CHARA Remote Operations and Data Access

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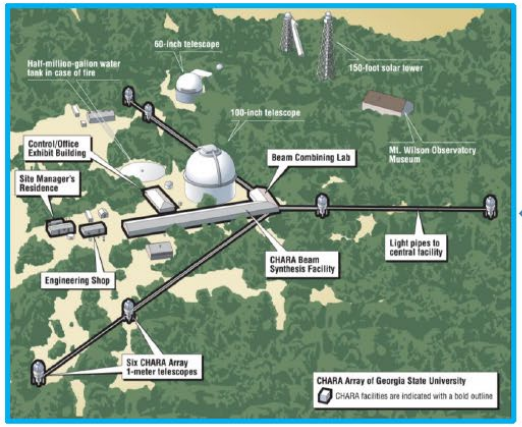
The CHARA Server

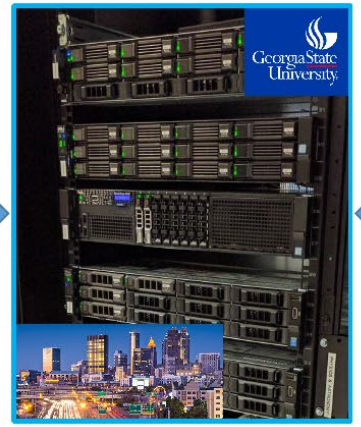
- Located at GSU Data Center
- 5 Virtual Machines:
  - Remote Observing
    - altair & novadel
  - Data Archive
  - Remote Data Reduction
  - Database Portal

Remote Observing

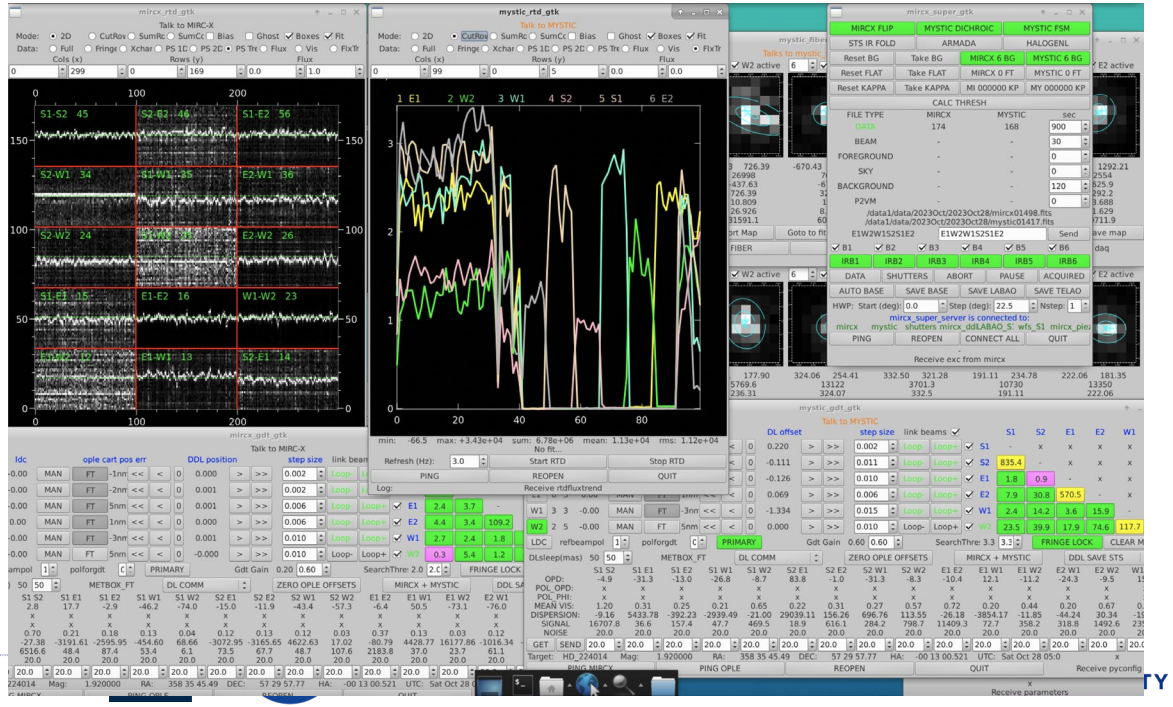
- Connect to Atlanta machine using VNC
- Atlanta machine connects to mountain using SSH tunnel
- CHARA software is the same as that on the mountain



