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EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

# JWST Cycle 2: additional programs

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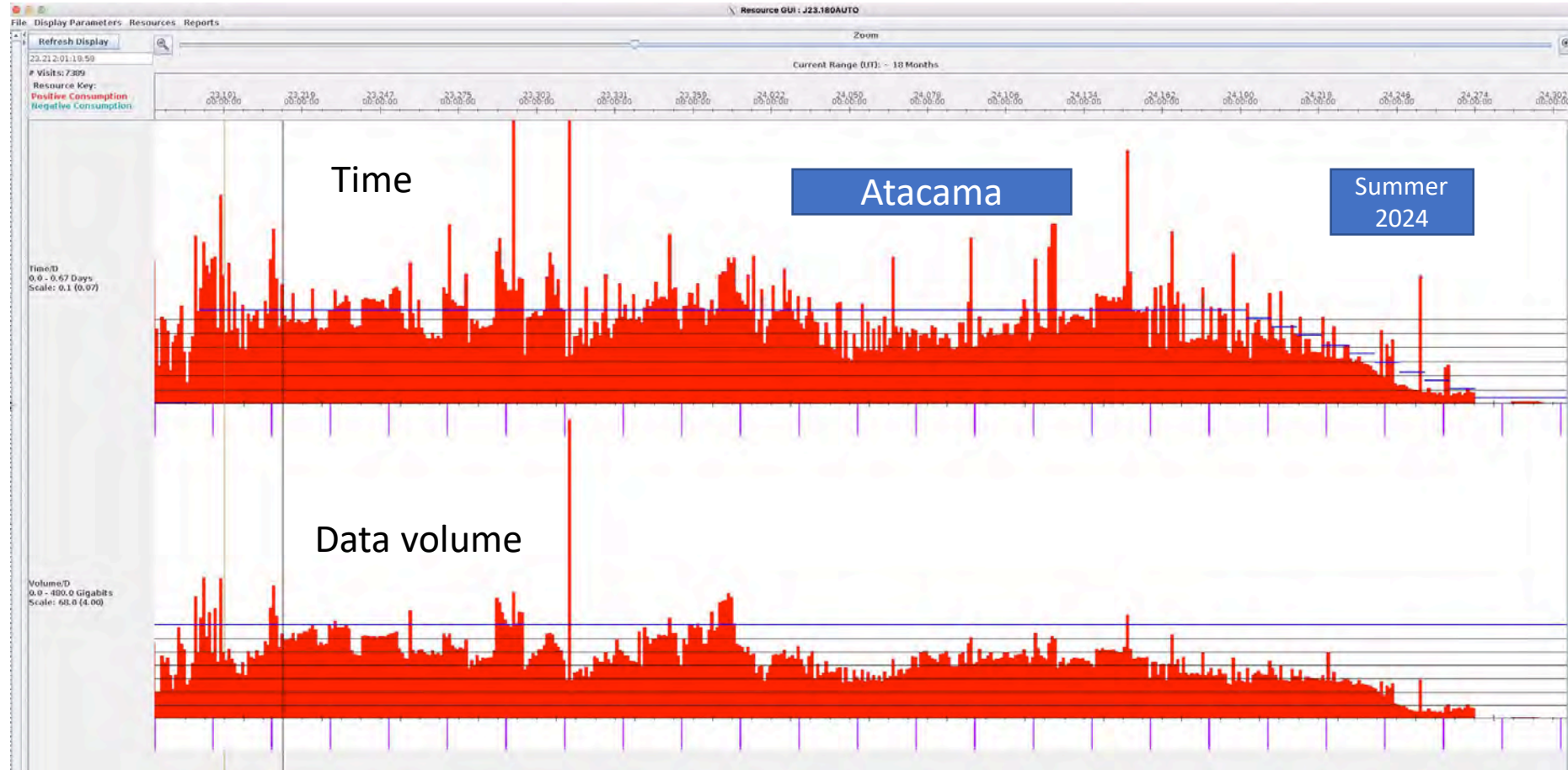
Neill Reid – for Science Policies and the LRP group

