HWO Red Limit SAG

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Purpose

Clearly articulate the science that would be lost at different wavelength cutoffs due to trade -offs in HWO's design, forfeiting a longer spectral wavelength range. Closely consider the technology and mission architecture aspects that bear upon the near-infrared sensitivity of the observatory.

Establishing the Need

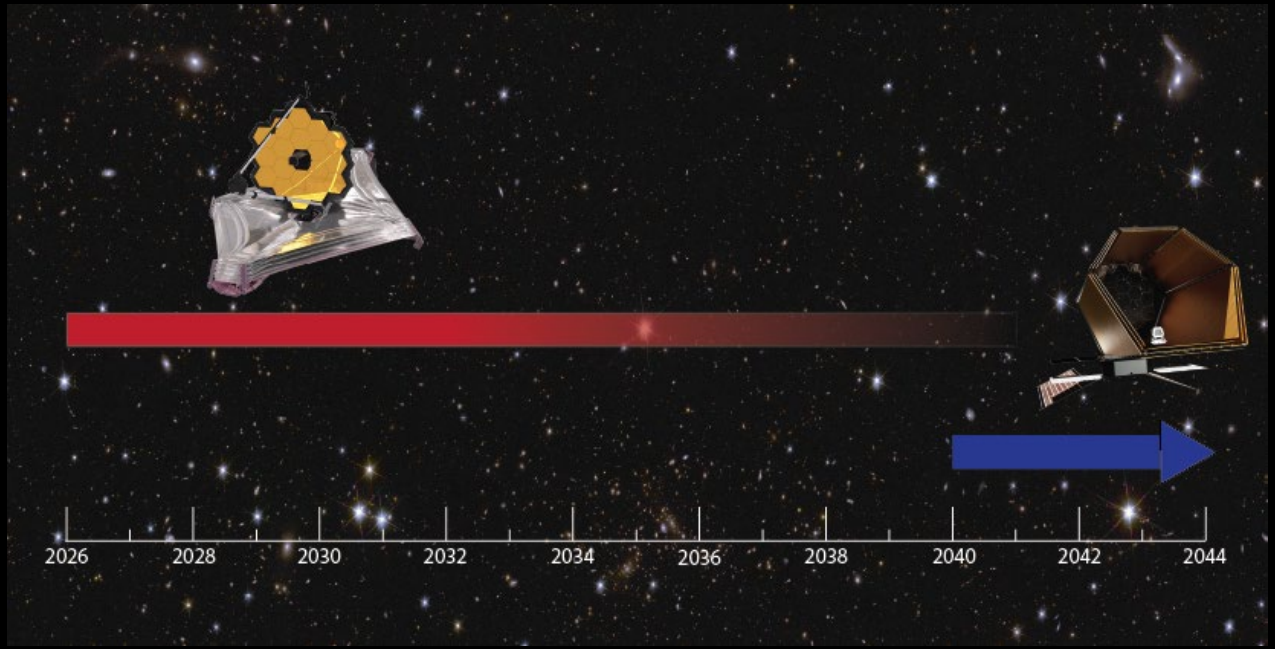
Astro2020 call for a UV/Optical/IR:

This observatory will become one of the most scientifically versatile astronomical telescopes ever flown, and its observations will directly address two-thirds of the 24 key science questions identified in Chapter 2 and will contribute toward answering many of the others.

