

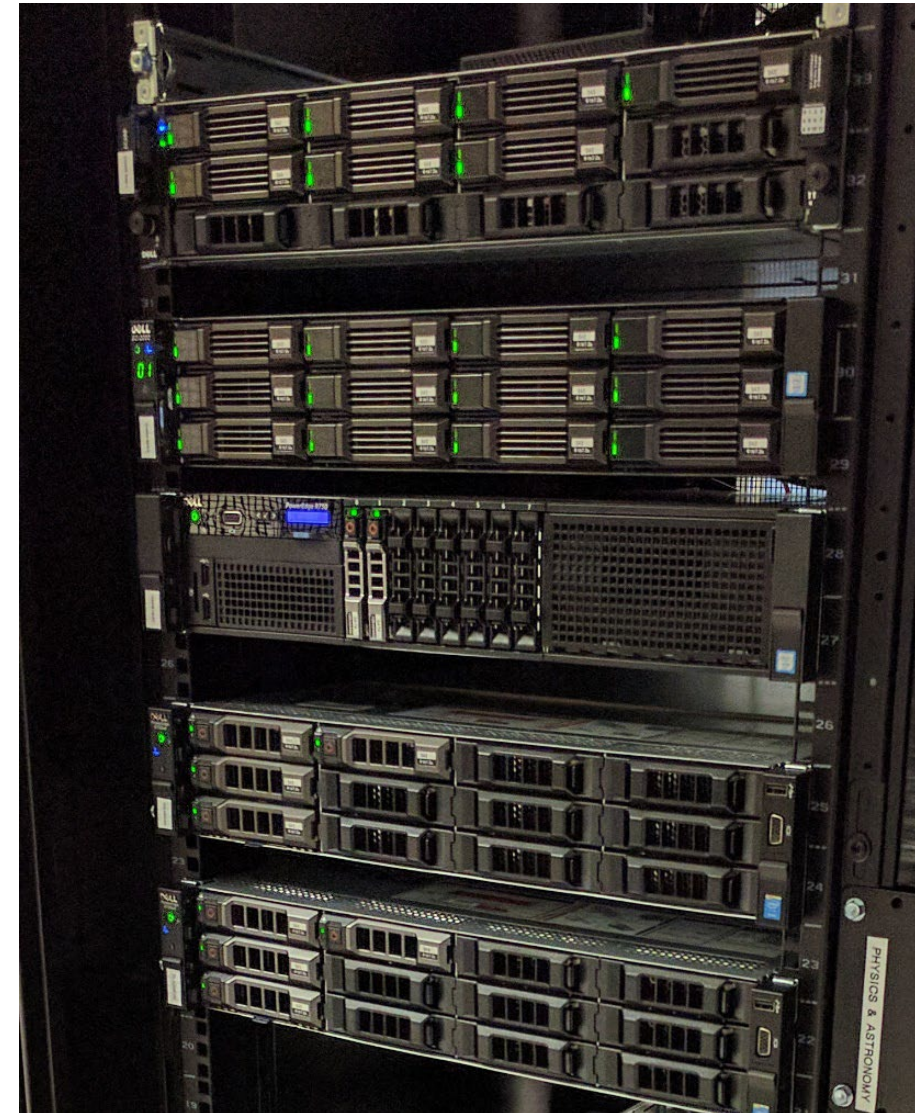
CHARA Remote Operations and Data Access

Jeremy Jones, CHARA Data Scientist



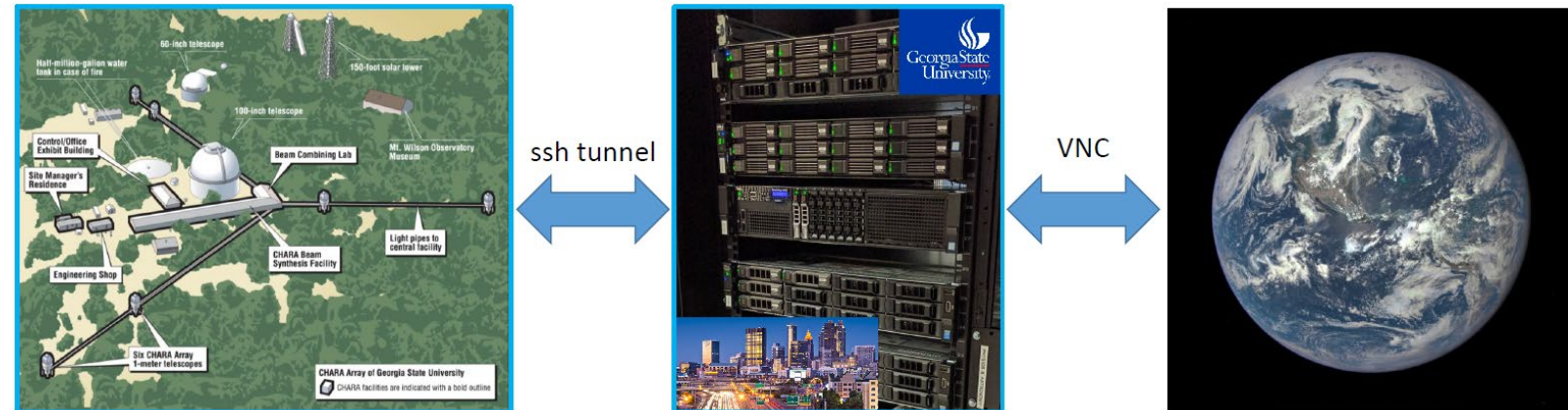
The CHARA Server

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

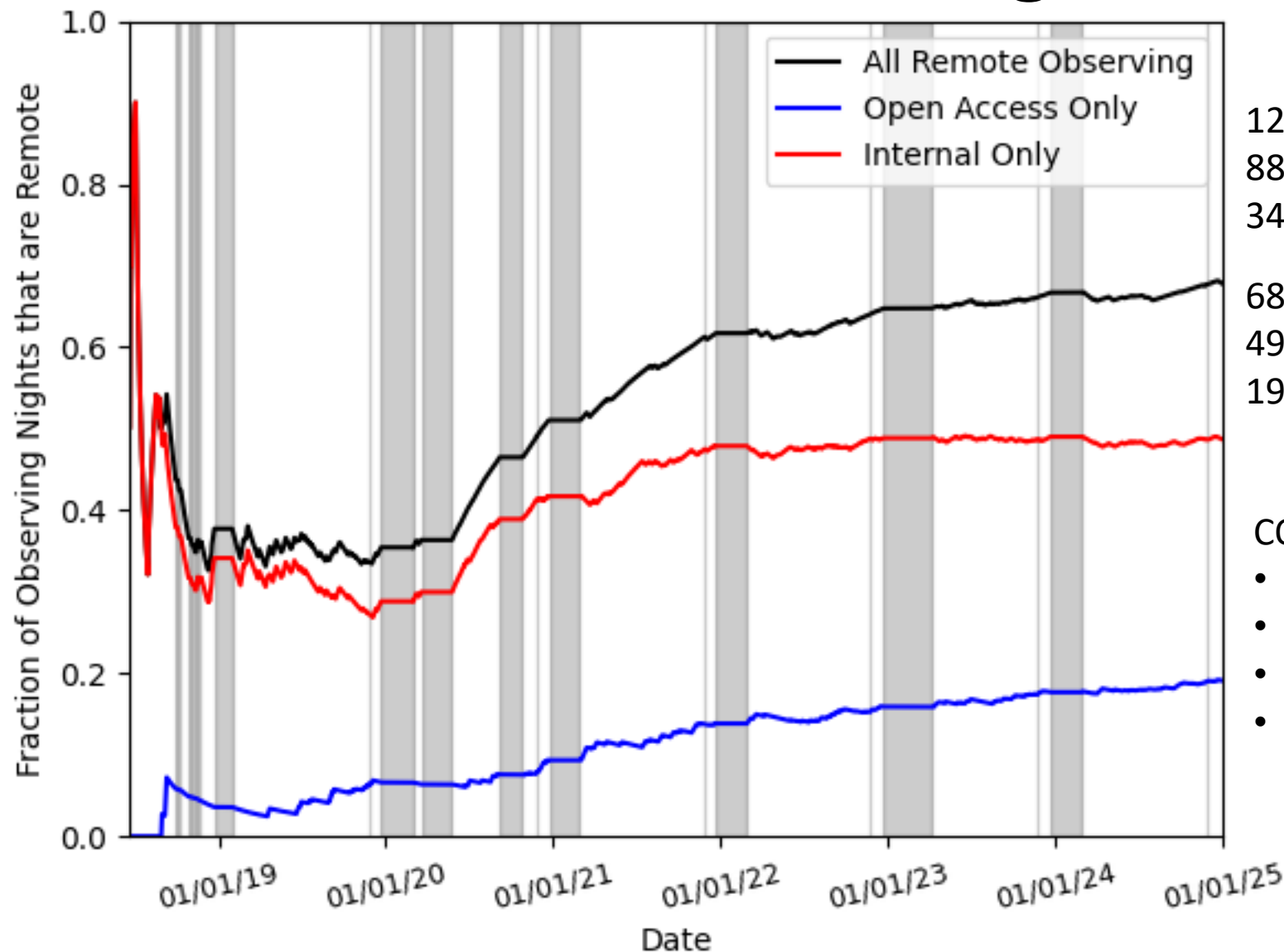


