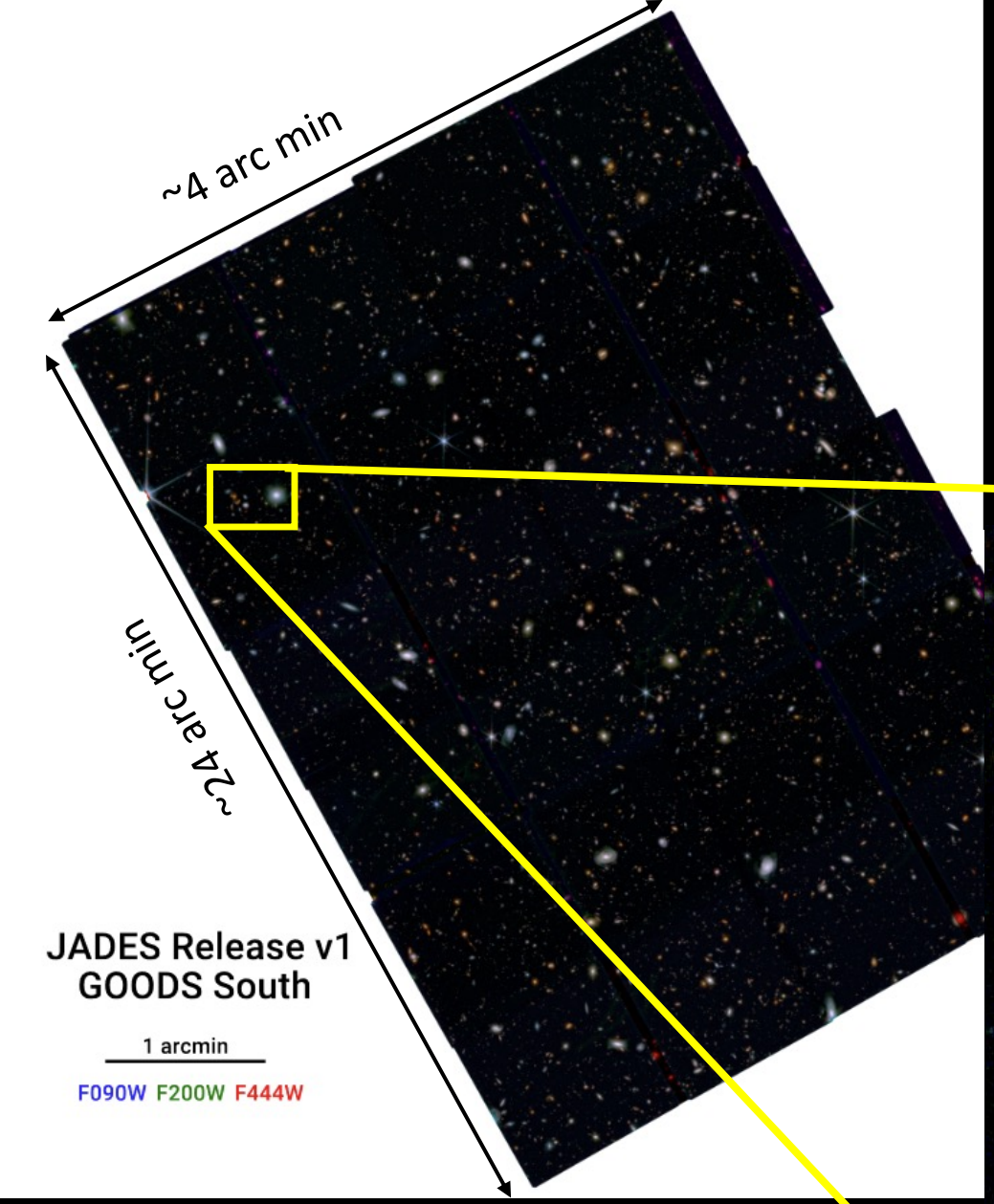
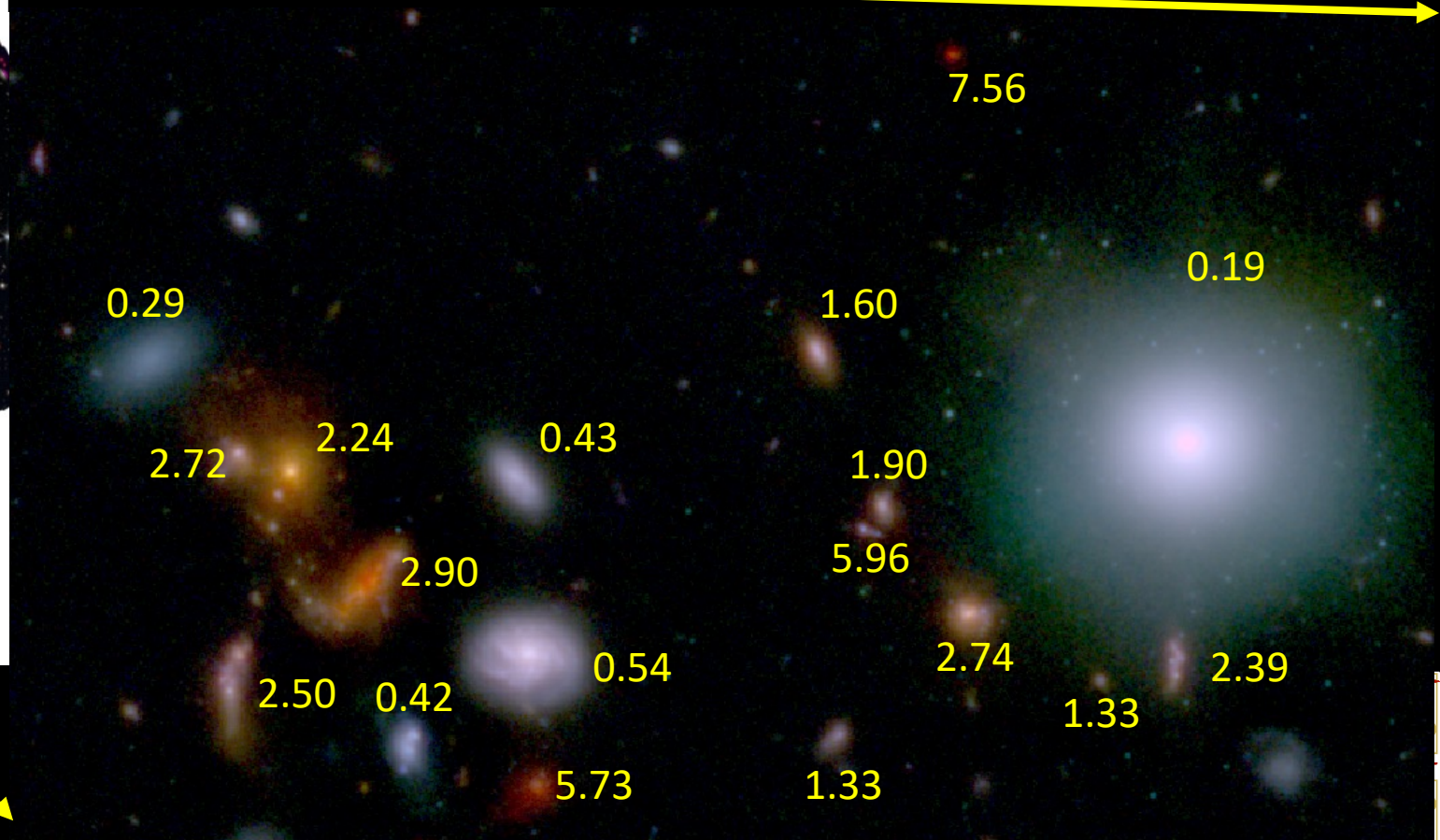
The JWST Advanced Deep Extragalactic Survey: Overview of Results and First Data Release