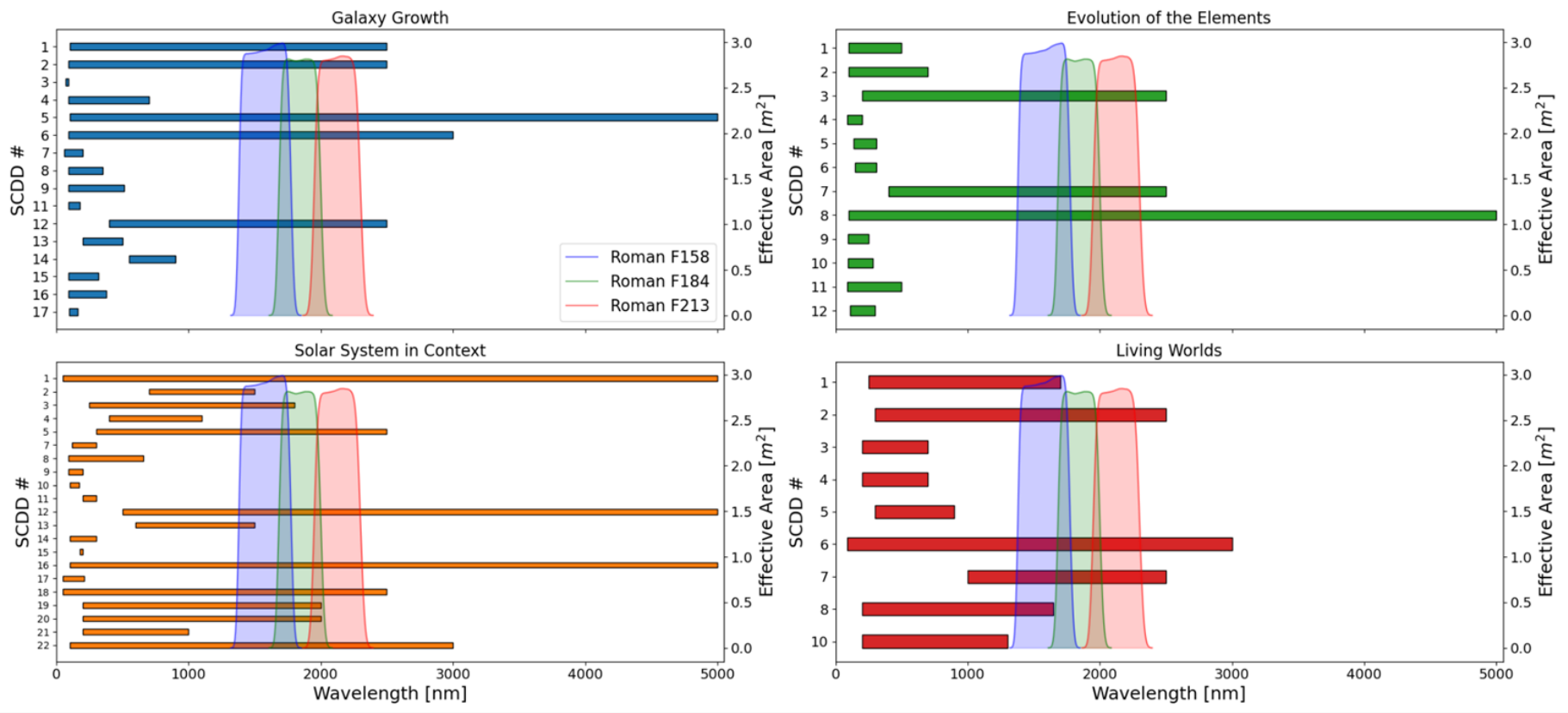
National Academies of Sciences, Engineering, and Medicine. 2023. Pathways to Discovery in Astronomy and Astrophysics for the 2020s. Washington, DC: The National Academies Press. https://doi.org/10.17226/1268.

Establishing the Need

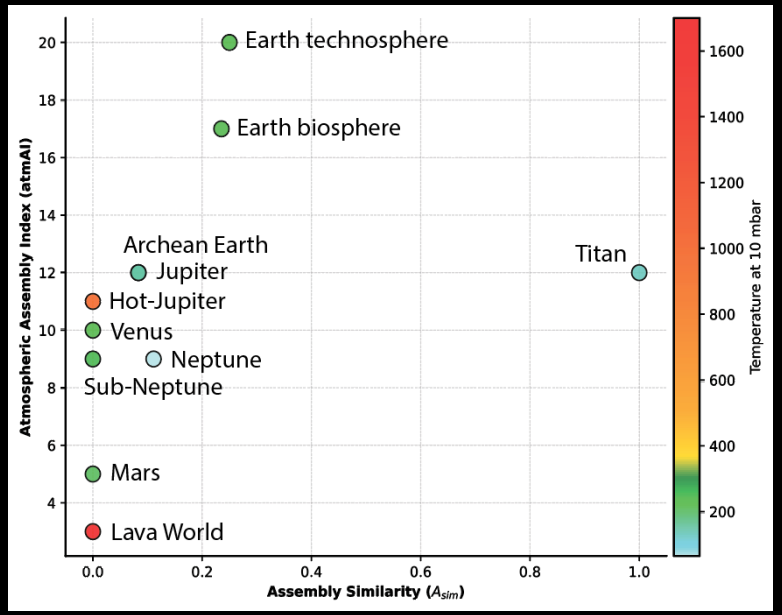
Even at a lifetime of 20 years, JW ST will be nearing the end of its life the time of HW O launch.

