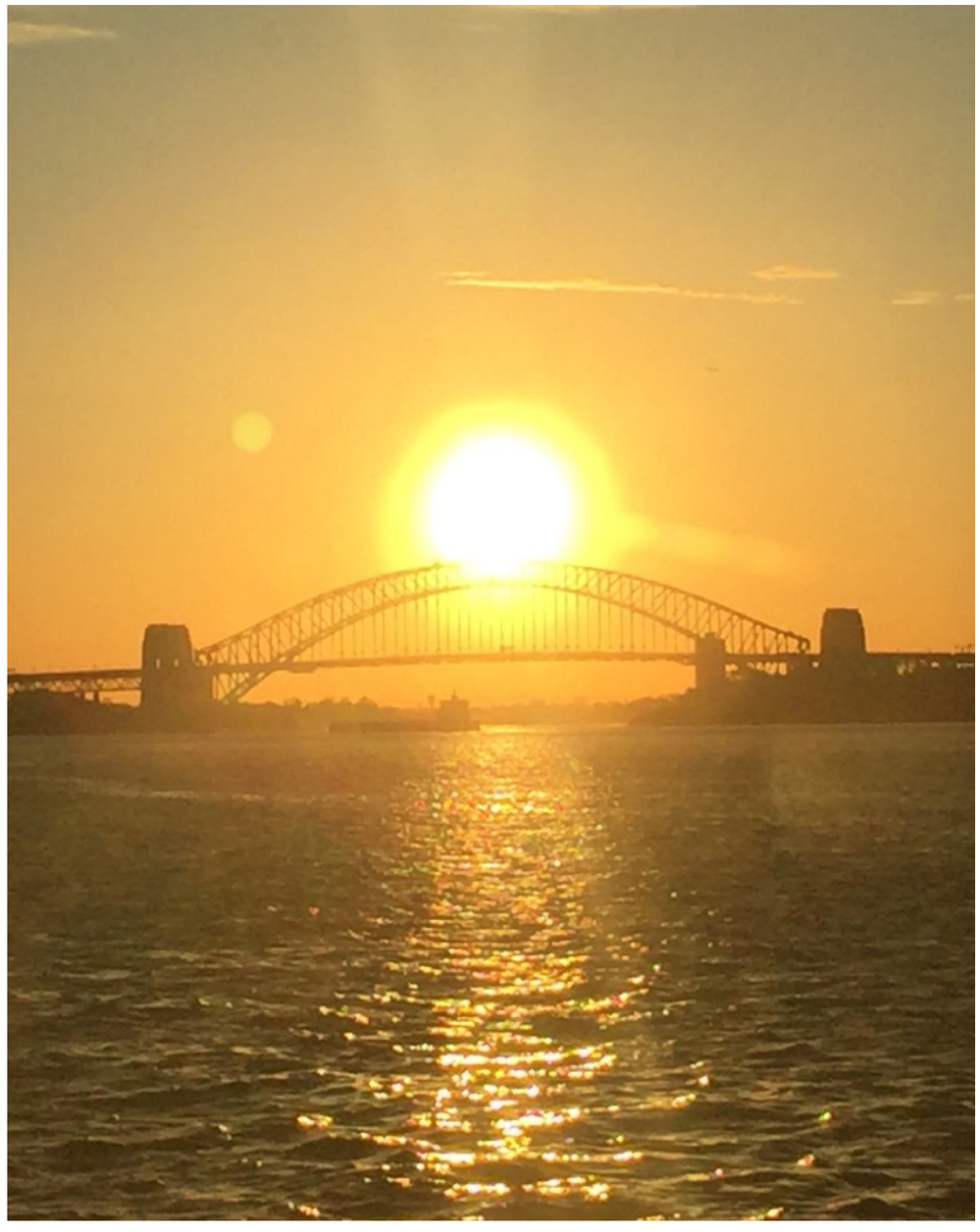
A Sun-Climate Data Institute?

An open source facility to enable better science

Could include:

- Inputs: Continuous updating of solar forcing datasets w/uncertainties
- Mechanisms: Library of codes/specs
- Targets: Continuous updates of relevant climate metrics (SSU, SBUV, BASIC, SAT, QBO, etc.)
- Archive of relevant derived data for model comparison to observations. Paleoclimate?
- Benchmarking of models to various (user-defined) targets.



Repository structure

- Setup GitHub repo for code/methods/documentation
  - folders for each area/sub-folders for code, data, notebooks
  - Readme on top and each directory (incl. CC0 license?)
  - intake routines for data (obs+model)
  - Diagnostic calculations
  - Some data (time series) (limits on size)
- Pull repo to working environment (Google CoLab, AWS, Pangeo, home computer, etc.)
- Edits pushed back to GitHub repo

Inputs to models

- Boundary conditions
  - Inputs4MIPs (to 2014)
  - SOLARIS-HEPPA
    - Ref-D1 1950-2020 https://solarisheppa.geomar.de/ccmi2022
    - TSI/SSI/F10.7/Ap/Kp/iprp/iprg/iprm
    - Emulator to continue?
- Time-series:
  - TSI, SSI reconstruction (NRLTSI2)
  - SEP
  - Volcanic forcing
  - GCRa
  - F10.7: F10.7 cm solar radio flux (?)

Derived data from models

- CMIP6: Draw from hist-vol, hist-sol, historical
  - ESGF/Pangeo
  - GISS models: https://portal.nccs.nasa.gov/datashare/giss_cmip6/
    - e.g. https://portal.nccs.nasa.gov/datashare/giss_cmip6/DAMIP/NASA-GISS/GISS-E2-2-G/hist-sol/r1i1p3f1/AERmon/toz/gn/v20210911/
  - CCMI: ref-d1/d2
  - Calculate SSU, MSU, correlations, volc-T, tropical profiles (T, Q, O3), toz
- ENSO, QBO, AO, NAO indices (pull from CVDP where possible https://www.cesm.ucar.edu/working_groups/CVC/cvdp/)
- Glb/NH/SH SAT

Targets/Observations

- Terminator unit conversion
- Satellite data (use pySat?)
  - SSU, MSU
  - SBUV, Basic, SWOOSH…
  - TIMED, MLS, etc….

Mechanisms

- Box models?

Benchmarking

- Climate diagnostics package focused on solar-related metrics - T, q, o3, dynamics, clouds etc.
- Use QBO, ENSO, MJO, NAO, AO, SAM diagnostics
- Taylor diagrams for specific targets?
- Correlations (different methods for dealing with volcanoes)