Remote Observing

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



Remote Observing Stats



1237 Remote Nights

888.5 Internal

348.5 Open Access

68% Remote Nights

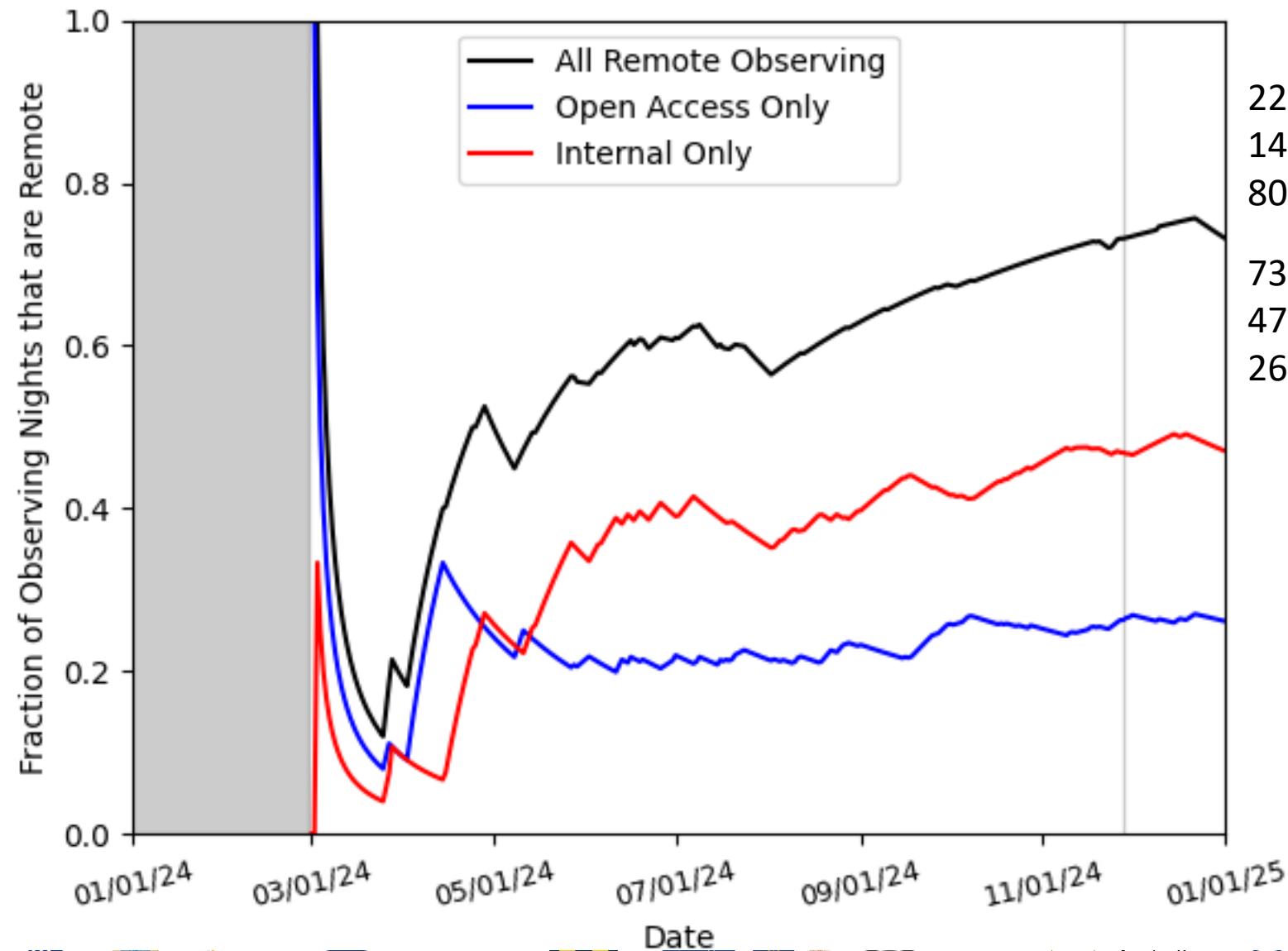
49% Internal+Remote