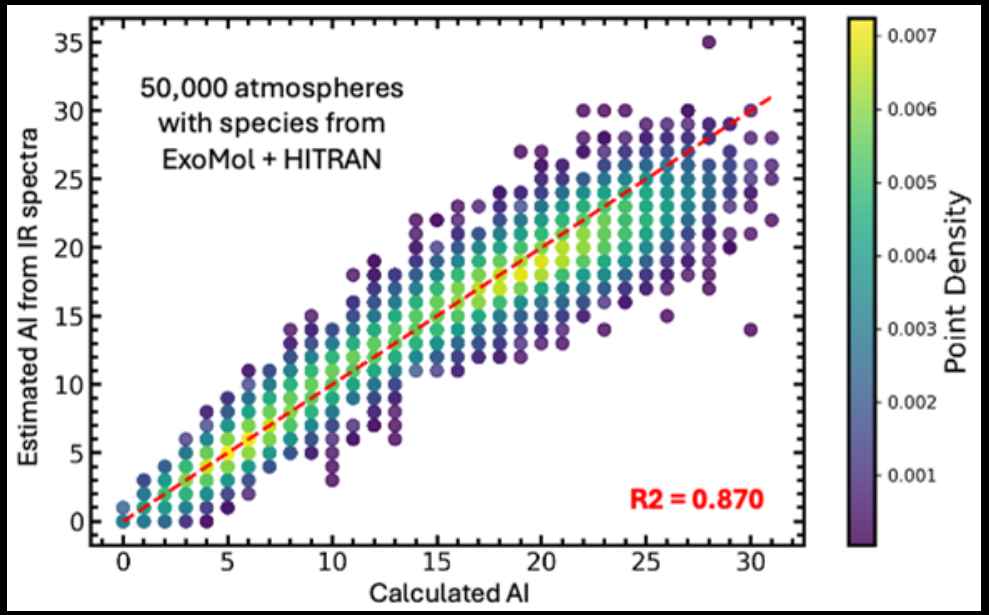


Community Needs



Science Case #1: Life As We Don't Know It (Estelle Janin)



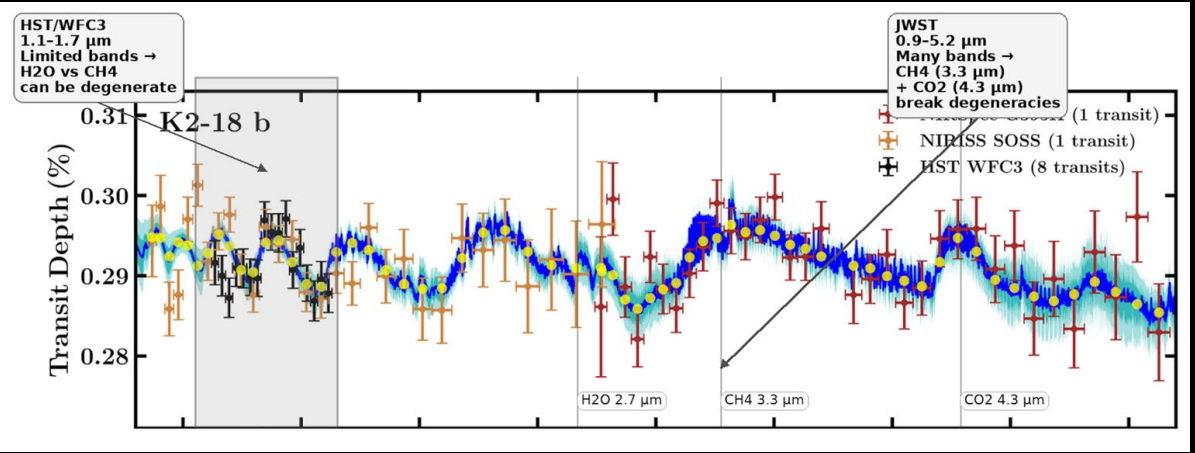


We can directly infer the complexity (atmAI) of an atmosphere through the number of peaks (emission/absorption lines) in the **IR spectrum (R ~ 100, λ > 2 um).**

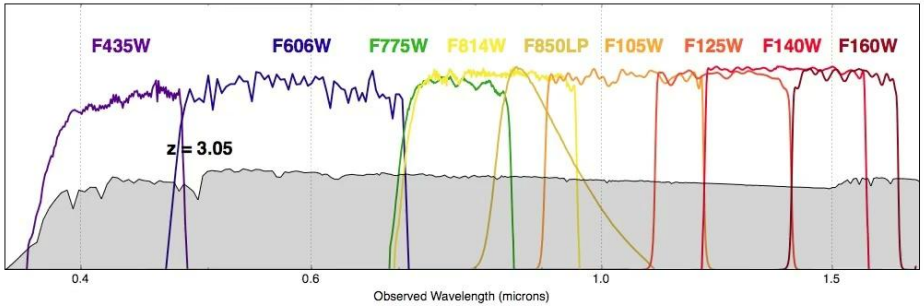
Living Worlds / Exoplanet Science

- ➔ Phase curves of giant planets require **at least 2.5 um** (Science Case: “Characterizing the Dynamics and Chemistry of Transiting Exoplanets with the Habitable World Observatory”)
- ➔ Fundamental lesson from Hubble-JWST comparison: A wider wavelength range is critical to **break degeneracies** and identify an appropriate range of atmospheric species for **accurate retrievals and interpretation**.