26 July 2023



## Background – a deficit of observations near the vernal equinox

- The LRP generally aims for a scheduling rate of  $\sim 0.75/\text{day}$ 
  - Deficit allows for ToOs, WOPRs, DD etc
- Applying MAZ constraints leads to 2 time periods being underscheduled
  - $\sim 110$  days around the Vernal Equinox,
  - $\sim 2$ -months in the summer of 2024.
- Cycle 3 programs should fill in summer 2024
- Focus here is on the Atacama – deficit corresponds to  $\sim 500$ - $550$  hours of observations

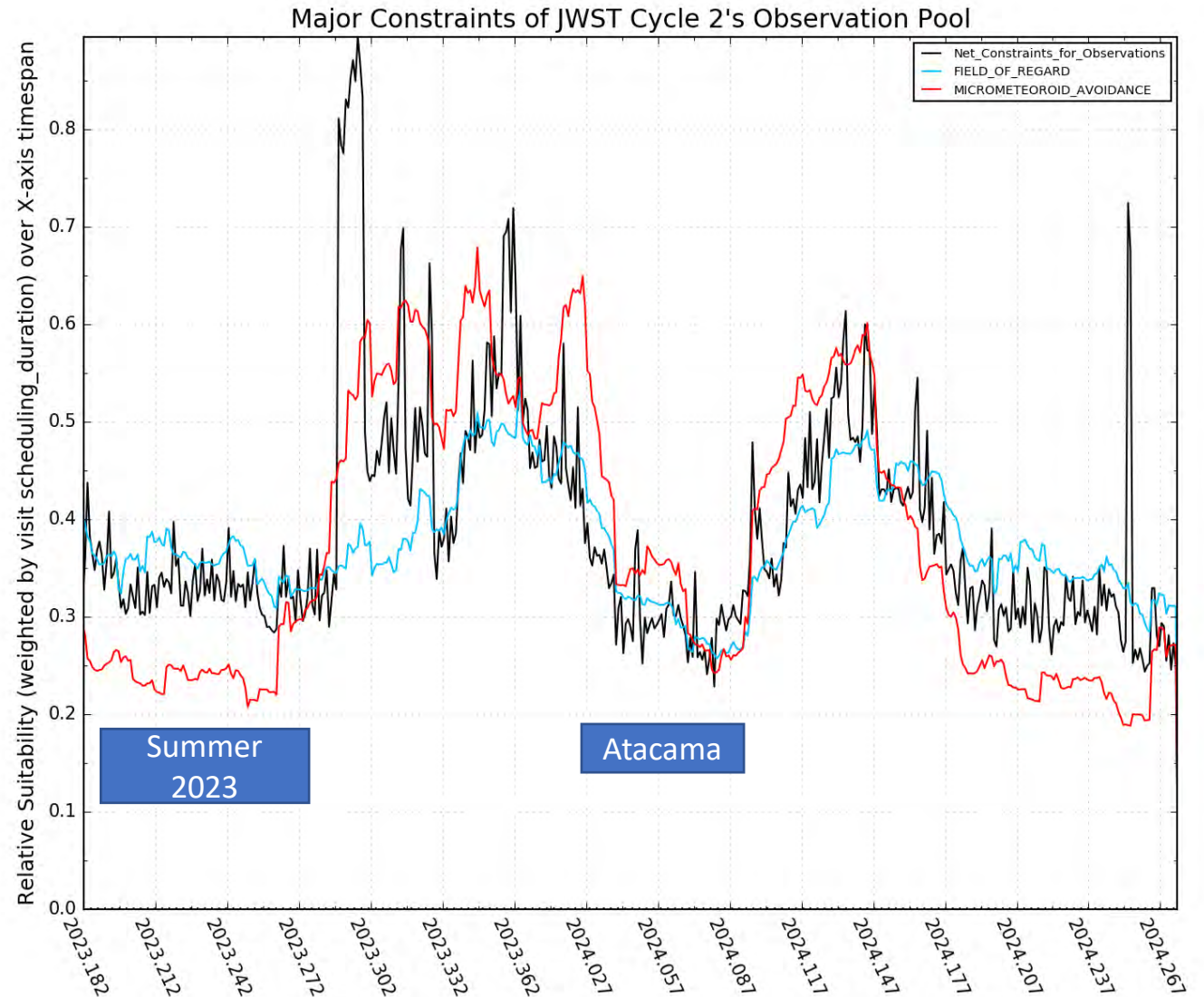


An under-subscription starting after the beginning of the second half of Cycle 2 was resistant to filling by all timely planning measures.