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

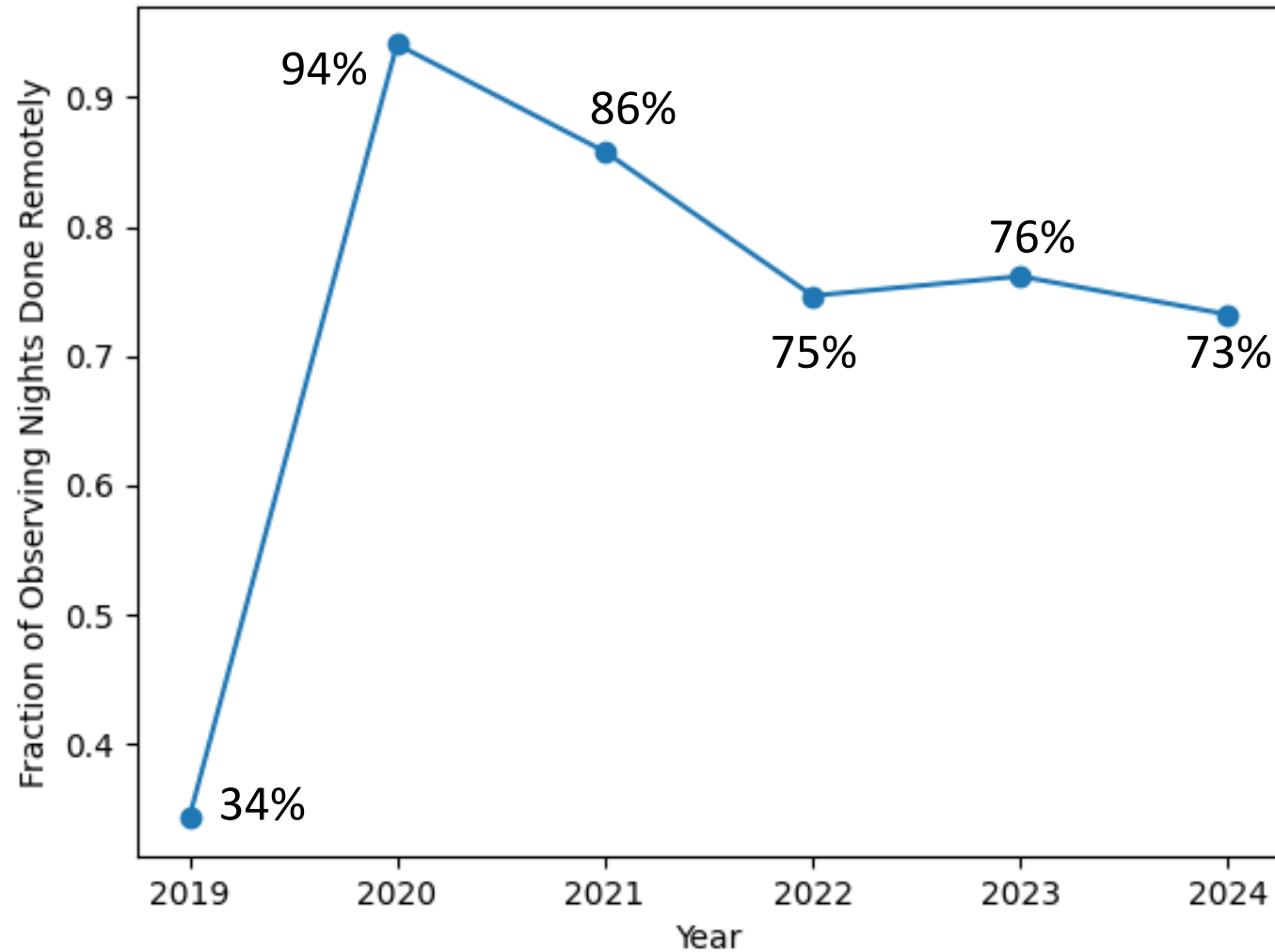
80 Open Access

73% Remote Nights

47% Internal+Remote

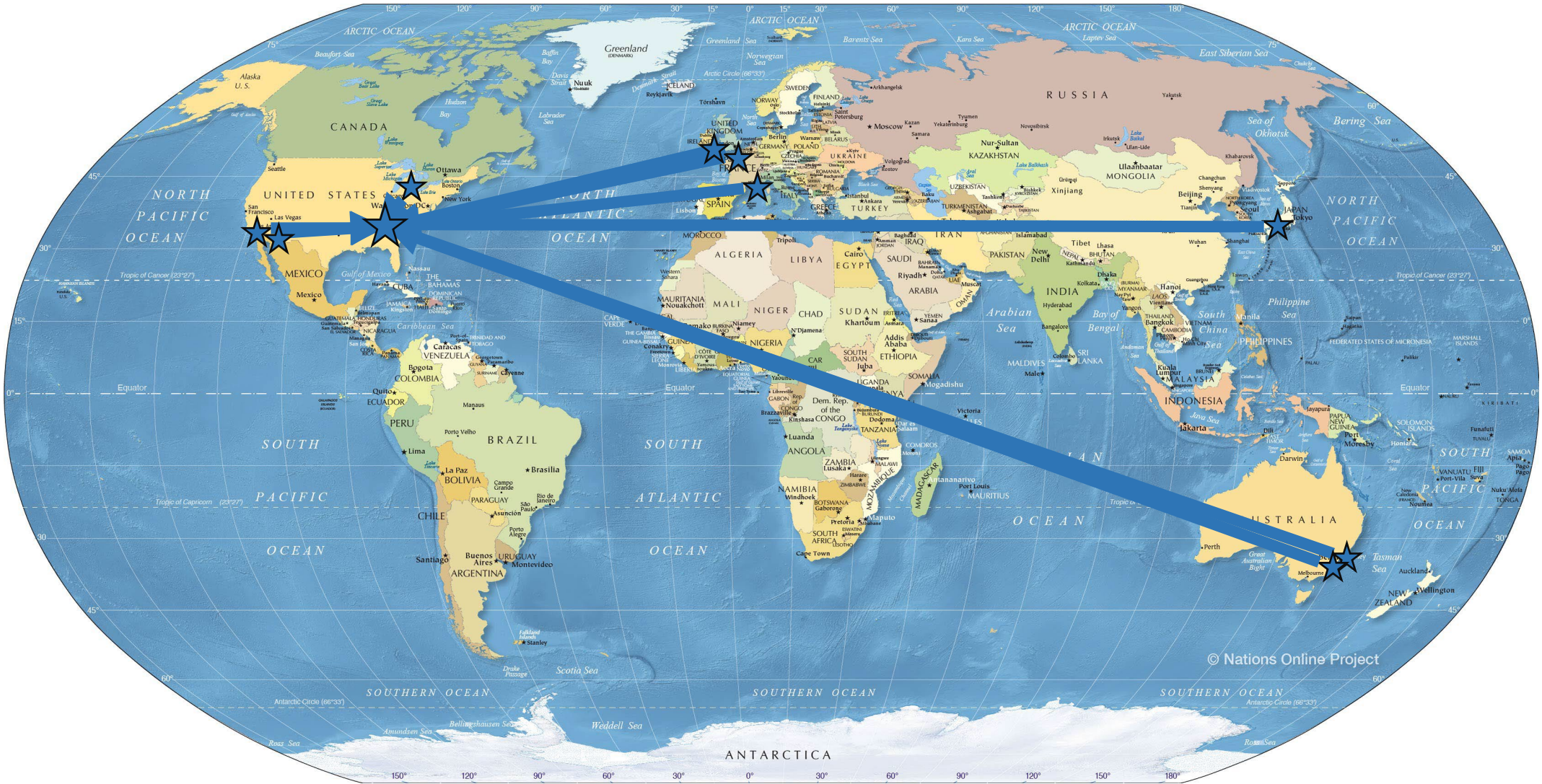
26% Open Access+Remote

Remote Observing Stats (2019 – 2024)