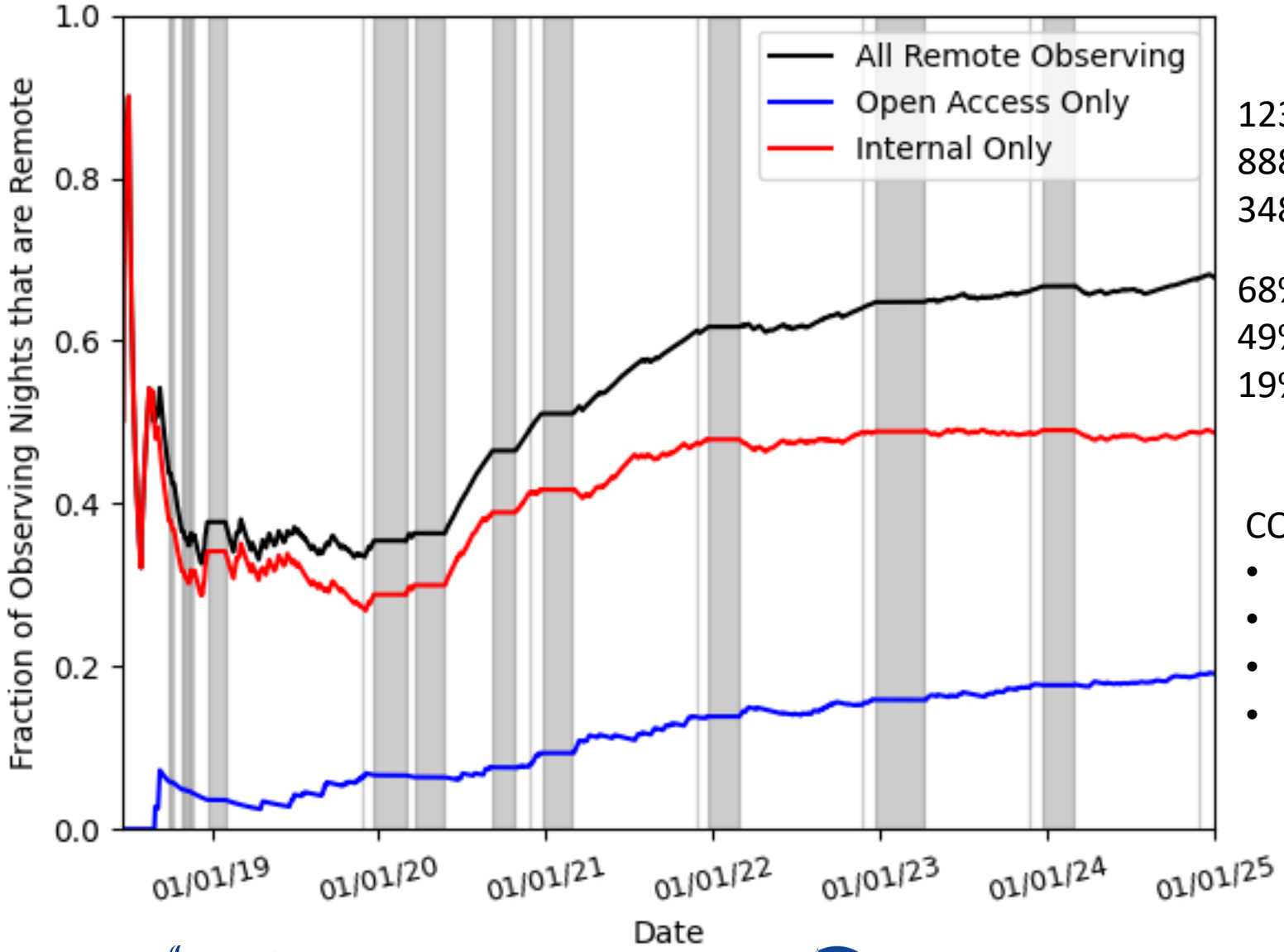
ssh tunnel



VNC



Remote Observing Stats



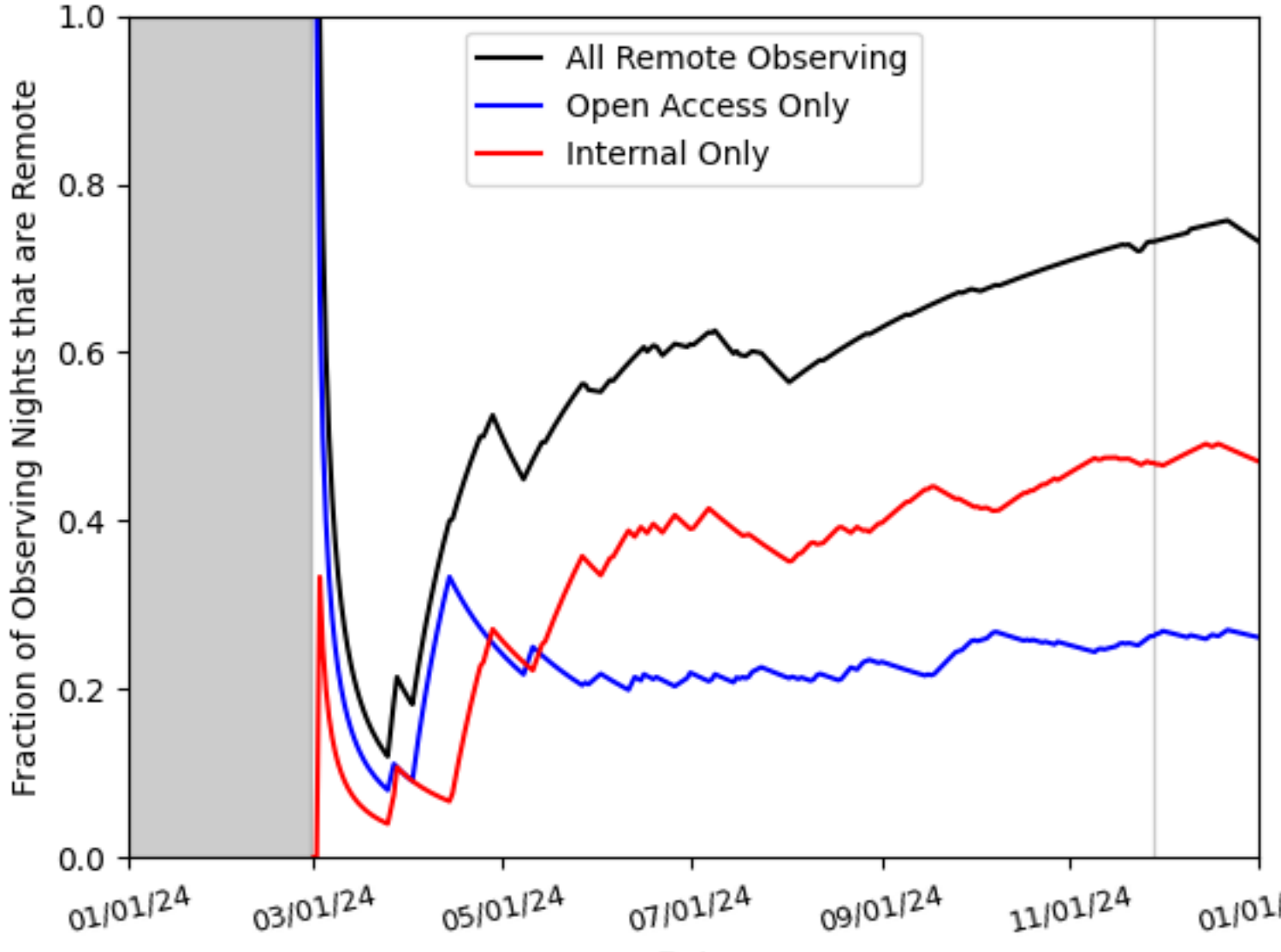
1237 Remote Nights
888.5 Internal
348.5 Open Access

68% Remote Nights
49% Internal+Remote
19% Open Access+Remote

CO2 emissions saved:

- ~274 tons
- ~1 month of a wind turbine
- ~58 gas cars driven for 1 year
- ~1.4 railcars of coal

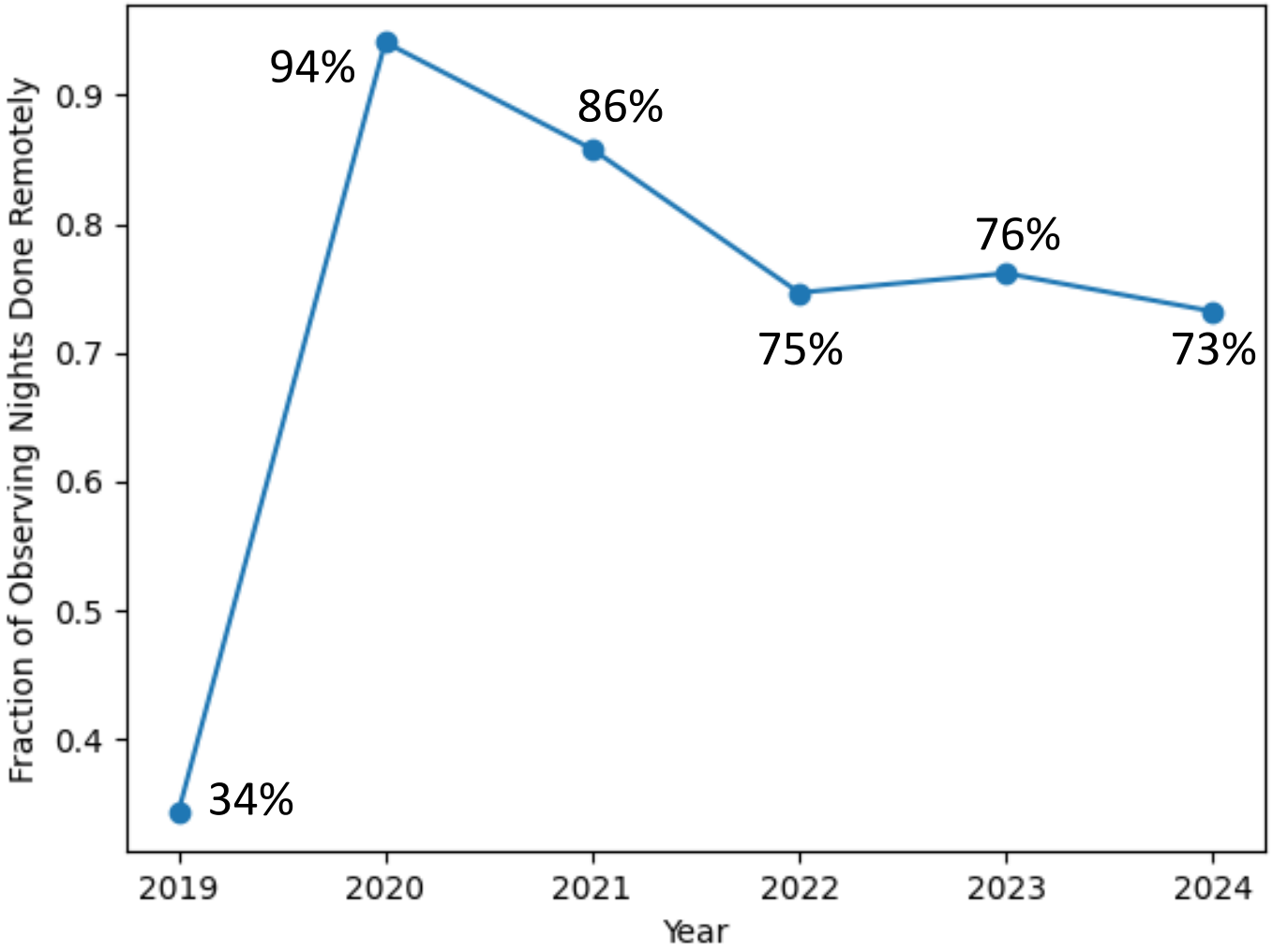
Remote Observing Stats (2024 Only)



224 Remote Nights
144 Internal
80 Open Access

73% Remote Nights
47% Internal+Remote
26% Open Access+Remote

Remote Observing Stats (2019 – 2024)