## Why do we have this problem?

- The blue line is the optimal scheduling for JWST Cycle 2 observations (no MAZ constraints)
  - There is a built in asymmetry through the year
- The red line shows the Cycle 2 scheduling profile after applying the MAZ constraints
  - Applying that constraint amplifies the asymmetry
- Cycle 1 observations fill in the summer 2023 scheduling deficit
- We need new, MAZ-compliant observations to fill in the vernal equinox deficit

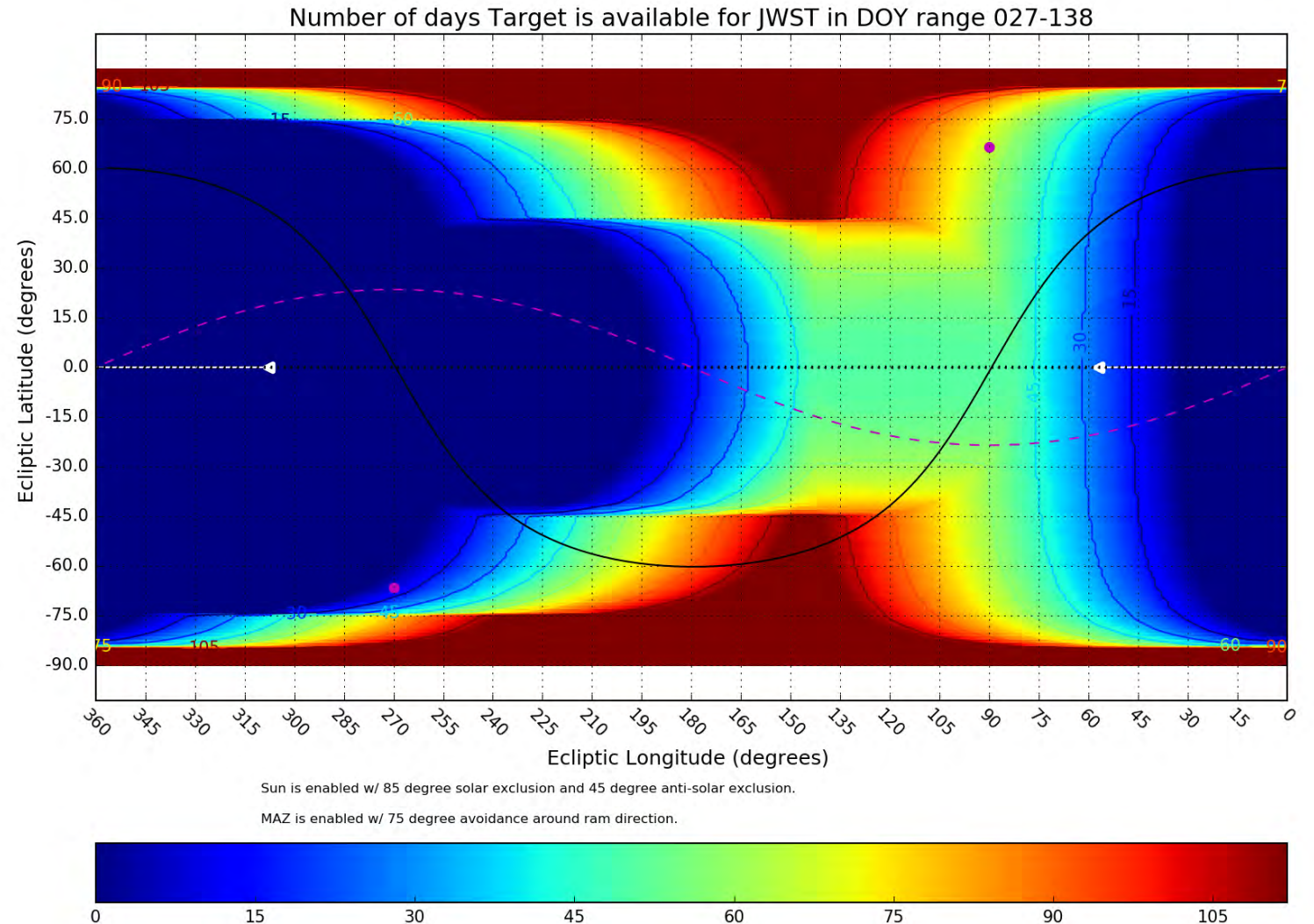




# Where do we need to look on the sky?

The figure shows the preferred observing directions for early 2024

- Blue indicates limited time access → blue is bad
- Green indicates moderate duration access → green is OK
- Red indicates long duration access → red is best