CHARA Atlanta Data Archive



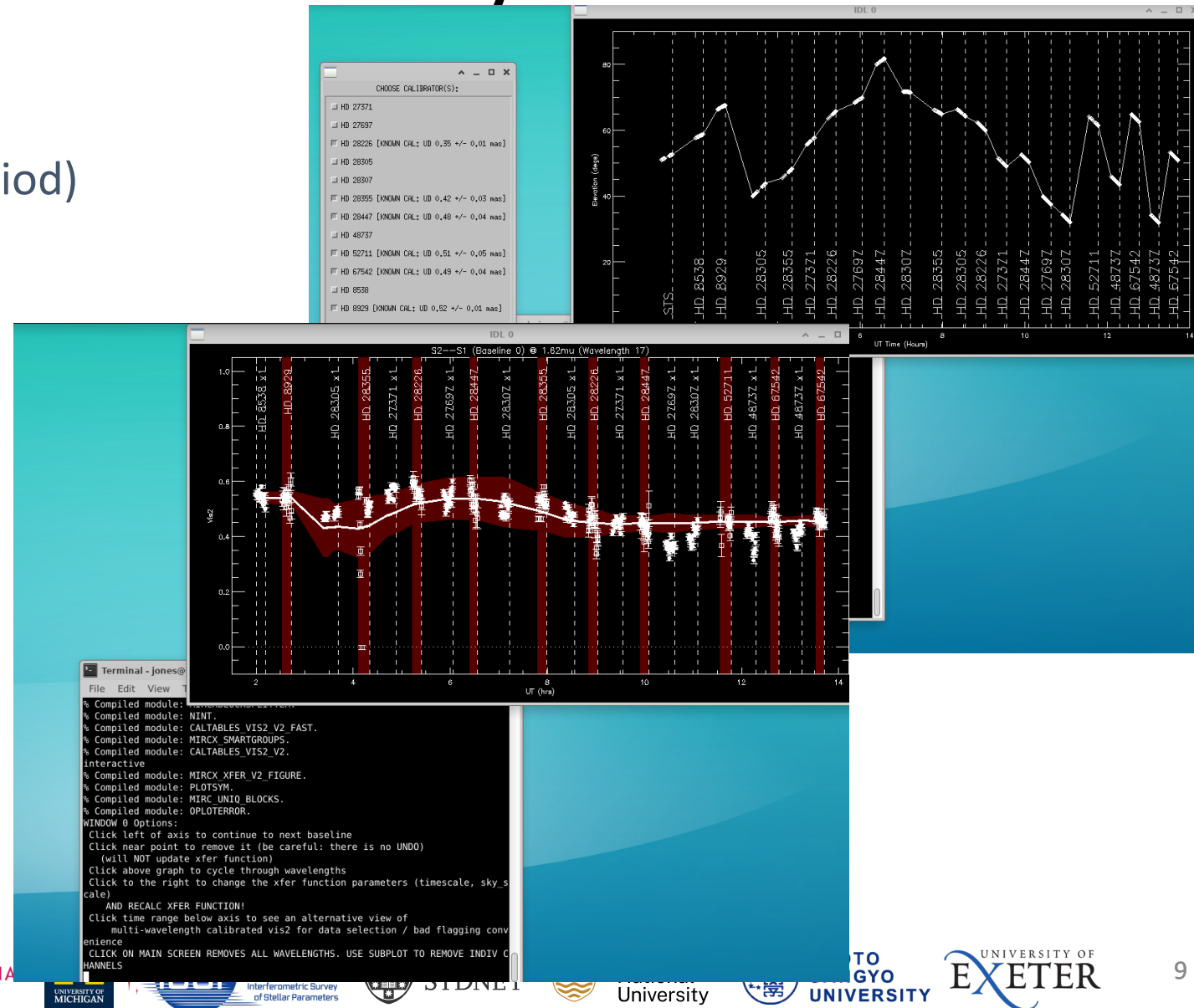
CHARA Atlanta Data Archive

- 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 Database Query Form

Select a database:

- ☐ All CHARA
- ☐ Classic
- ☐ CLIMB 1
- ☐ CLIMB 2
- ☐ FLUOR
- ☐ JouFLU
- ☐ MIRC
- ☐ MIRC-X
- ☐ MYSTIC
- ☐ PAVO
- ☐ VEGA

Submit

CHARA Database Query Form

Star Name

Enter a target name in any format (e.g., Vega, alpha Lyr, HD 172167, etc.). The webapp will determine the coordinates of the target using a CDS search and will constrain the database to those coordinates.

Start Date

End Date

Search Distance (degrees)

The distance from the target star to constrain the database by.

Columns to Display:

Select Beam Combiner(s):

Select PI(s):

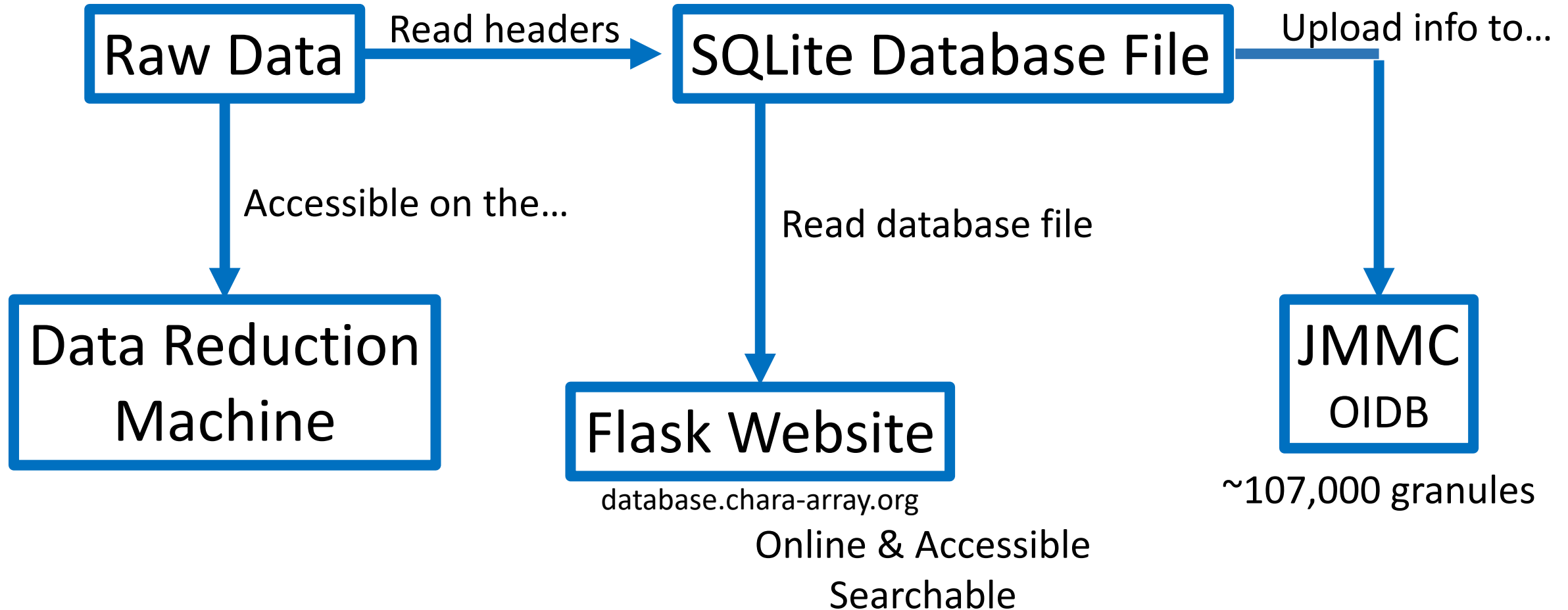
The Primary Investigator as listed in the data headers. NOTE: Sometimes misspellings of PI names occur or filler text is used on testing nights. Many observations do not have a listed PI.