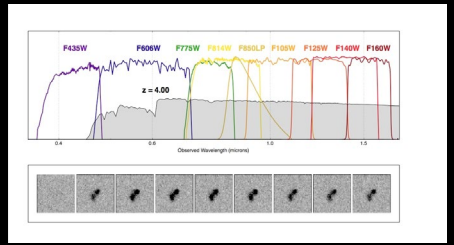
+ general underestimation of IR science cases



Science Case #2: Epoch of Reionization

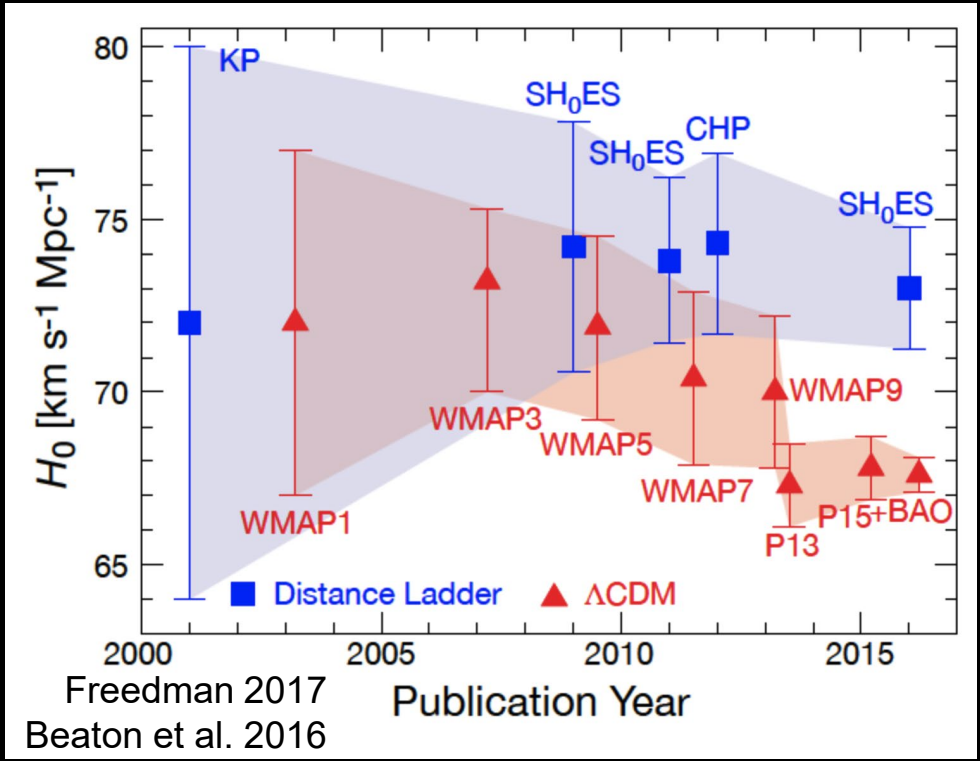


The longest wavelength dictates how much of EoR gets simultaneously mapped.