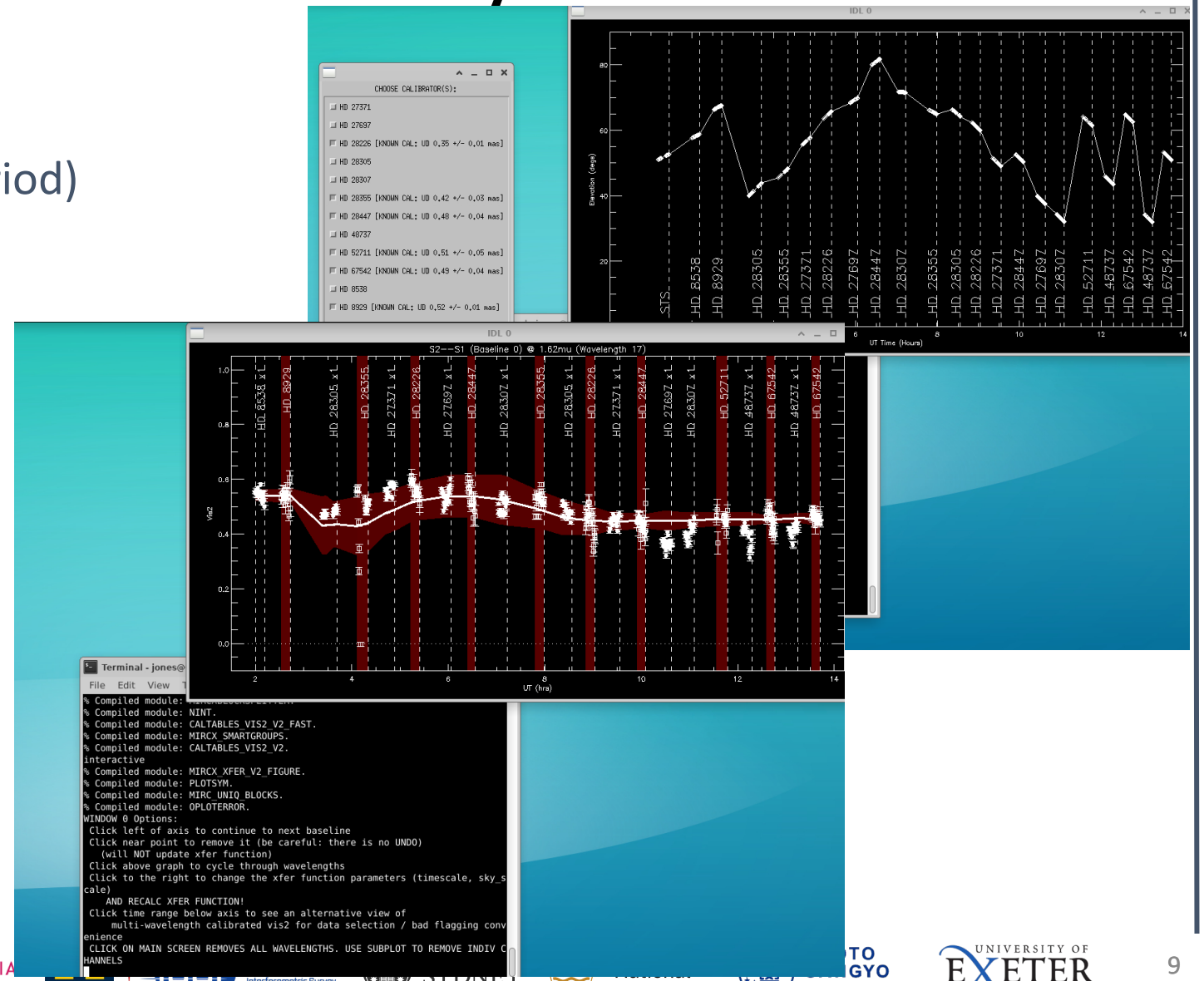
CHARA Atlanta Data Archive

CHARA Atlanta Data Archive

- New CHARA Server!
  - Old server no longer supported by Dell
  - Improved Stability
  - More space!
    - ~400 TB total space
  - Old server moving to CHARA