Submit



CHARA Online Database Portal

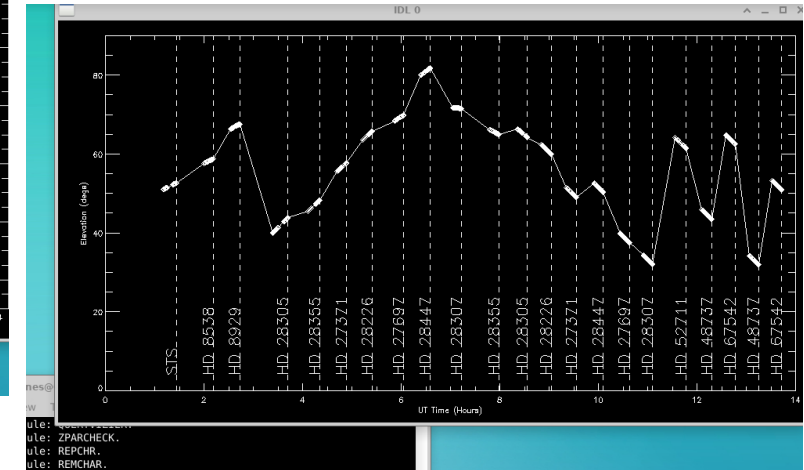
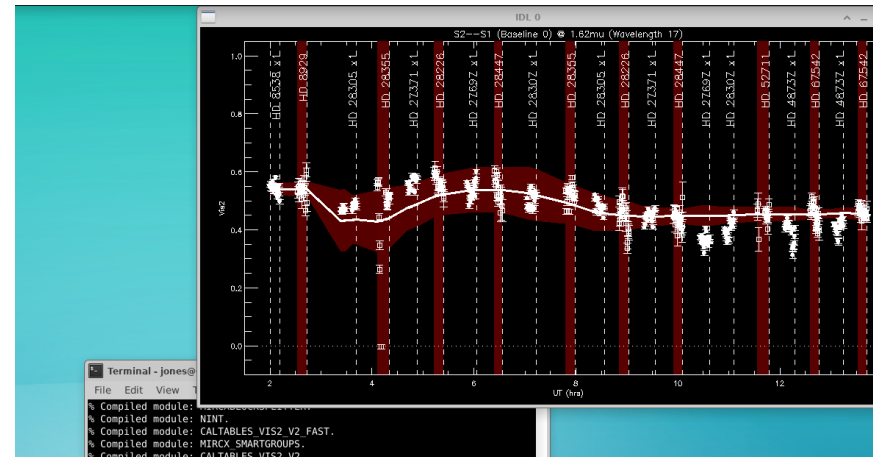
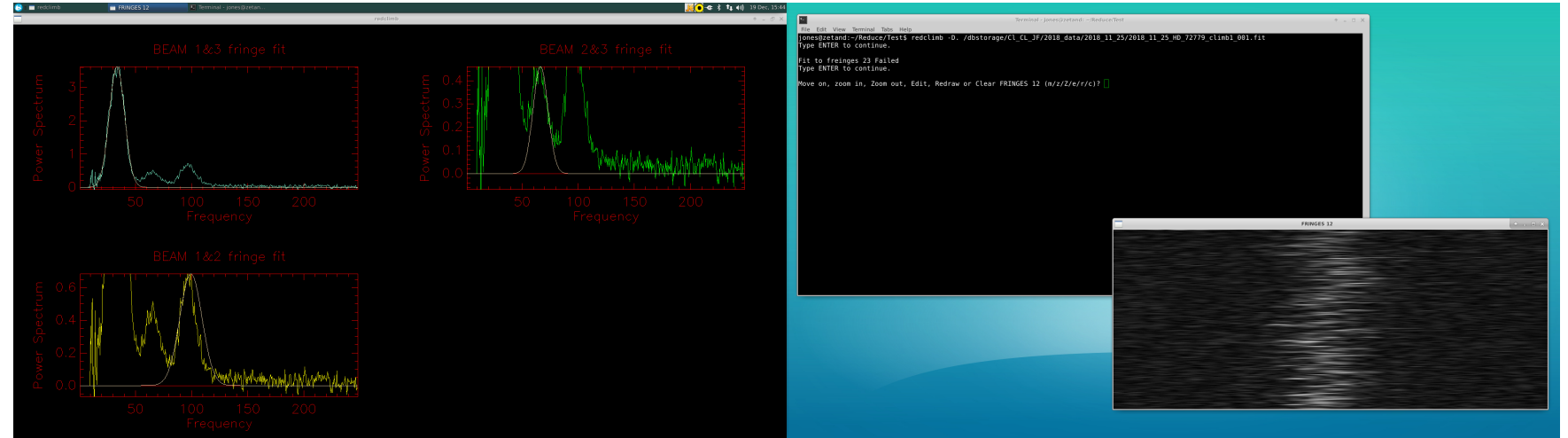
Stored on archive machine



Remote Data Reduction

- Data Reduction Machine linked to archive
- Reduce data remotely
- Download final reduction
- **Benefits:**

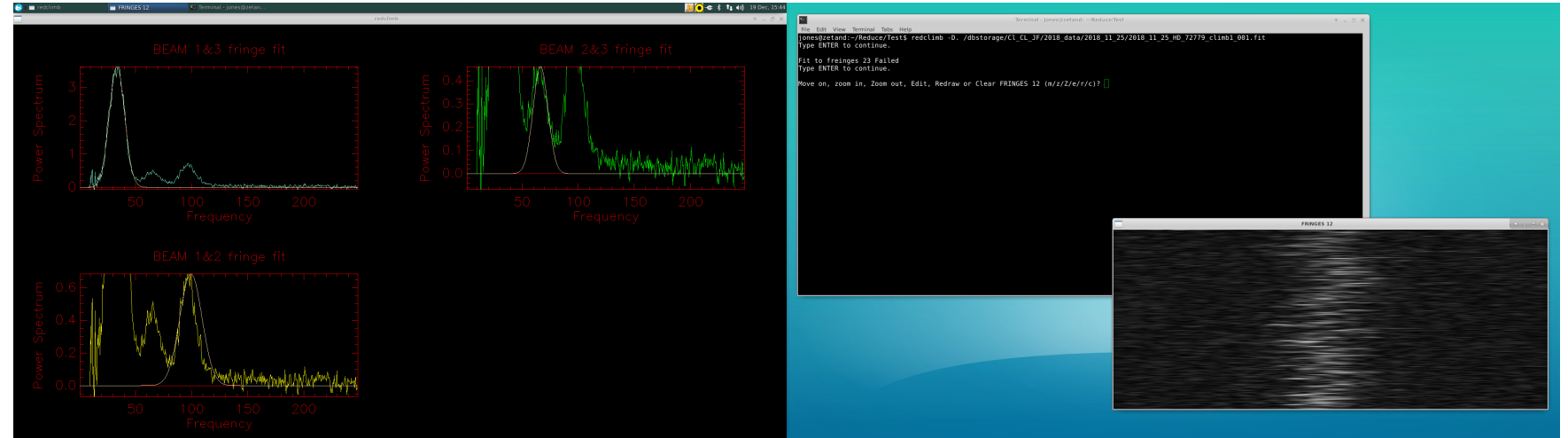
- Reduction software always up to date
- No need to download raw data
- Cross-platform