Marcia Rieke on behalf of the JADES Collaboration

June 6, 2023

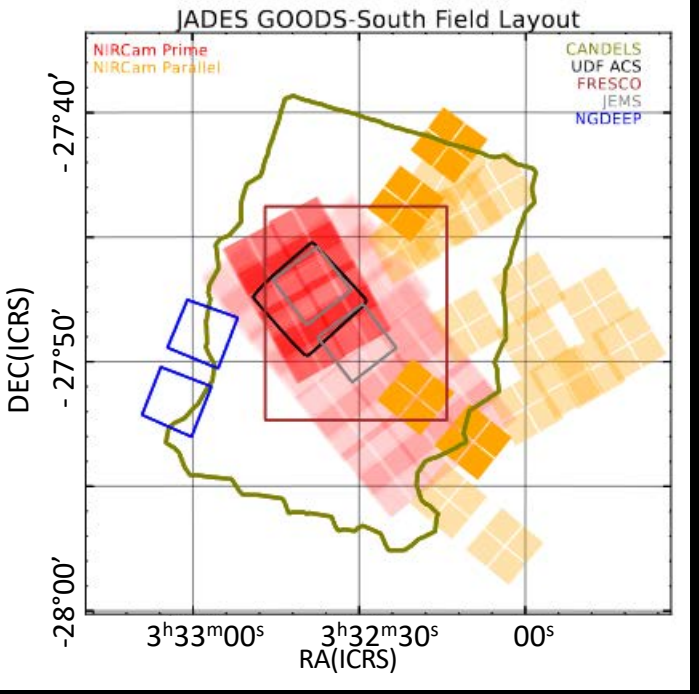


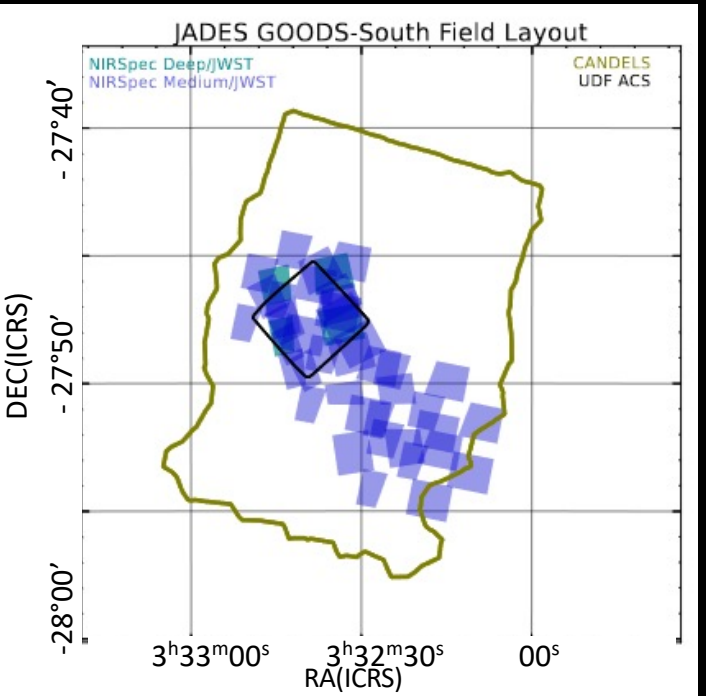


The JADES Collaboration

Contributing Team Members: Stacey Alberts, Ricardo Amorin, Santiago Arribas, William Baker, Stefi Baum, Rachana Bhatawdekar, Nina Bonaventura, Rebecca Bowler, Kit Boyett, Hubert Bretonnière, Andy Bunker, Alex Cameron, Stefano Carniani, Stephane Charlot , Zuyi Chen, Jacopo Chevallard, Chiara Circosta , Mirko Curti, Emma Curtis-Lake, Lola Danhaive, Christa DeCoursey, Francesco D'Eugenio, Anna de Graaff, Alan Dressler, Ugne Dudzeviciute, Eiichi Egami, Daniel Eisenstein , Ryan Endsley , Pierre Ferruit , Michael Florian, Marijn Franx, Giovanna Giardino, Justus Gibson, Kevin Hainline, Ryan Hausen, Jake Helton, Yu-hsiu Huang, Bernd Husemann, Raphael Hviding, Peter Jakobsen , Zhiyuan Ji, Ben Johnson, Sean Johnston, Gareth Jones, Nimisha Kumari, Isaac Laseter, Sophie Lebowitz, Tobias Looser, Nora Luetzgendorf, Jianwei Lyu, Zheng Ma, Roberto Maiolino , Michael Maseda, Erica Nelson, Elenora Parlanti, Michele Perna, David Puskas, Tim Rawle, George Rieke, Marcia Rieke, Hans-Walter Rix, Brant Robertson, Bruno Rodriguez del Pino, Wiphu Rujopakarn, Lester Sandles, Aayush Saxena, Jan Scholtz, Katie Sharpe, Irene Shivaei, Maddie Silcock, Charlotte Simmonds, Maya Skarbinski, Renske Smit, Daniel Stark, Meredith Stone, Wren Suess, Fengwu Sun, Sandro Tacchella, Mengtao Tang, Michael Topping, Hannah Űbler, Giacomo Venturi, Natalia Villanueva, Imaan Wallace, Lily Whitler, Christina Williams, Christopher Willmer , Chris Willott, Joris Witstok, Charity Woodrum

With this special session, JADES is announcing the first data release. See https://archive.stsci.edu/hlsp/jades.