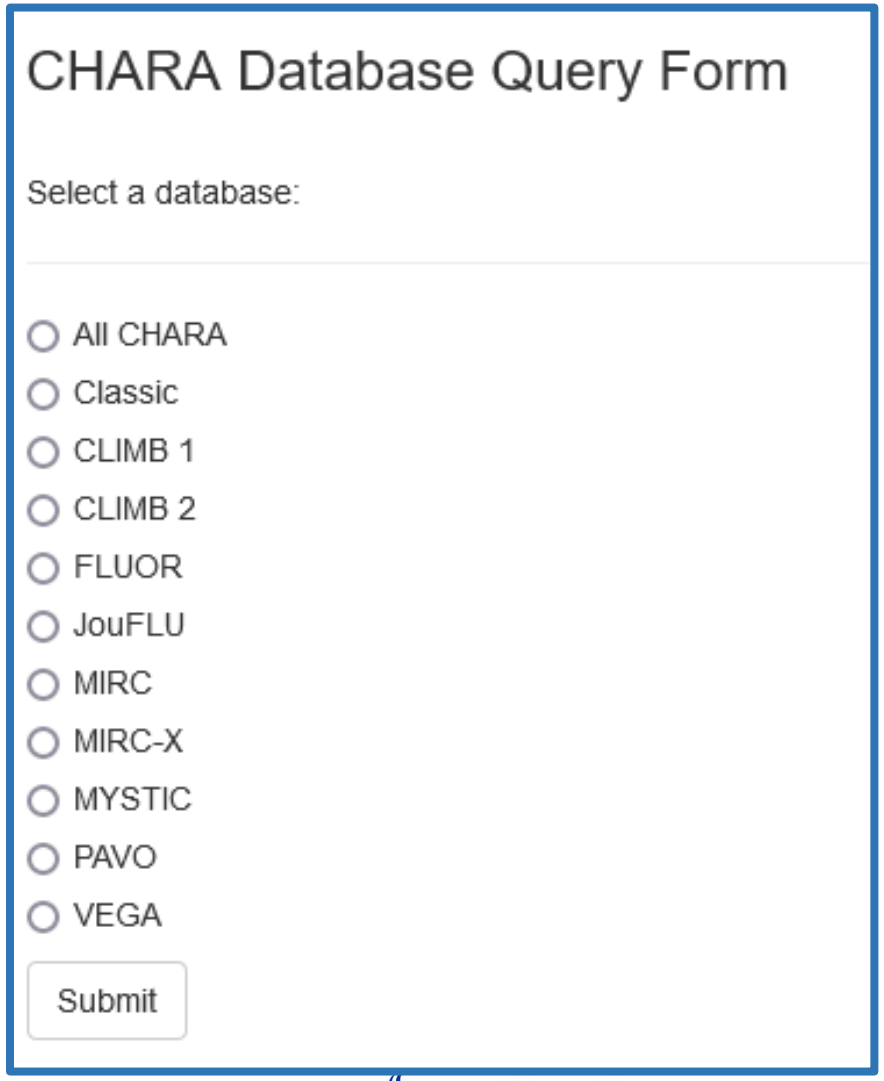
CHARA Data Policy

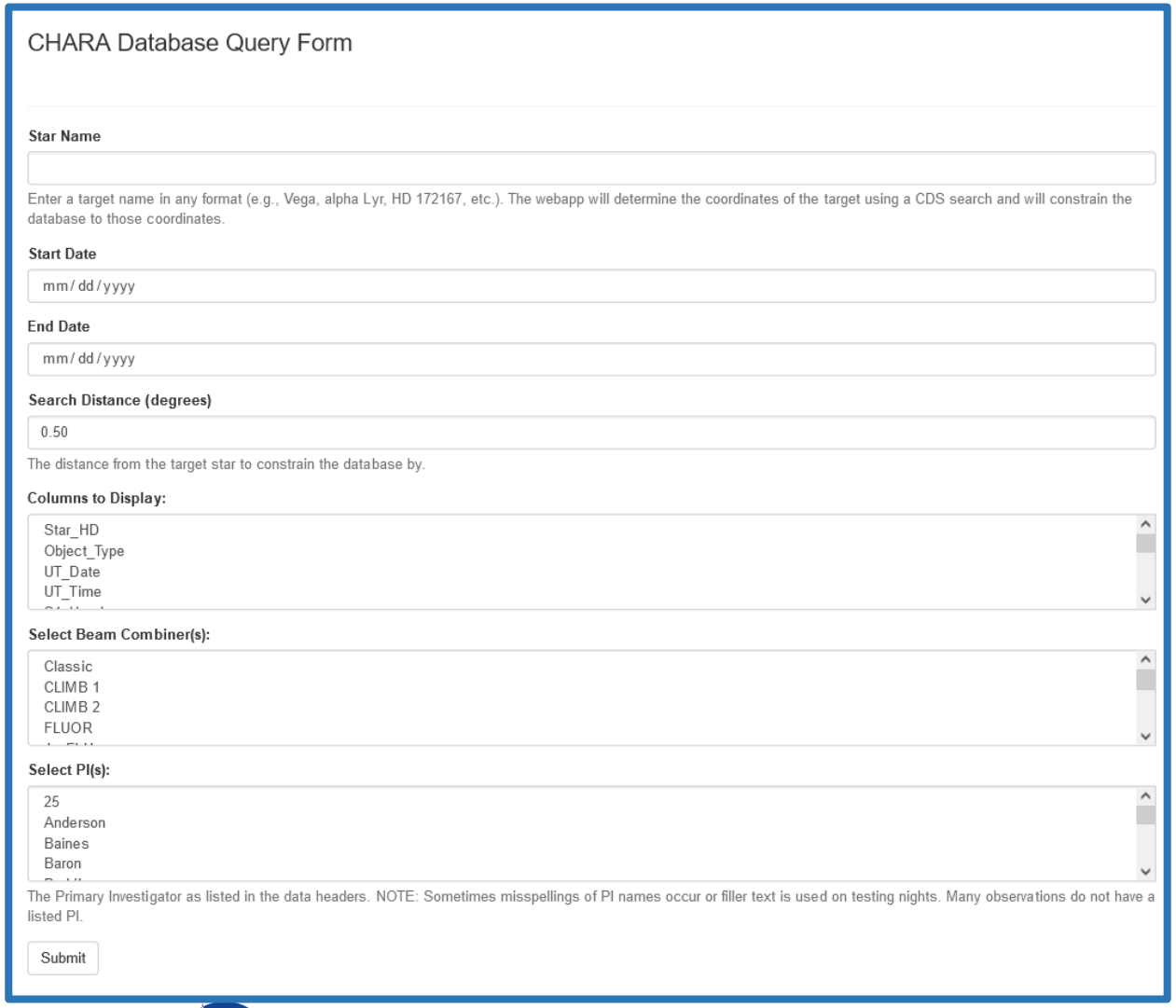
- All CHARA data are public EXCEPT:
  - New data (18-month proprietary period)
  - Student thesis data
  - Long-term survey data
- Data are accessible on the Remote Data Reduction Machine
- Even if data are public, you should still contact data PIs as a courtesy to see if they wish to be involved in the project