Remote Data Reduction

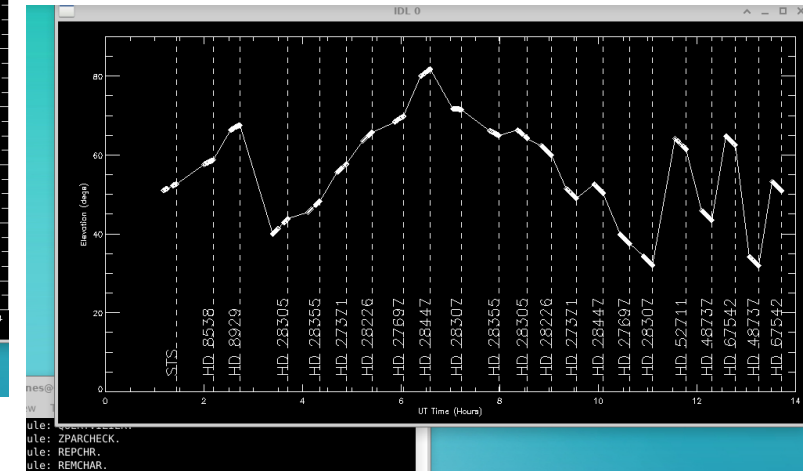
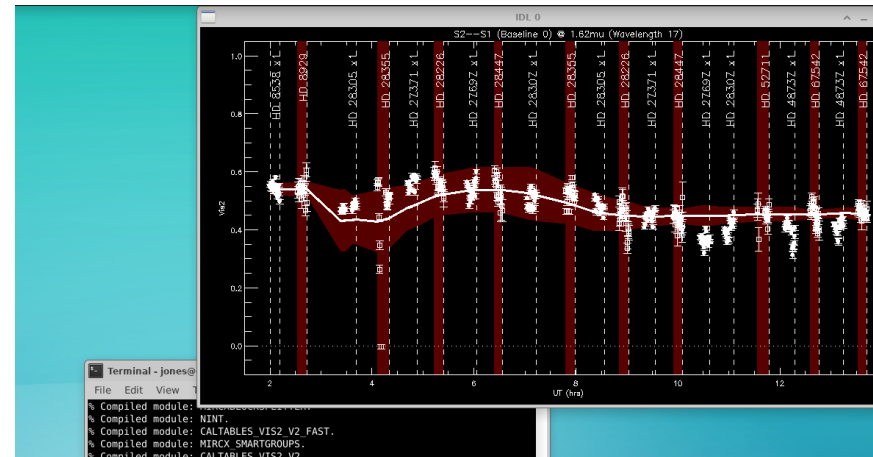
Current Reduction Codes:

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



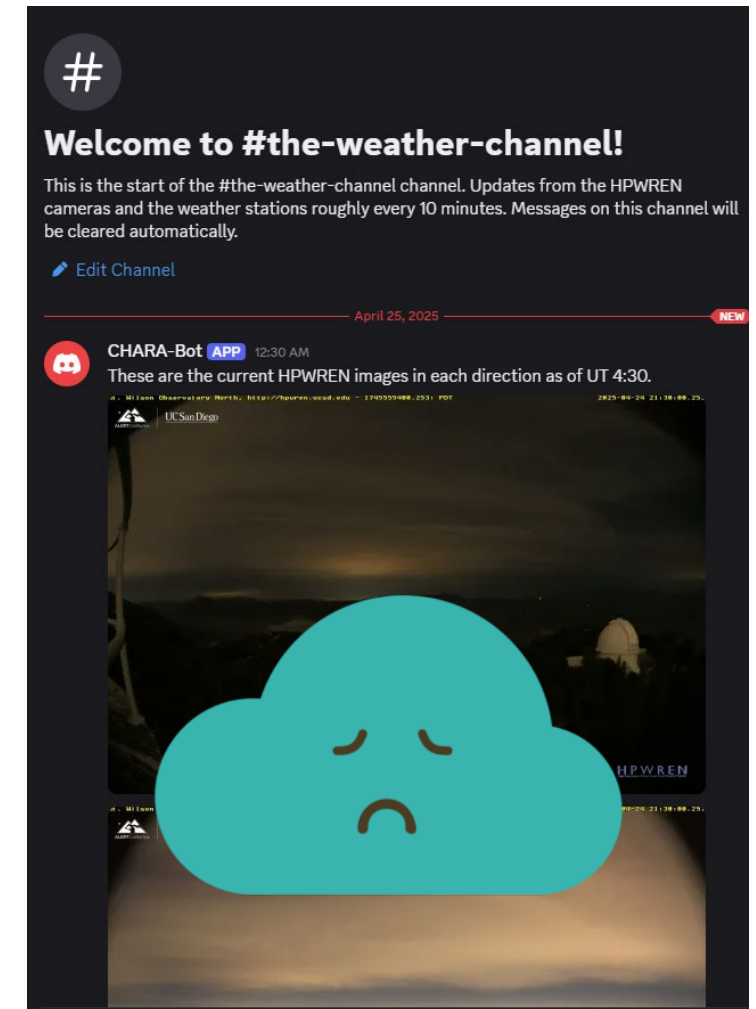
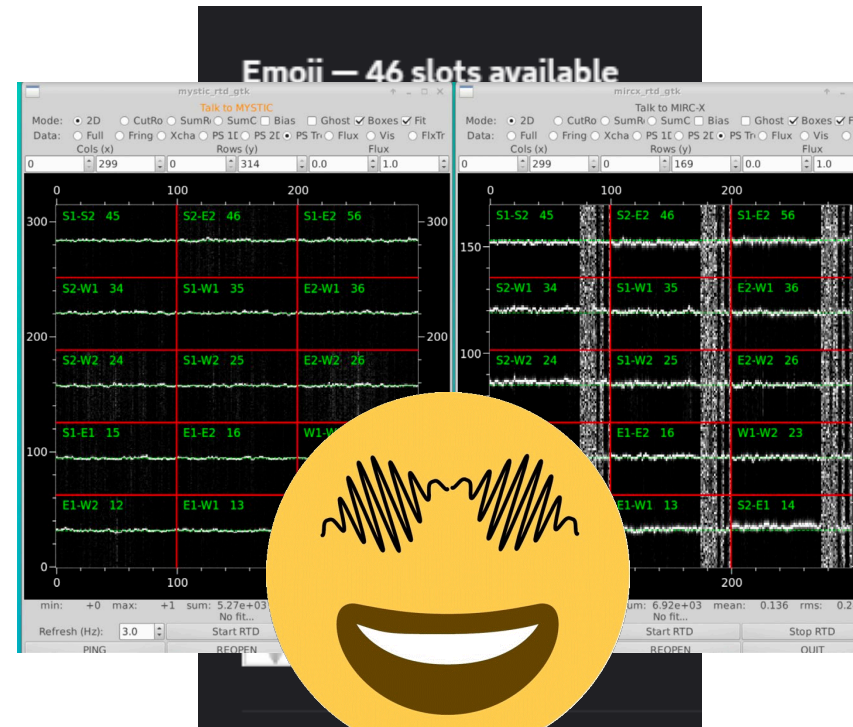
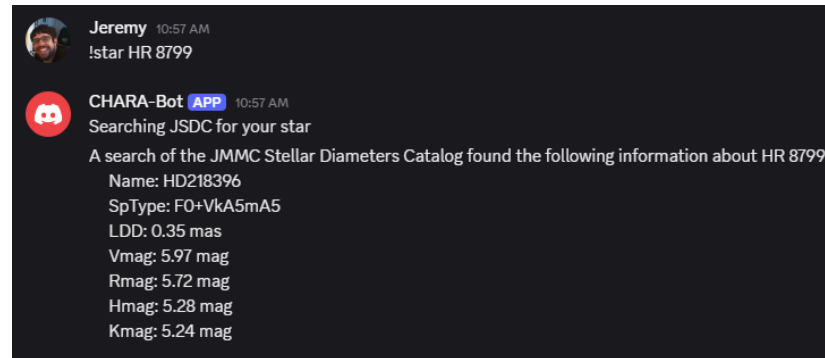
Coming Soon:

- SPICA (Summer 2025)
 - with Arnaud Caci



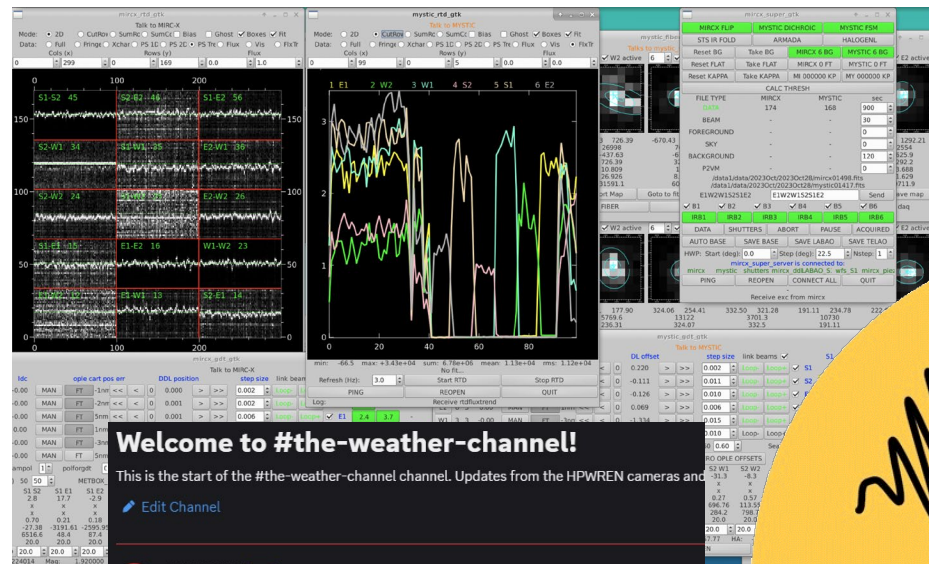
CHARA Discord Bot

- 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

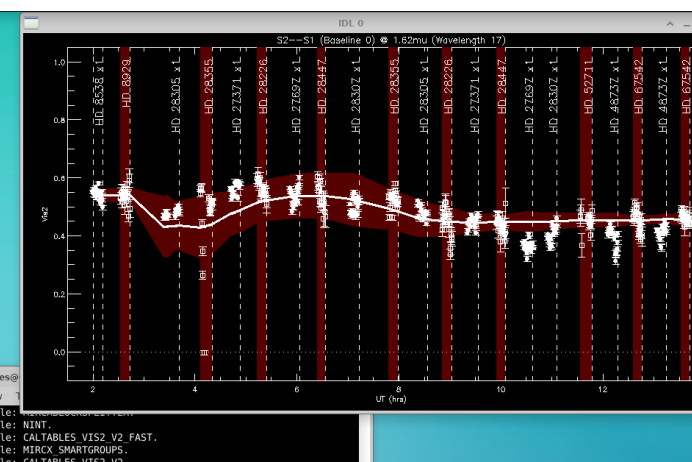


CHARA Database Query Form

Select a database:

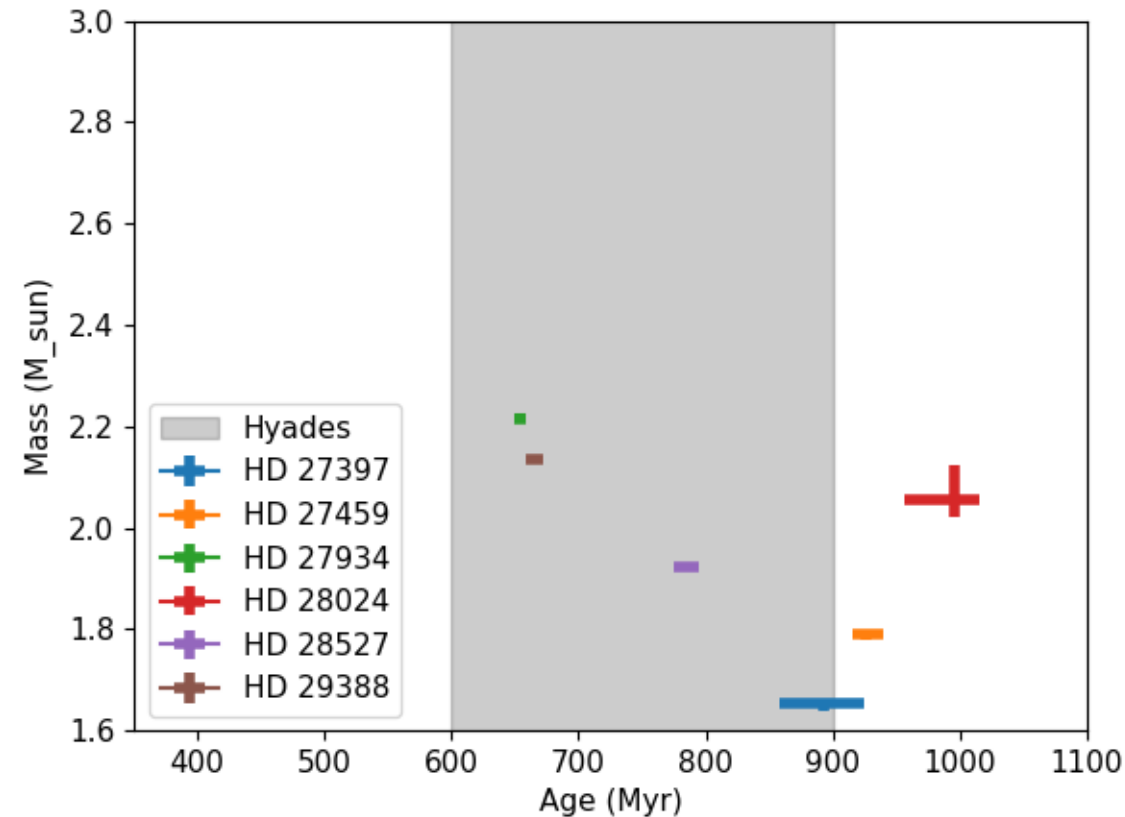
- ☐ All CHARA
- ☐ Classic
- ☐ CLIMB 1
- ☐ CLIMB 2
- ☐ FLUOR
- ☐ JouFLU
- ☐ MIRC
- ☐ MIRC-X
- ☐ MYSTIC
- ☐ PAVO
- ☐ VEGA

Submit



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

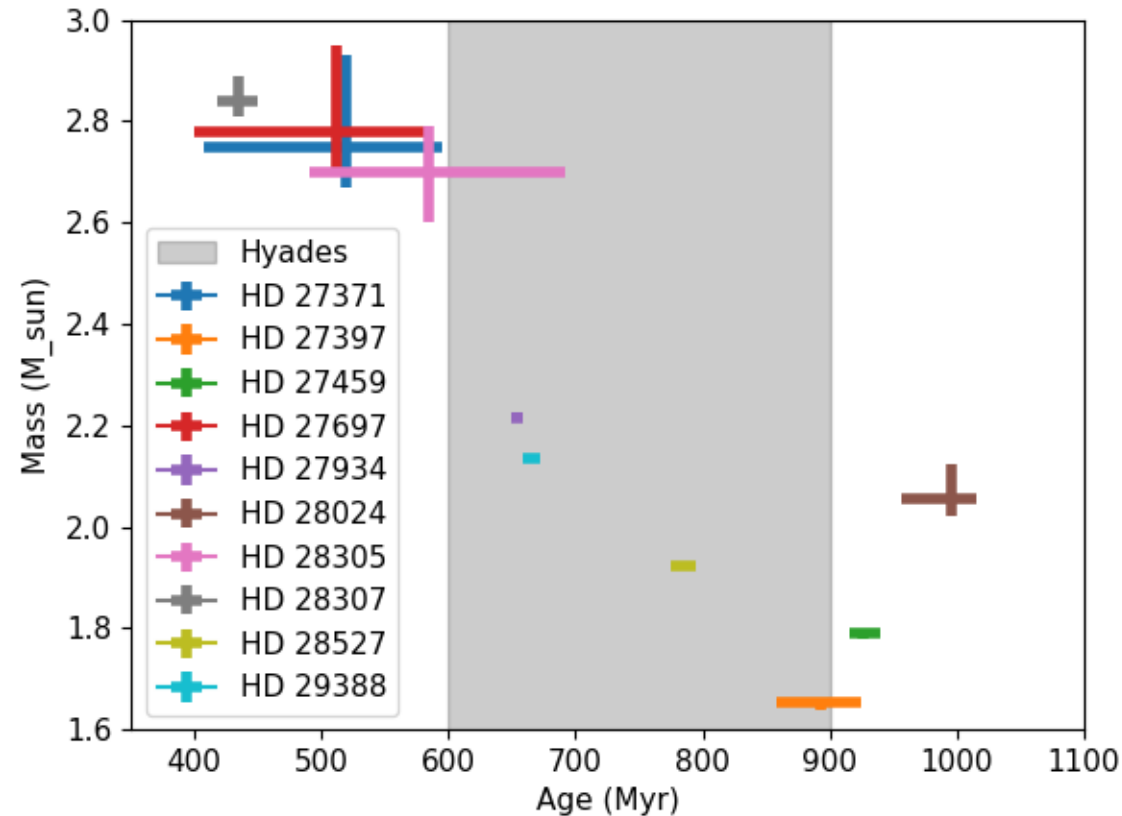
The age of the Hyades???