What is JADES?

In 2015 the NIRSpec and NIRCam GTO Teams realized that combining observing plans would benefit both teams.

-- NIRCam images are needed for positioning NIRSpec slits on JWST-only sources and for slit loss corrections

-- NIRCam will detect 10s of 1000s more sources than can be realistically studied spectroscopically so spectra to tune-up photo-zs for high-z sources are needed

We also designed a scheme where both NIRCam and NIRSpec can be operated in parallel to double the exposure time available to the program (~400 hrs from each team becomes ~1600 hrs for the full program)

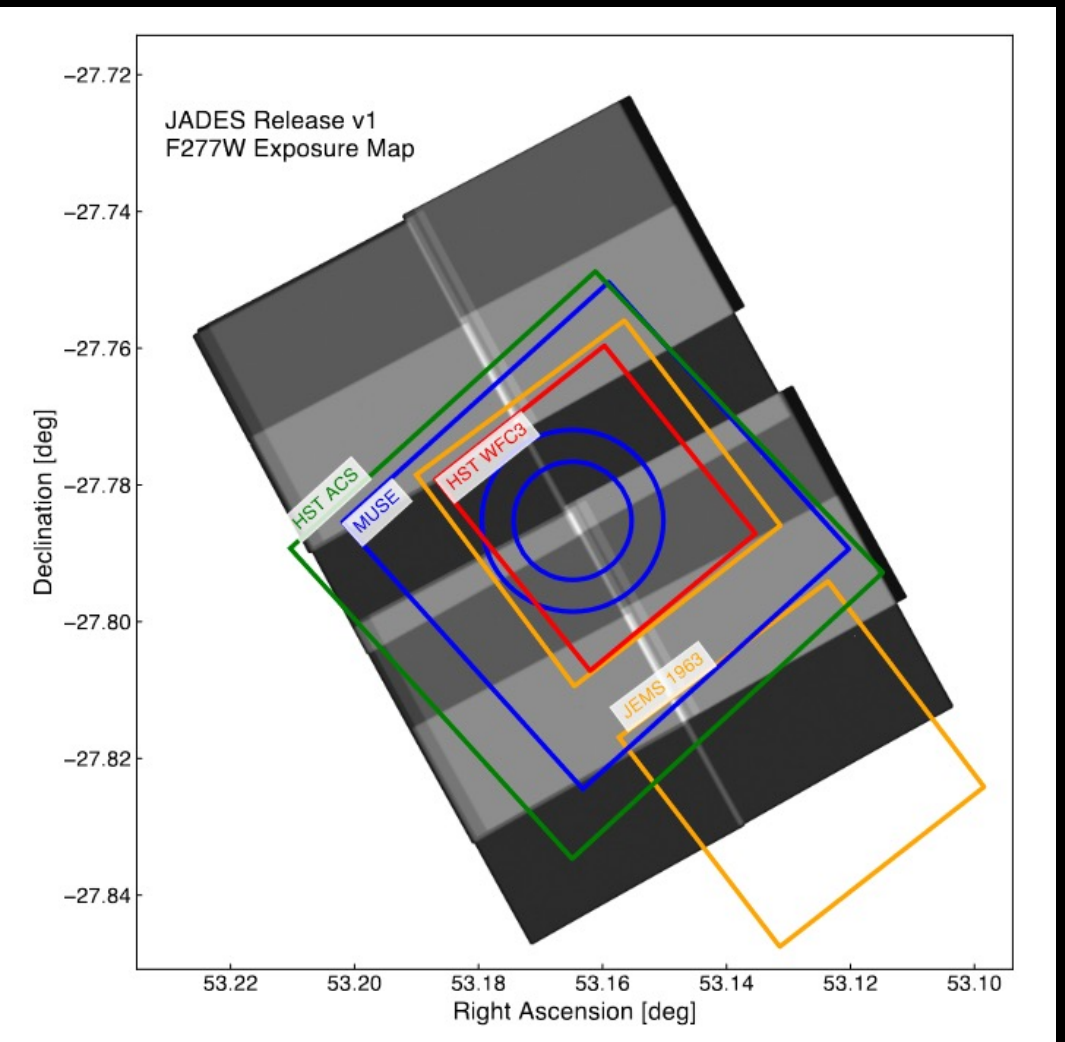
Program includes some MIRI parallels and medium depth observations of GOODS-N.