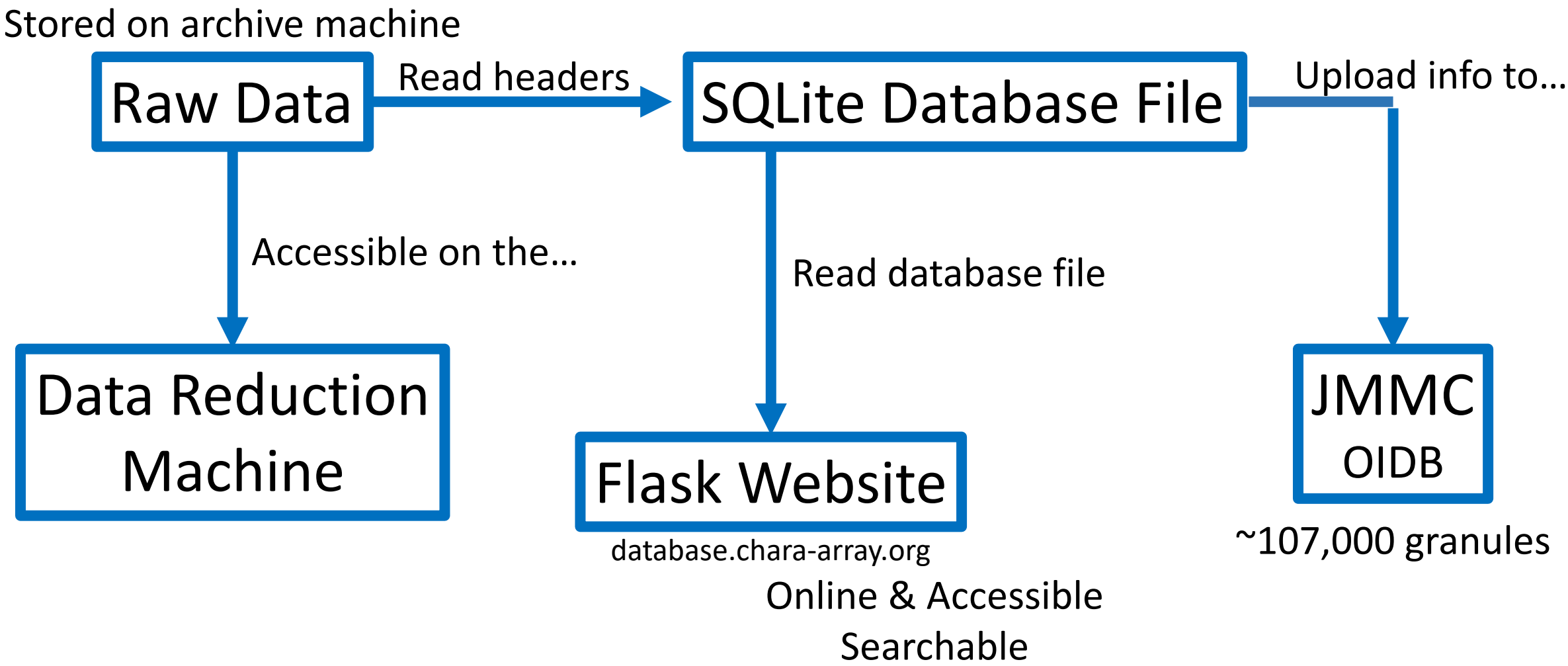
CHARA Online Database Portal

database.chara-array.org



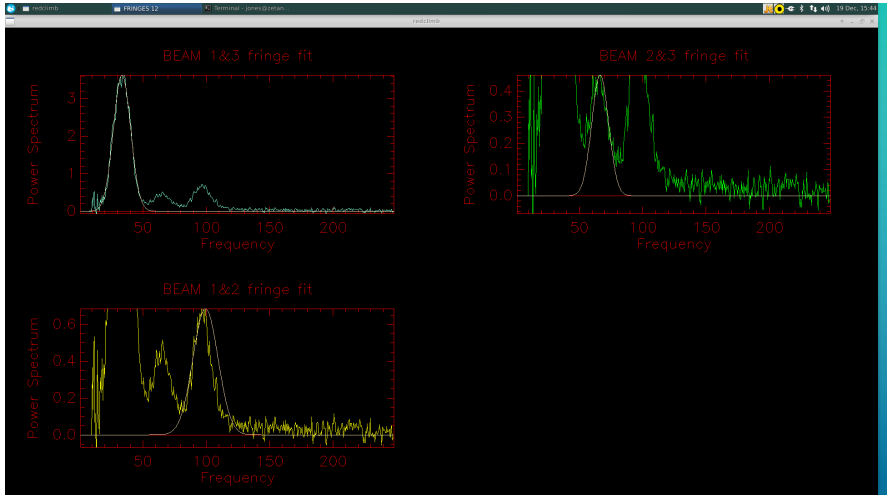


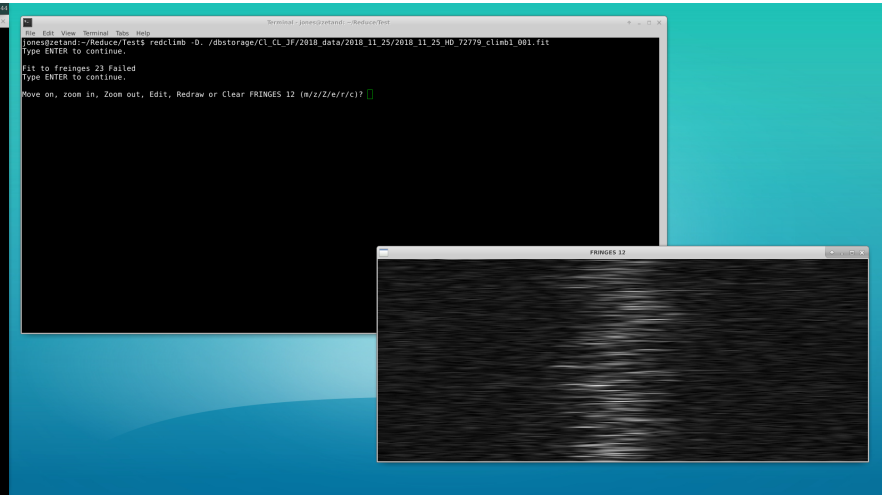
CHARA Online Database Portal

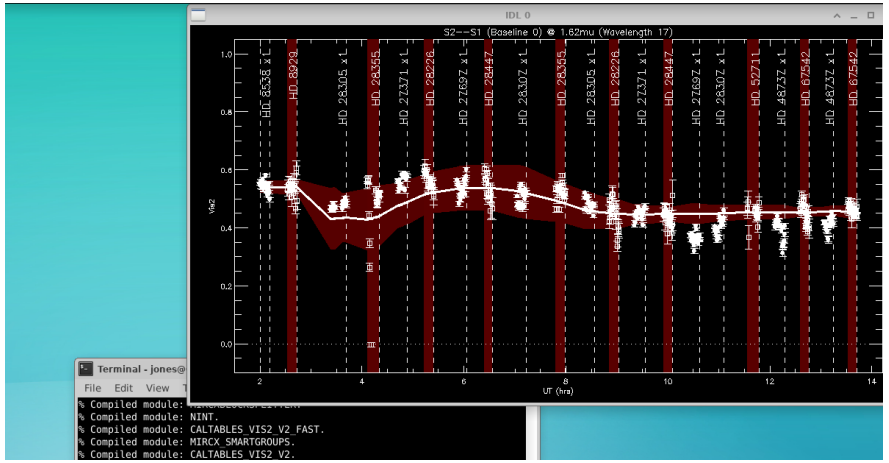


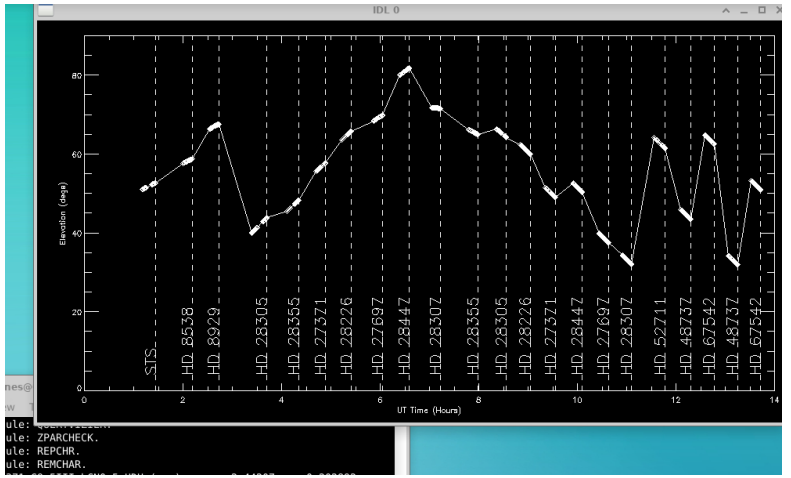
Remote Data Reduction

- Data Reduction Machine linked to archive
- Reduce data remotely
- Download final reduction
- **Benefits:**
  - Reduction software always up to date
  - No need to download raw data
  - Cross-platform









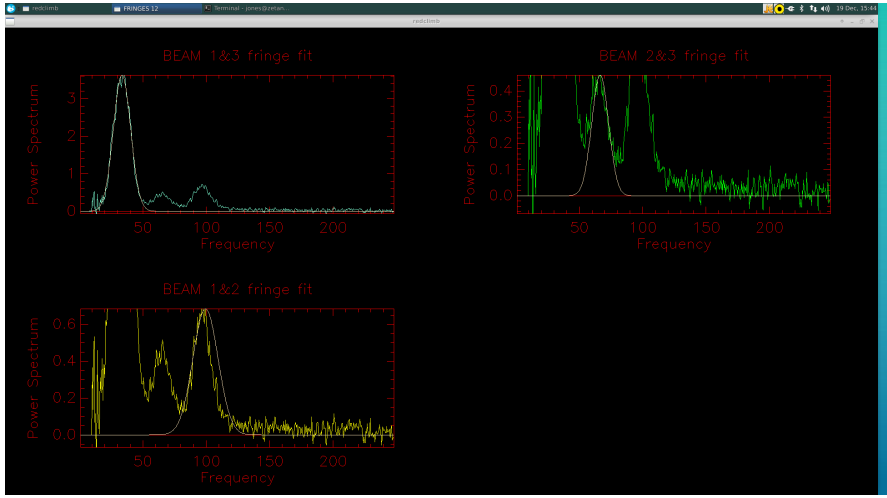
Remote Data Reduction

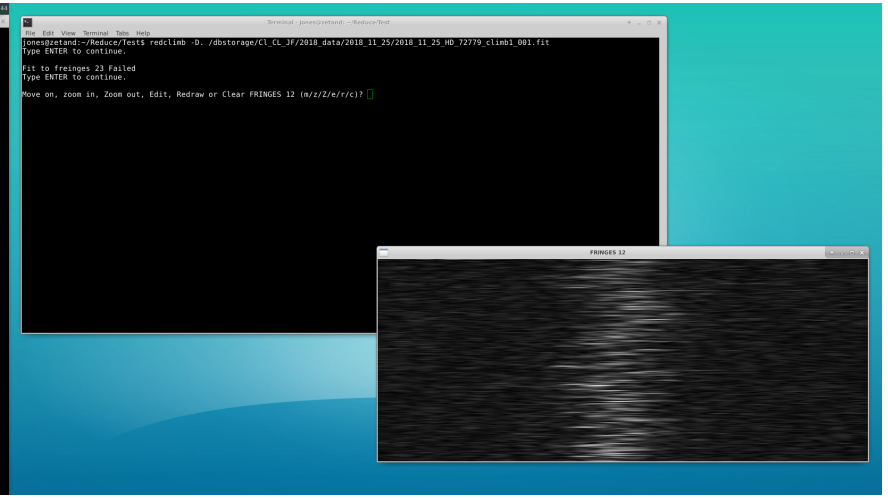
Current Reduction Codes:

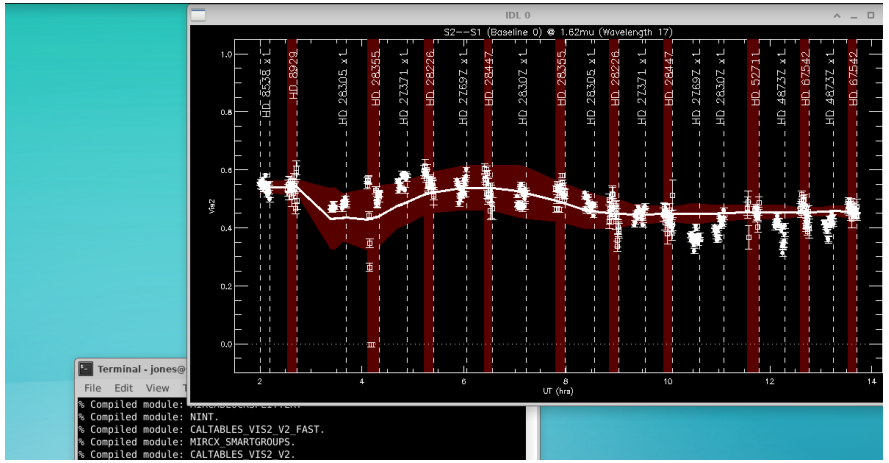
- MIRC-X/MYSTIC
- Classic/CLIMB
- PAVO

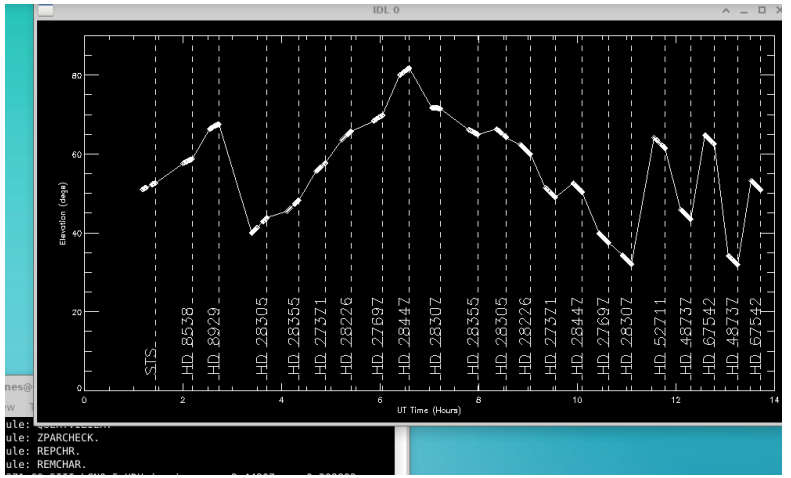
Coming Soon:

- SPICA (Summer 2025)
  - with Arnaud Caci



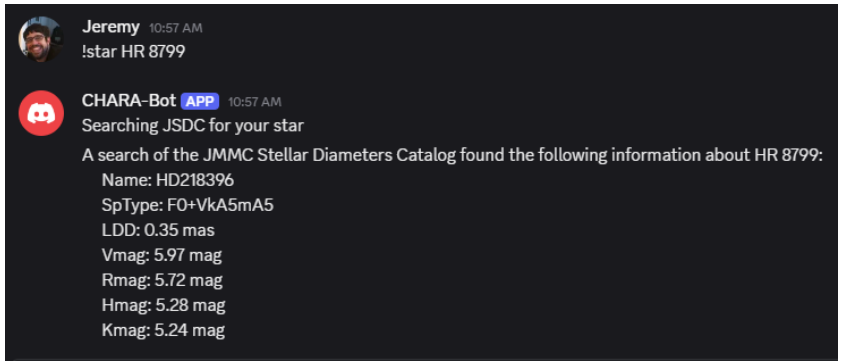


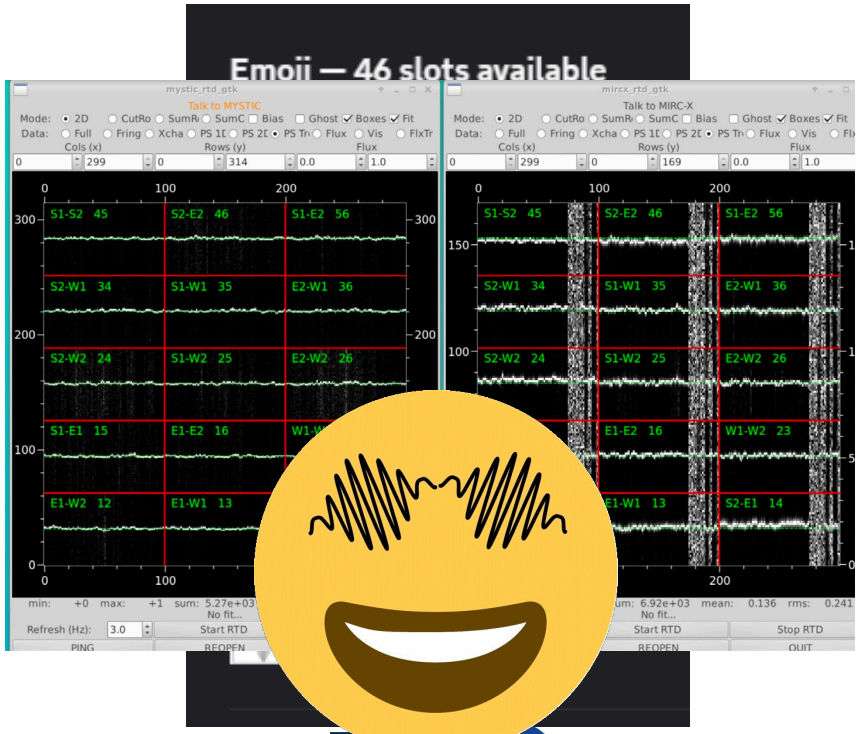


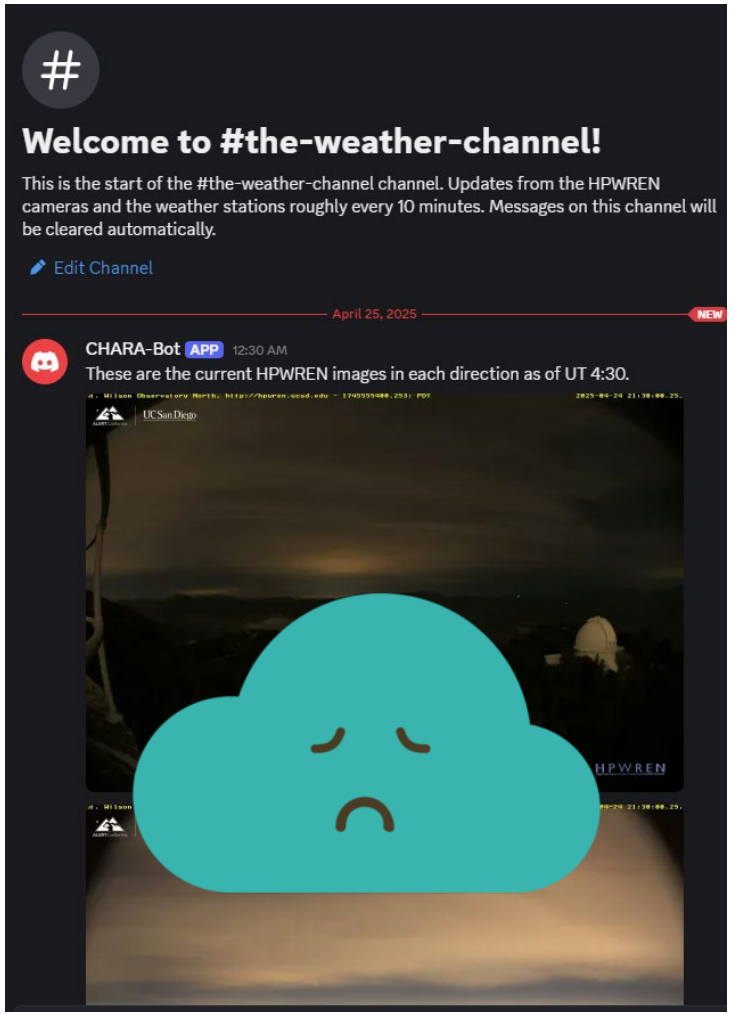


CHARA Discord Bot

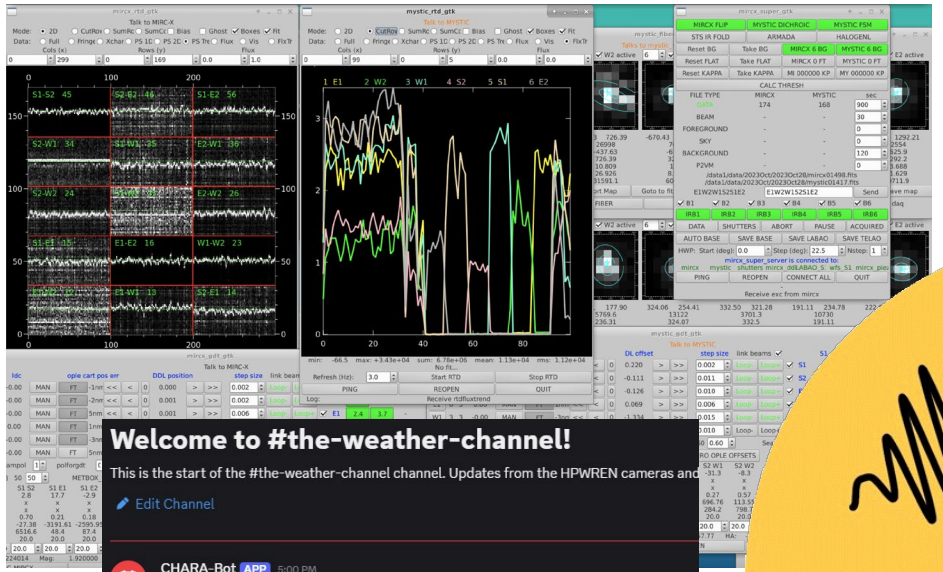
- Reads logs from wavefront sensor and weather server
- Helpful notices at start, mid, and end of night
- Can print various reports
- bot-spam channel
- New features:
  - !hpwren
  - !star
  - the-weather-channel
  - Custom emojis!