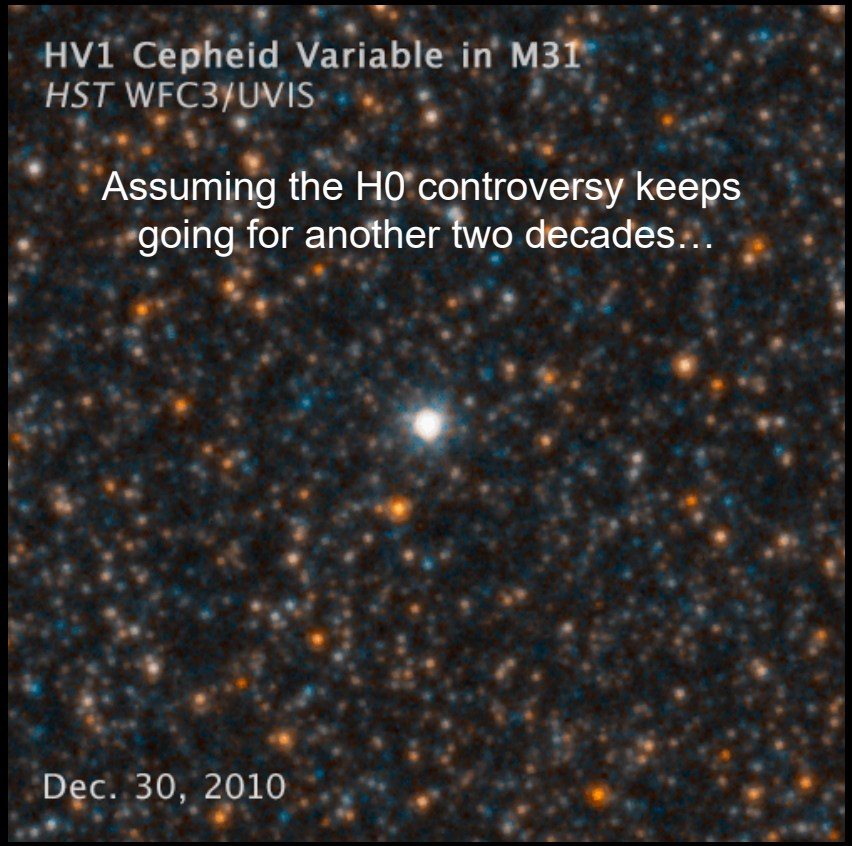


Is it WFC3 or something else?

Science Case #3: Distances



Freedman 2017
Beaton et al. 2016



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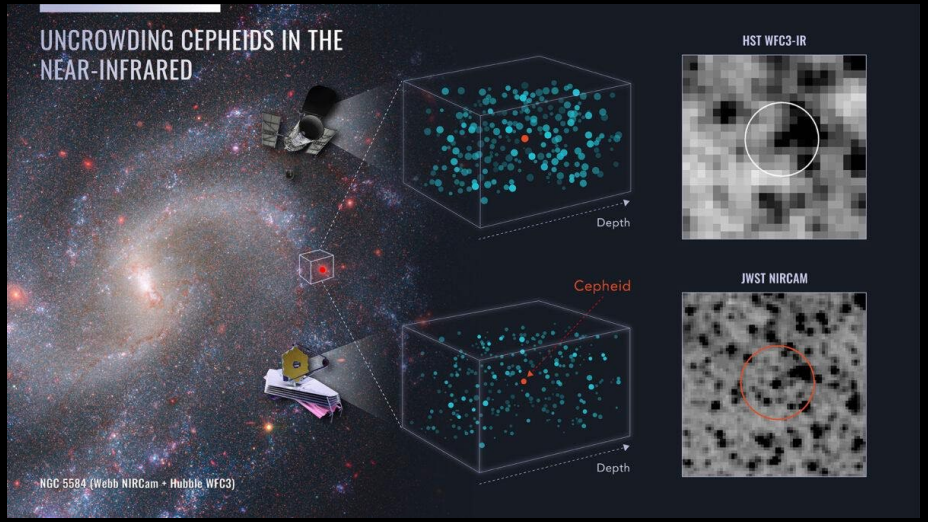