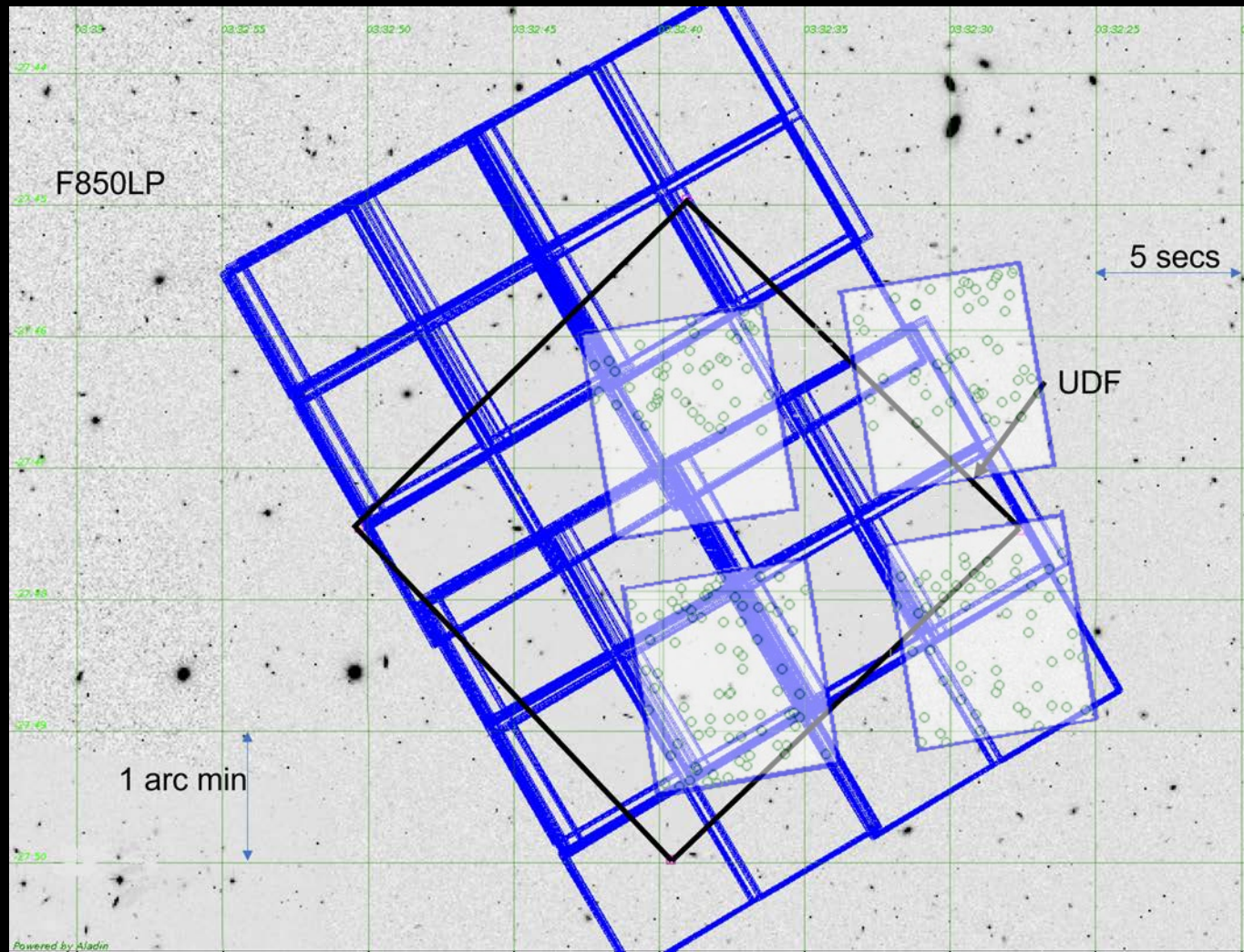
NIRCam imaging includes F090W, F115W, F150W, F200W, F277W, F335M, F356W, F410M, and F444W.