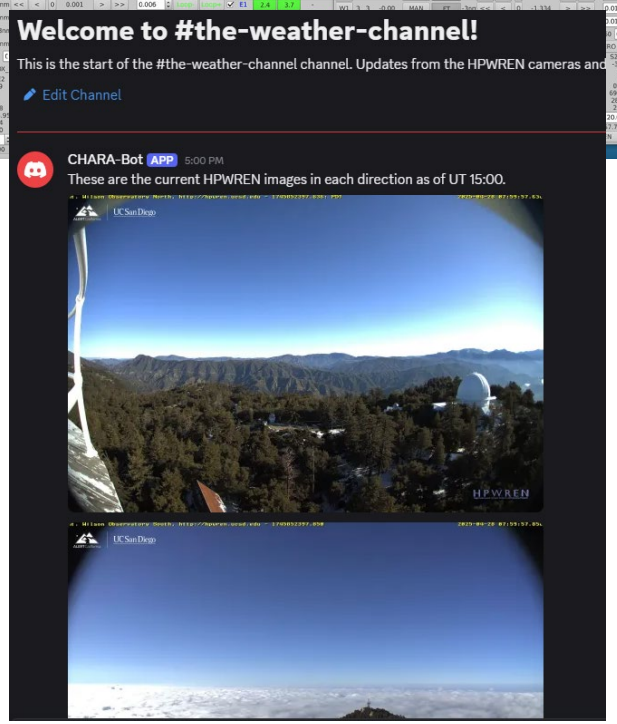


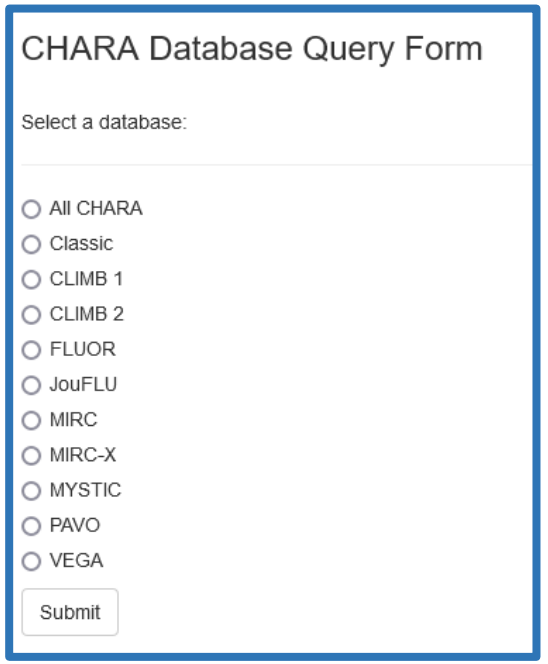


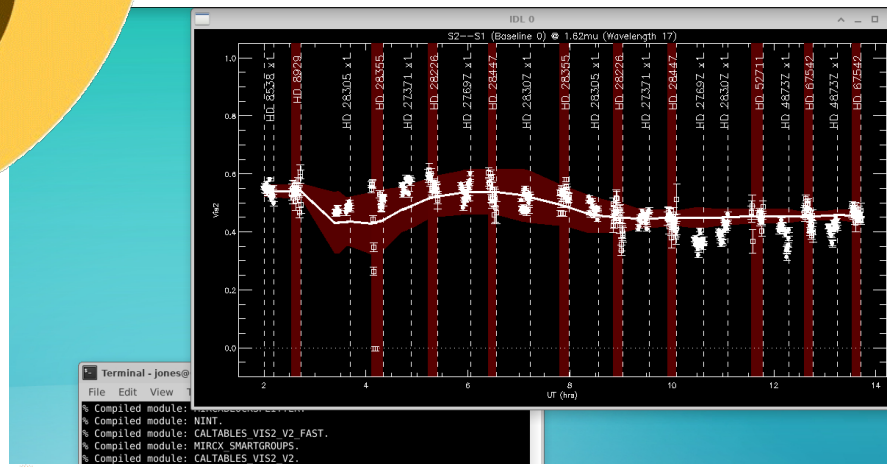


CHARA Remote Operations



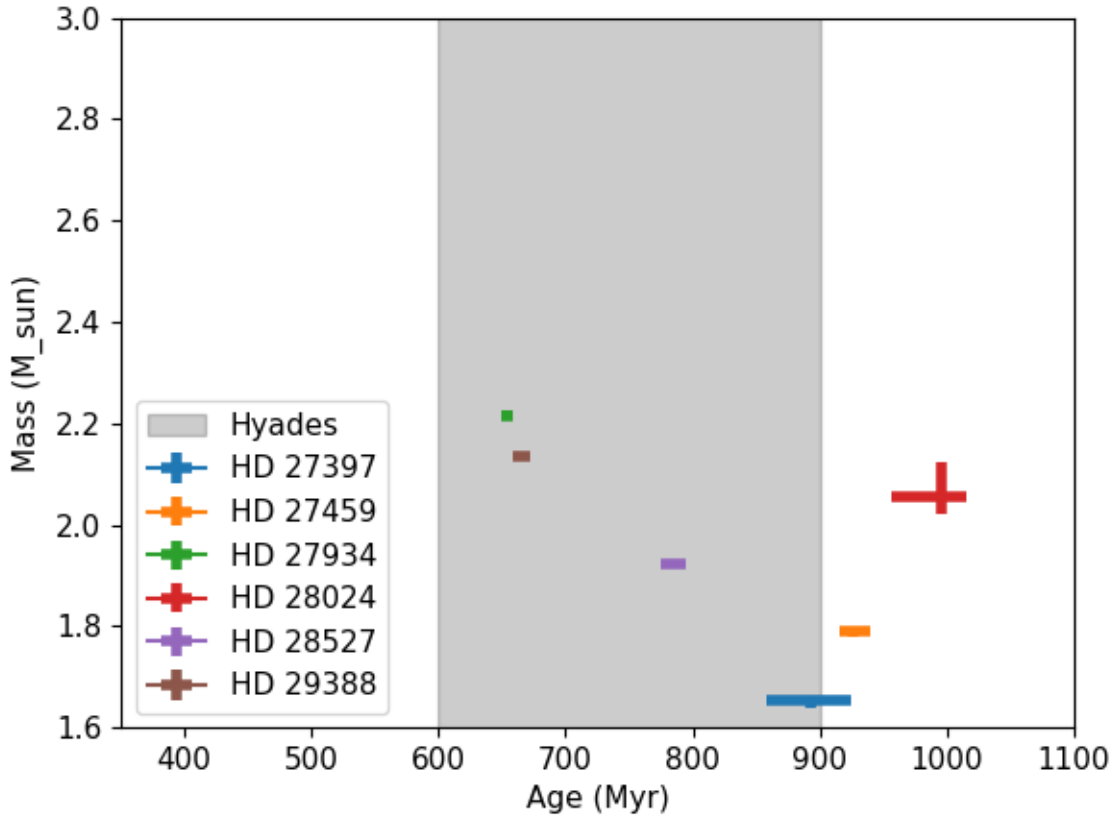






The age of the Hyades???