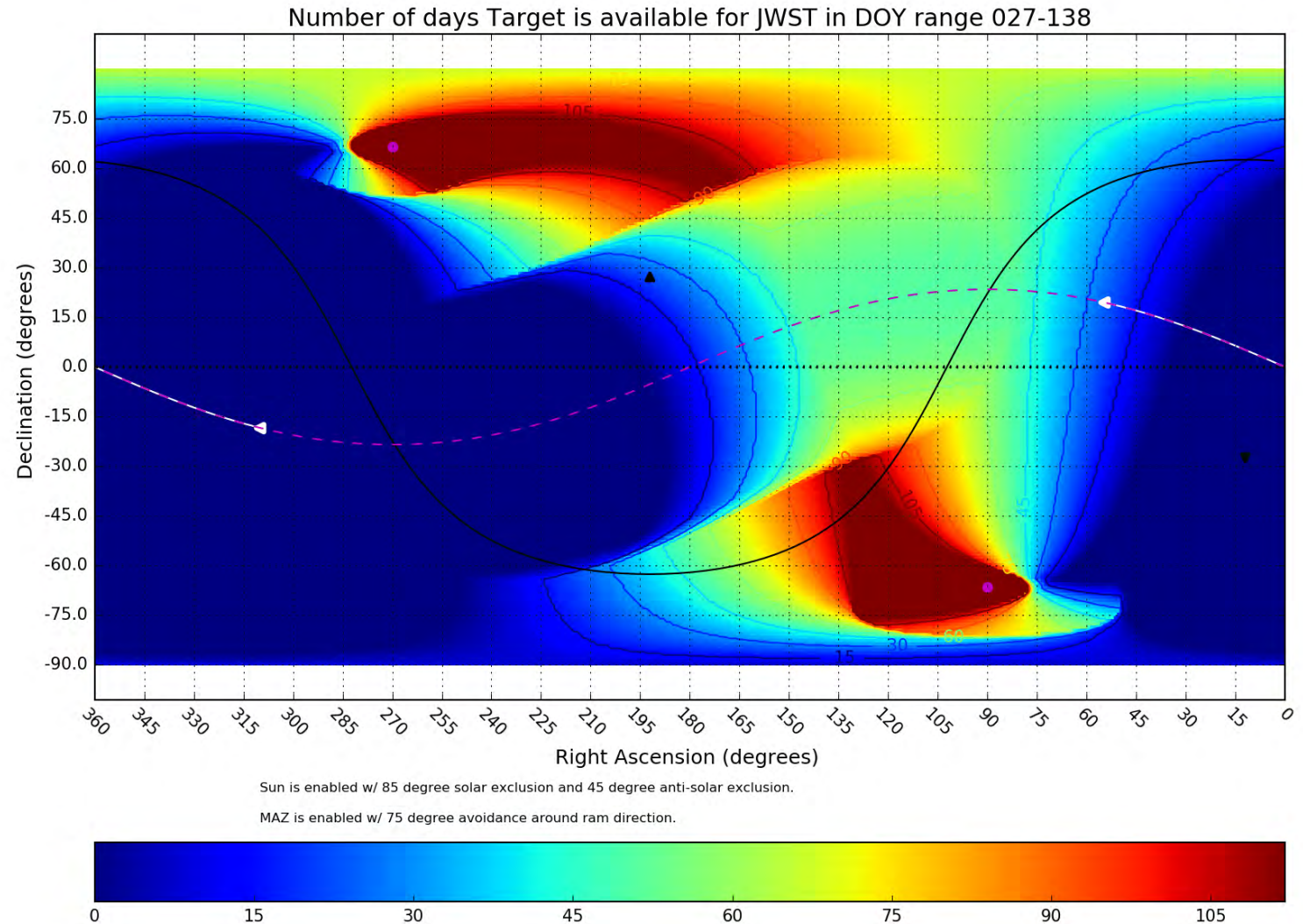




# Where do we look in equatorial coordinates?

This figure translates the preferred regions to  $(\alpha, \delta)$

- Northern region at  $\delta > 45^\circ$ ,  $11^h < \alpha < 18^h$ 
  - Moderate to high galactic latitude
  - Includes HDF, GOODS-N, EGS fields
- Southern region at  $-30^\circ > \delta > -85^\circ$ ,  $5^h < \alpha < 11^h$ 
  - Galactic Plane, Pyxis/Carina region