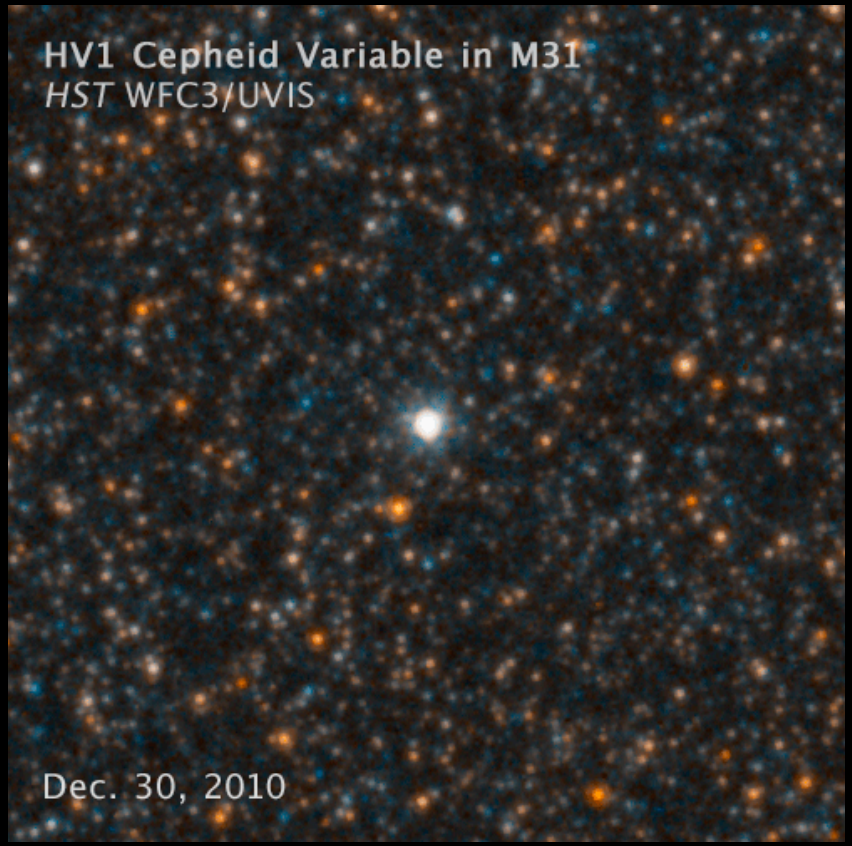

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