It all started with the A-stars



A-Stars

How age/mass are determined:

- Model size/shape from
  - CHARA V^2
  - Spectral Energy Distribution
  - Gaia Parallax
- Compare model L & R to MESA

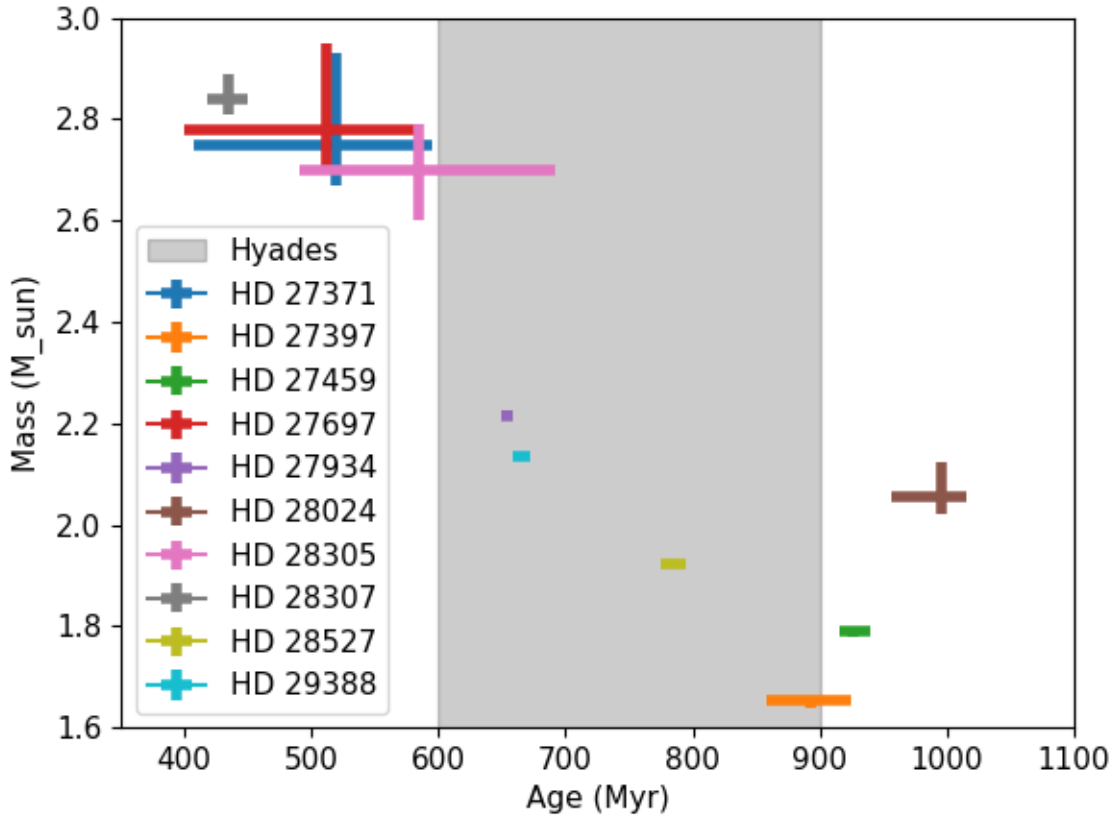
The age of the Hyades???

It got worse with the giants

Giants

How age/mass are determined:

- Model size from
  - CHARA V^2
  - Spectral Energy Distribution
  - Gaia Parallax
- Compare model L & R to MIST



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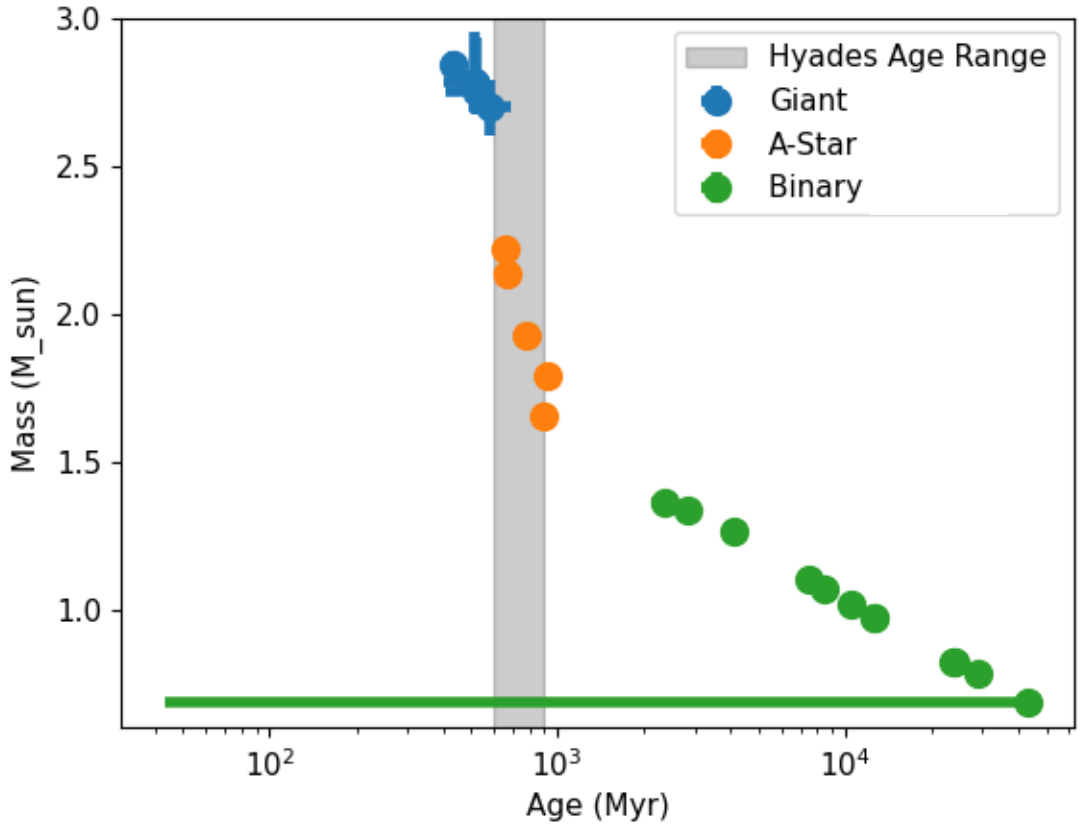
The age of the Hyades???

Lower mass binaries – even crazier



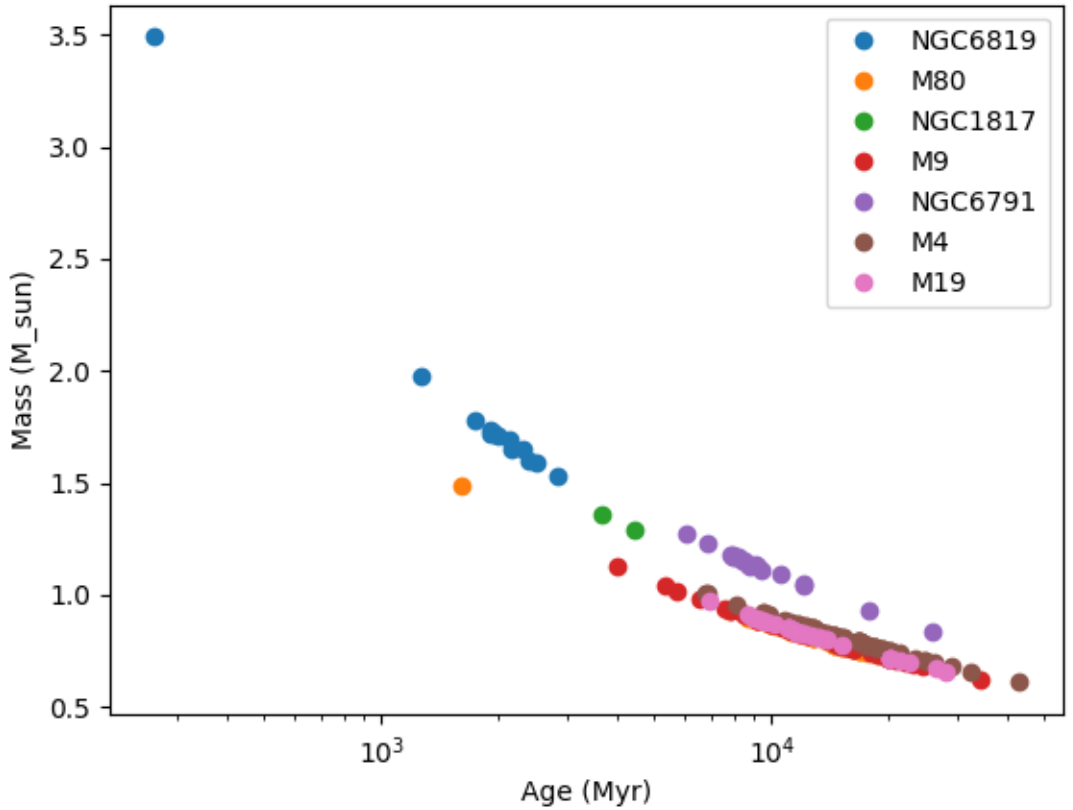
Binaries

How age/mass are determined:

- Dynamical mass from CHARA orbit
  - Torres et al. 2024
- V-K color
  - Torres et al. 2024
- Compare to MIST

The ages of other clusters???

Age/mass of stars from asteroseismic observations



Asteroseismic Giants

How age/mass are determined:

- Compare asteroseismic parameters to MESA+GYRE
- Taken from a compilation of multiple sources
- Tayar & Joyce 2025

Questions?