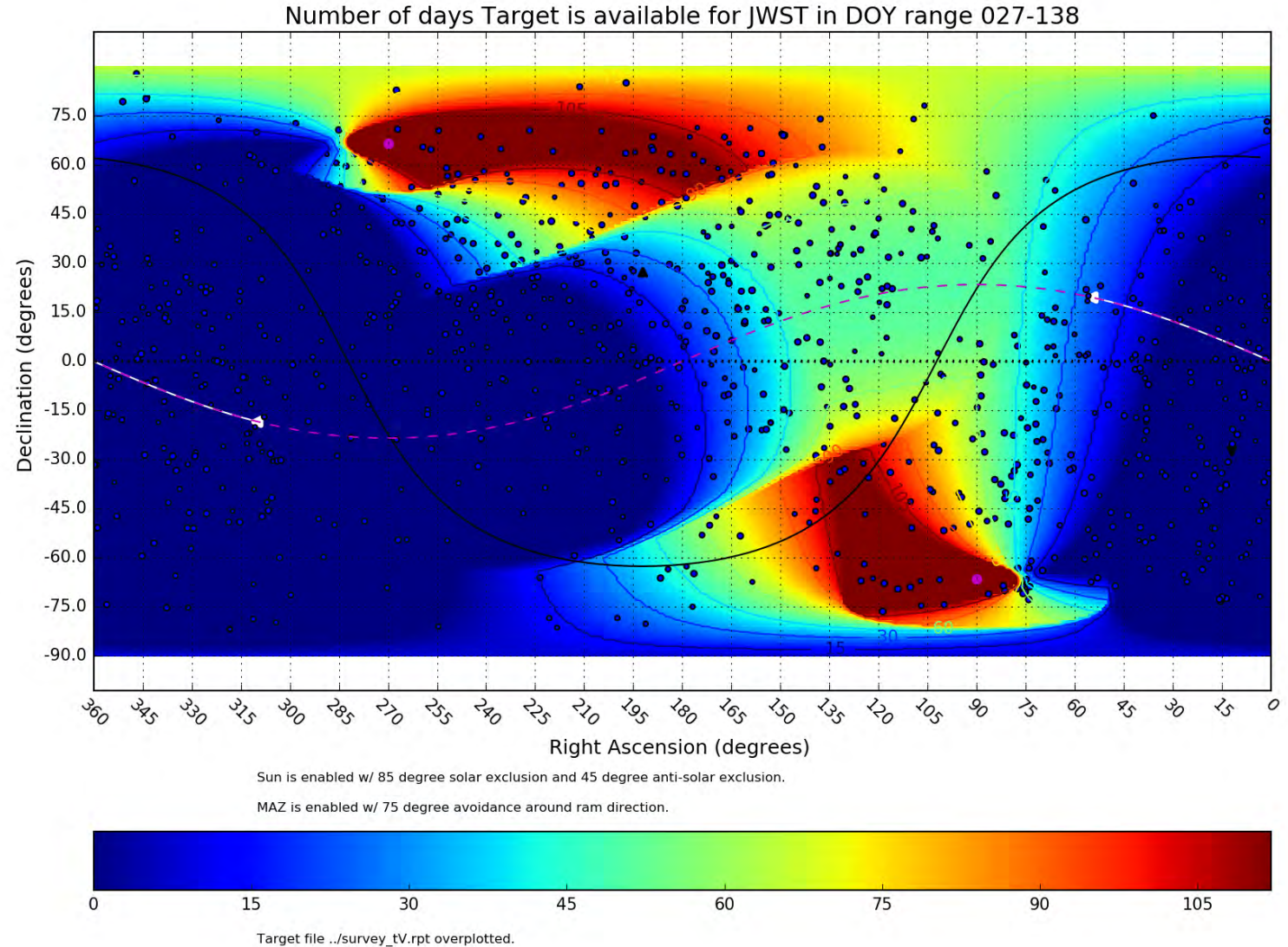




# Do survey programs help?

Yes, but not enough by themselves – need ~550 hrs

SURVEYs and the Atacama	No. Visits	Total duration (hours)
All SURVEY programs	989	1,402
At least 1 day	600	471
At least one week	566	450
At least 1 month	431	308
Midpoint of window	269	183





## Process to identify additional programs

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- Examine the ranked lists from the Cycle 2 TAC – oversubscription, 7:1
  - Review the five proposals immediate below the line for each panel
  - 20 panels, so 100 proposals
- Criteria for selection
  - At least 50% of the program targets must fall in the long-duration scheduling windows identified on slides 4-6
  - In some cases, constraint requirements were applied to ensure scheduling in the first quarter of 2024
- 10 programs identified as matching requirements
  - 7 Extragalactic
  - 3 Galactic/stellar/ISM
  - Programs range in scale from ~7 hours to ~70 hours



## Programs - #1

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- **GO 2974:** The Hubble constant at 1.9% from spatially resolved kinematics of gravitational lens – LSS panel
  - Three of four targets allowed
- **GO 3177:** Mapping Quasar Light Echoes with Lyman-alpha Forest Tomography during the Epoch of Reionization – Galaxies 2
  - One of two targets allowed
- **GO 3224:** Measuring Dust Evolution Over the Past 10 Billion Years With 3-12 micron Spectra for 60 High-Redshift Galaxies - Galaxies 2
  - Observations in GOODS-North & xFLS allowed
- **GO 3523:** Evolution of protoplanetary disks and early stellar evolution in starburst - Stellar Pops1
  - Full program allowed
- **GO 3577:** Complete NIRCам Grism Redshift Survey (CONGRESS) - Galaxies1
  - Observations in GOODS-N allowed with the requirement that they schedule during the Atacama (orientation constraint)