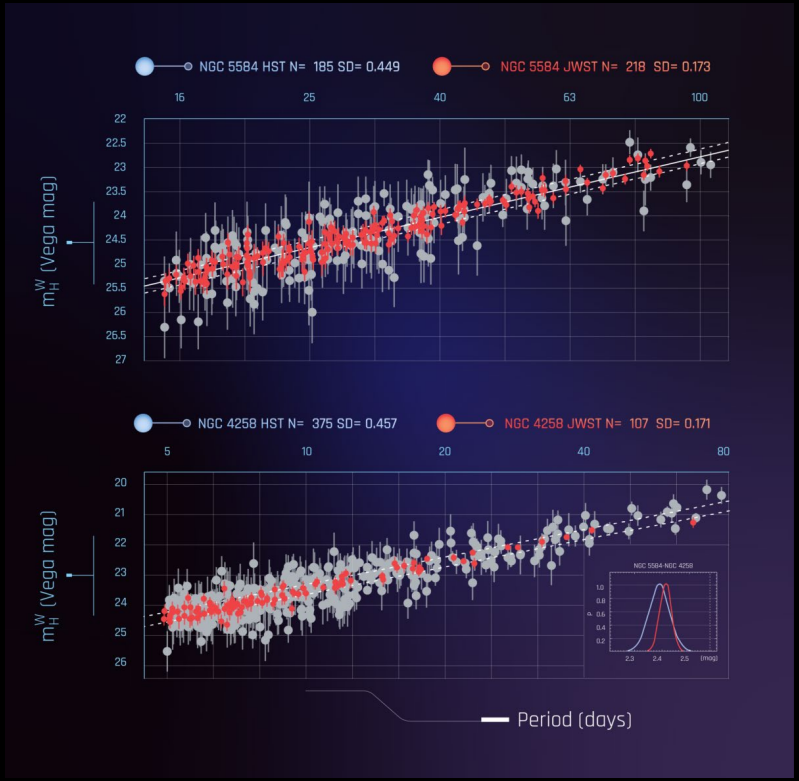
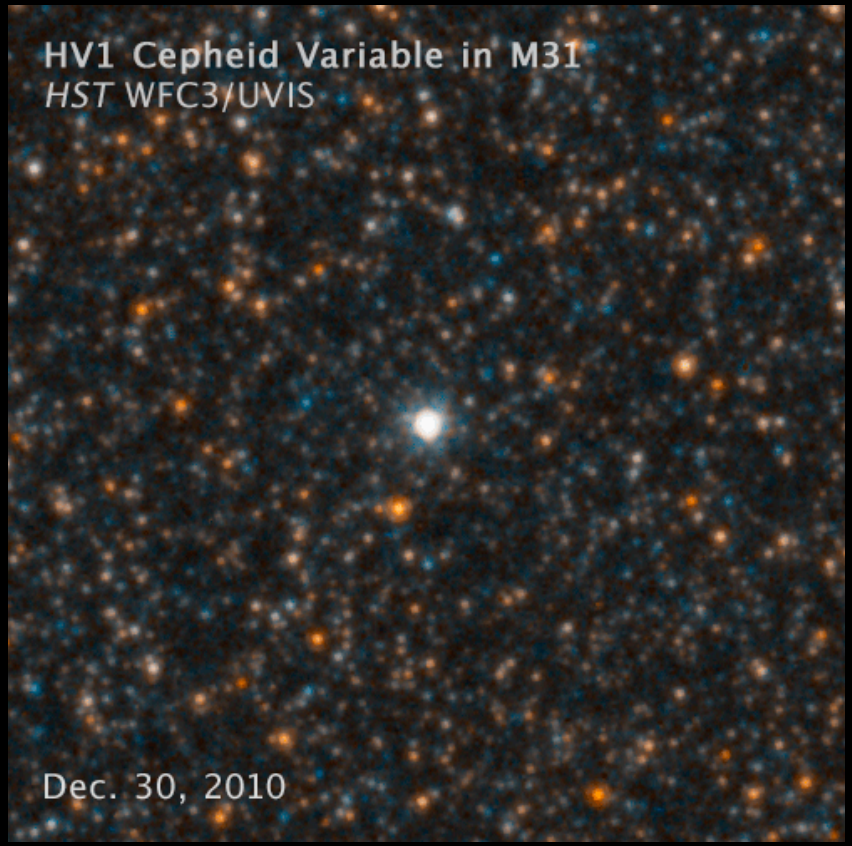
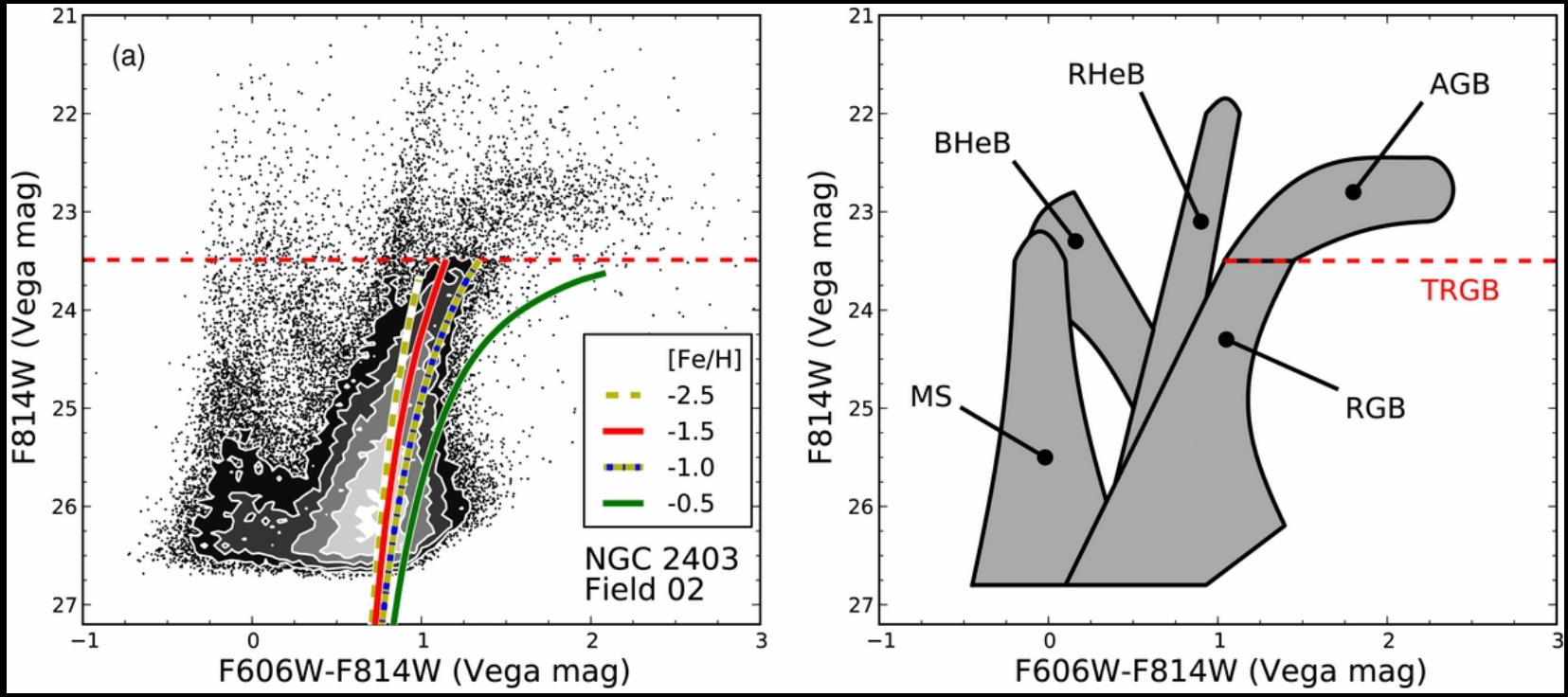