It got worse with the giants

Giants

How age/mass are determined:

- Model size from
 - CHARA V²
 - Spectral Energy Distribution
 - Gaia Parallax
- Compare model L & R to MIST



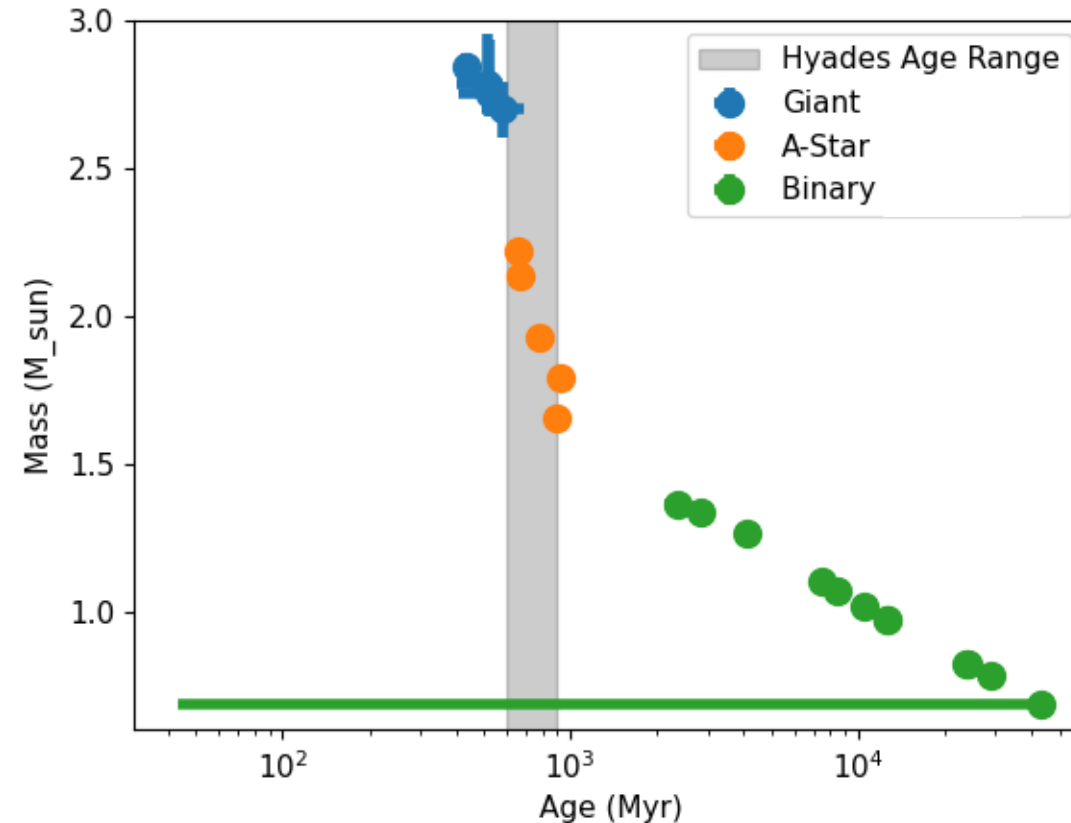
A-Stars

How age/mass are determined:

- Model size/shape from
 - CHARA V²
 - Spectral Energy Distribution
 - Gaia Parallax
- Compare model L & R to MESA

The age of the Hyades???

Lower mass binaries – even crazier



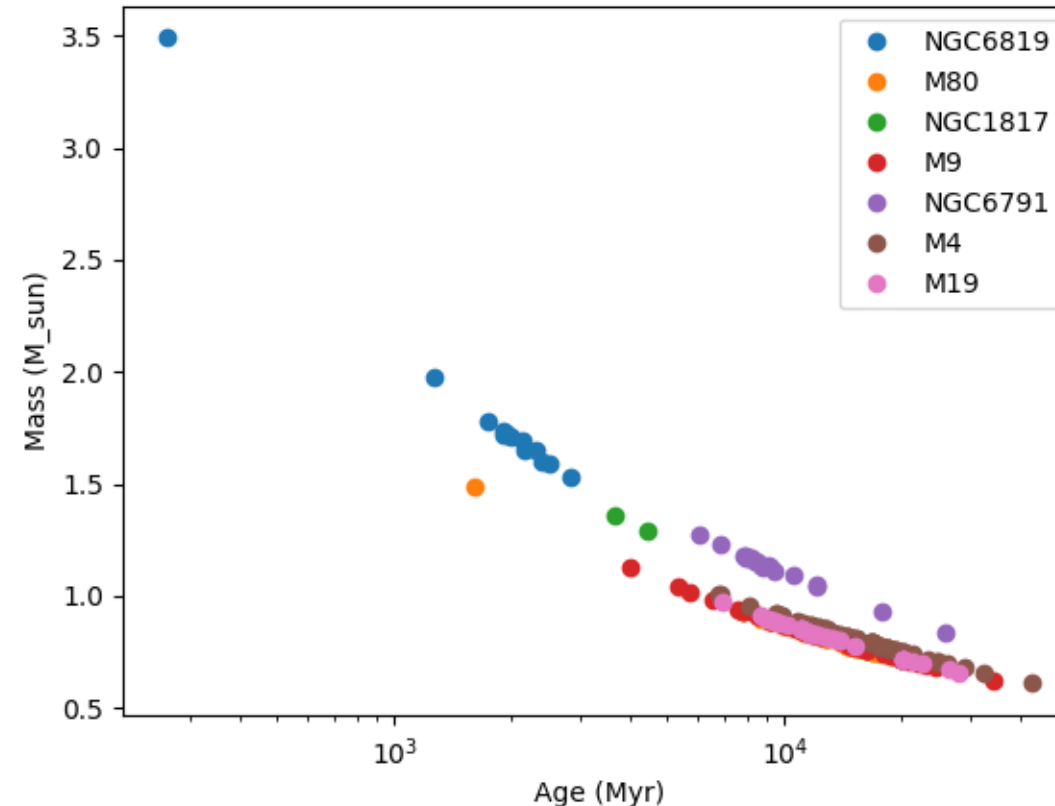
Binaries

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?