## Candidate proposals – 3702, 3768, 4237, 4291

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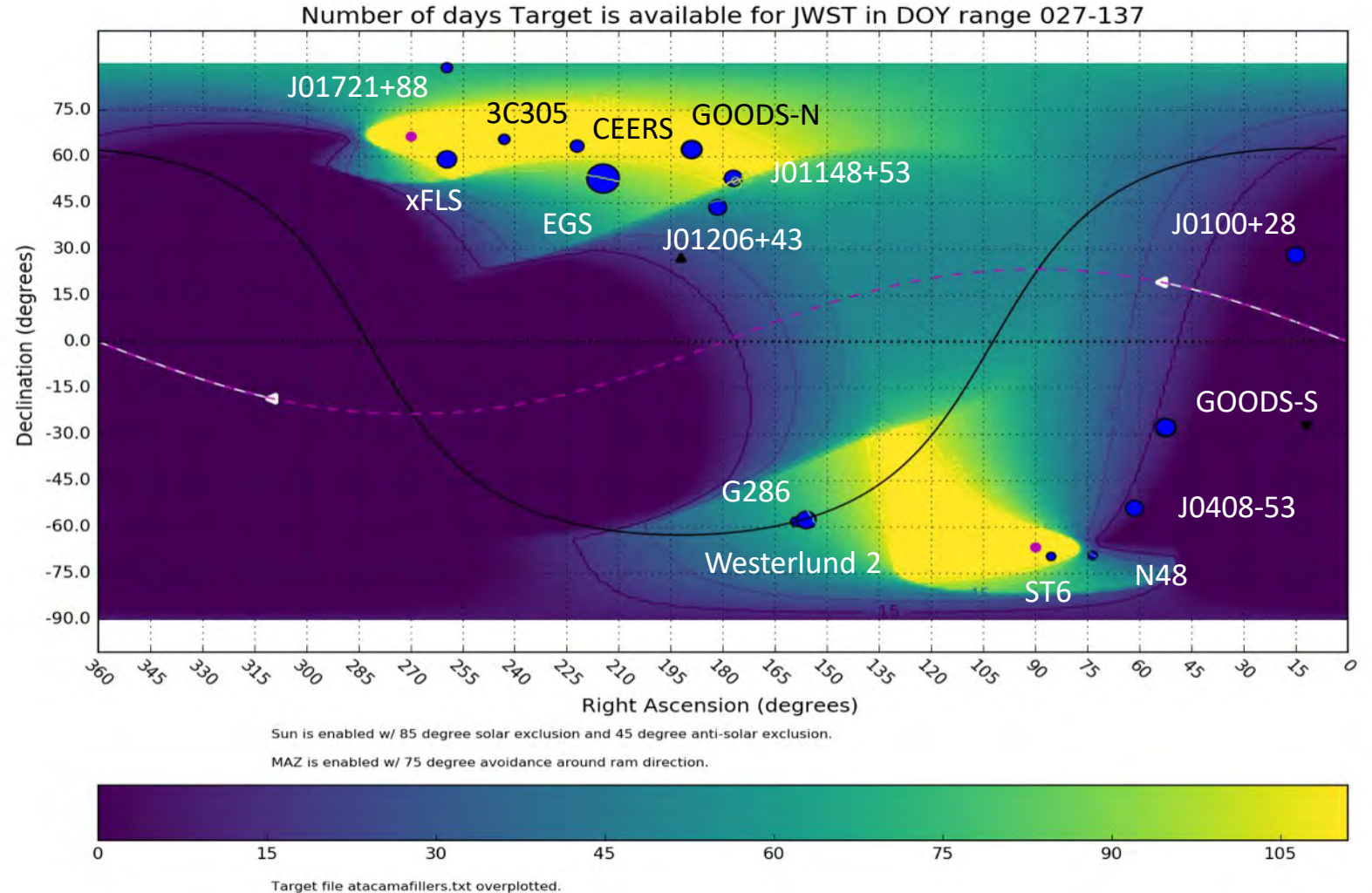
- **GO 3702:** Ice observations toward massive protostars in the low-metallicity Large Magellanic Cloud - StellarPops external
  - Full program allowed
- **GO 3768:** A global view of a massive cluster in formation with JWST - Stellar Pops external
  - Full program allowed
- **GO 4237:** AGN Feedback and Radio-driven Jets in 3C305 - SMBH-external
  - Full program allowed
- **GO 4291:** Galaxy angular momentum alignment with filaments at  $z \sim 3$ , LSS
  - Full program allowed
- **GO 3794:** MEGA Mass Assembly at Cosmic Noon: MIRI EGS Galaxy and AGN Survey - Supermassive Black Holes 1
  - All observations allowed with the requirement that they schedule in the Atacam (orientation constraint)



# Target distribution

**Total duration of 10 programs  
~315 hours**

LRP group estimates that,  
combined with Survey  
observations, these programs will  
address the deficit of observations  
in the Atacama



Colormap: viridis



## Demographics

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### Principal Investigators

- 8 NASA, 2 ESA
- 4 Female, 6 Male (estimated)

### All Investigators

- 166 investigators
- 55 from ESA member countries
- 4 from Canada
- 15 US states & DC
- 15 countries, including USA



## Implementation

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- Principal Investigators and teams were informed in early August
  - JWST Observer article circulated to inform the community
- Teams have the option of submitting budgets for consideration by the Cycle 2 FRC Review (Sept 12-15)
  - Deadline August 29
  - All teams submitted
- Programs will be finalised for inclusion in the LRP by the end of September

### Looking forward

- Cycle 1 observations were not MAZ-constrained, which is an advantage in filling in the summer 2023 deficit
- Cycle 3 observations will be MAZ constrained
  - May be additional challenges combining 2 MAZ-constrained science programs