Science Case #4: Stellar Populations



Radburn-Smith+ (2011)

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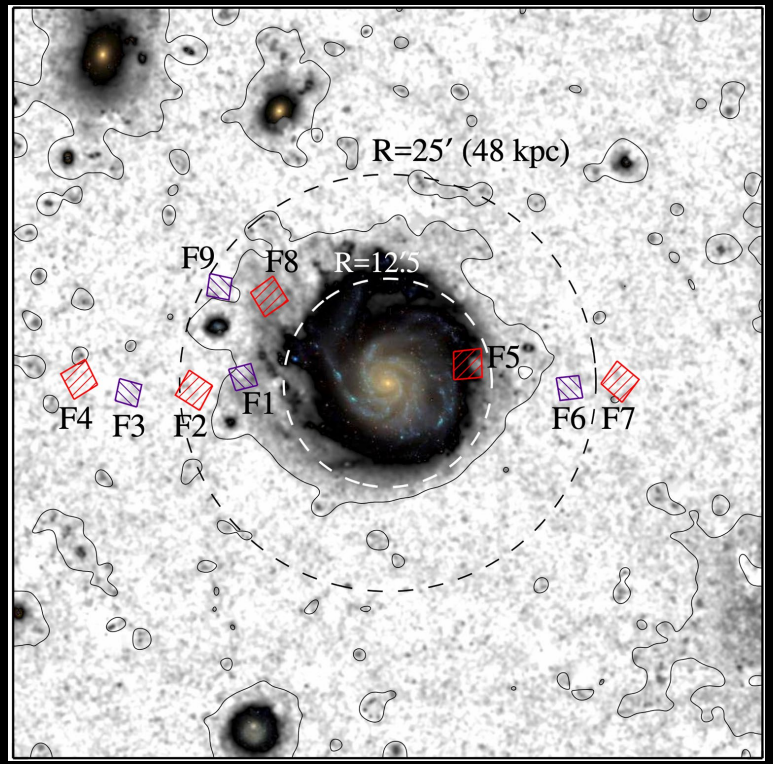
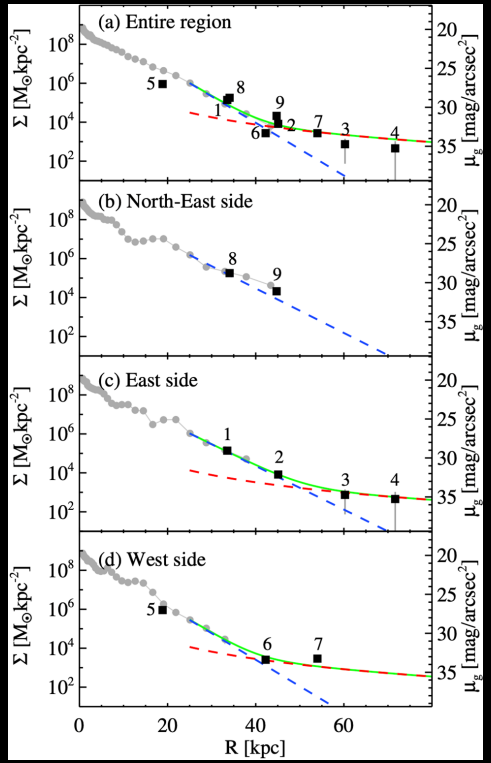




But now do this out to 100 Mpc! Ellipticals! Cluster environments! Galaxies not found by Messier

Jang+ A&A, 2020

Goals and Considerations

The SAG will produce a white paper that:

- Clearly articulates the science lost at different wavelength cutouts
- Reports on the architecture considerations that influence the red limit

Solicitation/Contact

Want to contribute to defining the red limit of HWO?

Contact the SAG at Red-Limit-SAG-owner@lists.nasa.gov

Or

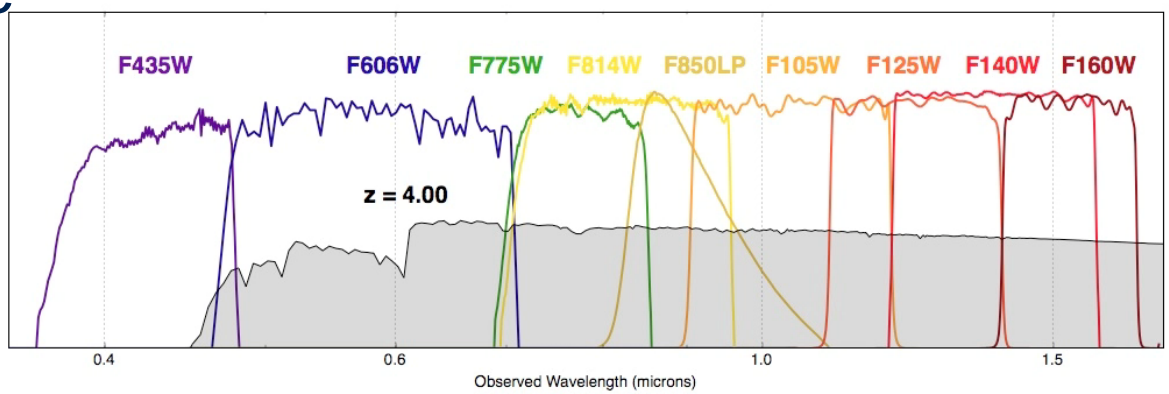
Join the mailing list by sending an email with “join” in the subject.

Red Limit Website

Red Limit Email

High Redshift Galaxies

Blue → Red



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