NIRSpec spectra use the R~100, R~1000, and R~2700 with the largest number of sources observed at R~100.

Contents of the First Data Release

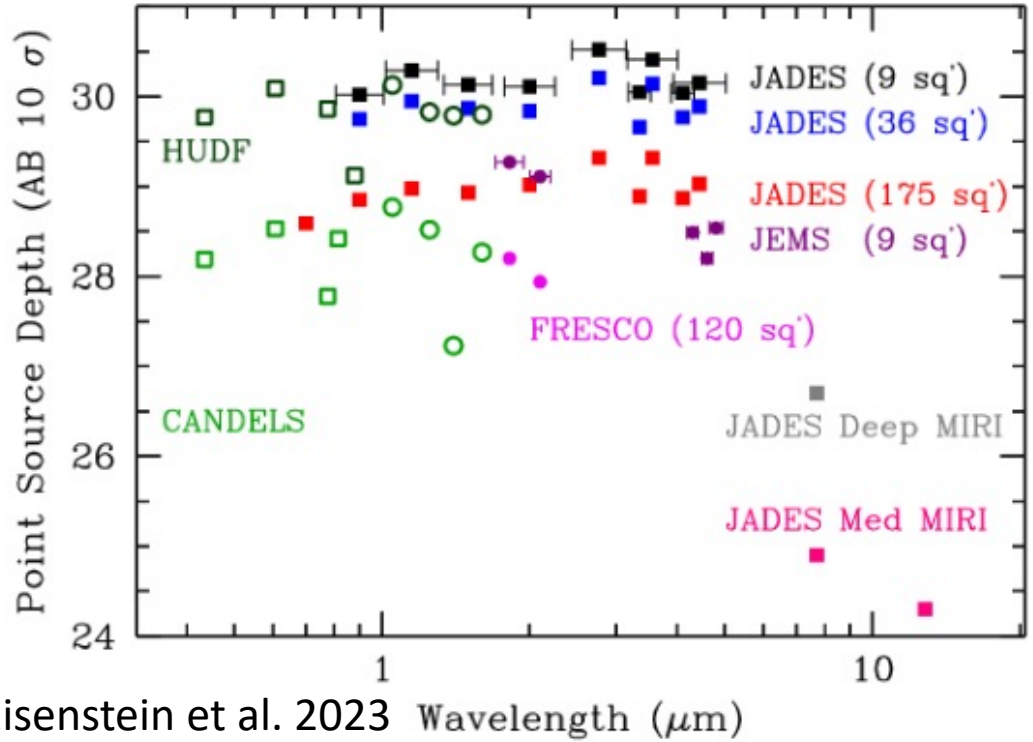
The raw data for the “Deep” NIRCam exposures from PID 1180 and the spectra from PID 1210 are available from MAST. Mosaics, extracted spectra, and catalogs are available at https://archive.stsci.edu/hlsp/jades. Parallel exposures will be released later.





Survey Depths

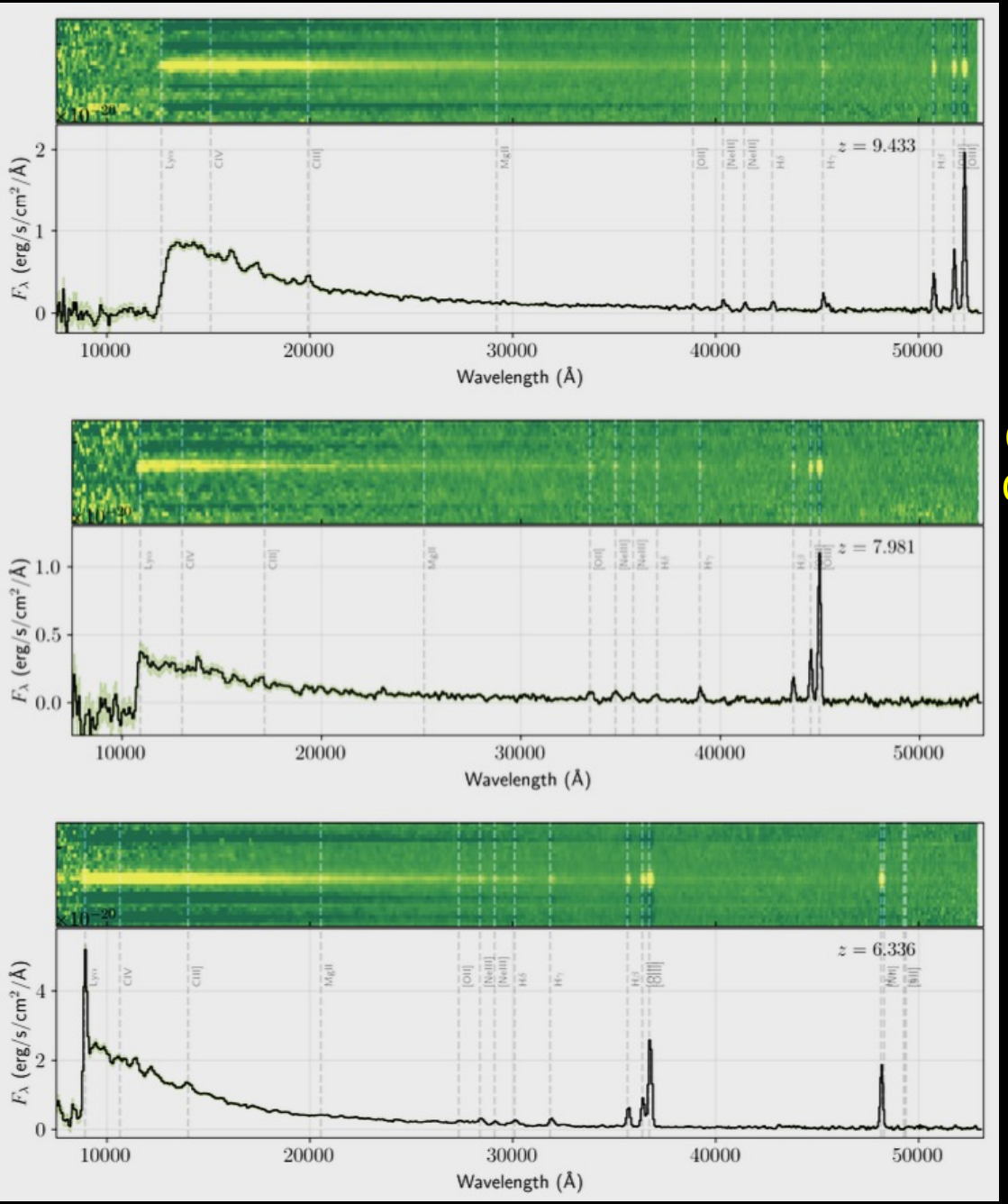
Subsurvey	Program	# Fields	Subpointings	Exposure Times (ksec) Prism	G140M	G235M	G395M	G395H
GOODS-S Deep/HST	1210	1	3	100	25	25	25	25
GOODS-S Deep/JWST	1287	1	3	100	25	25	25	25
GOODS-S Medium/HST	1180	7[ab]	1	3.8	3.1	3.1	3.1	—
GOODS-S Redo Obs 134	1180	1[c]	2	7.5	6.2	6.2	6.2	—
GOODS-S Redo Obs 135	1180	1[c]	3	11.3	9.3	9.3	9.3	—
GOODS-S Medium/JWST	1286	8	3	8.0	8.0	9.3	9.3	8.0
GOODS-N Medium/HST	1181	8[a]	1	6.2	3.1	3.1	3.1	—
GOODS-N Medium/JWST	1181	4	3	9.3	9.3	9.3	9.3	9.3



Eisenstein et al. 2023

Filter	Deepest (9 arcmin^2) Time (ks)	PS Depth AB mag	Deep (36 arcmin^2) Time (ks)	PS Depth AB mag	Medium (175 arcmin^2) Time (ks)	PS Depth AB mag
F070W[a]	...	...	...	...	7.1	28.59
F090W	79.3	30.02	48.6	29.75	9.2	28.85
F115W	134.5	30.29	71.9	29.95	12.1	28.98
F150W	79.3	30.13	48.6	29.87	8.6	28.93
F200W	56.0	30.11	34.3	29.84	7.6	29.02
F277W	78.0	30.52	44.0	30.21	8.5	29.32
F335M[b]	56.3	30.05	27.7	29.66	6.7	28.89
F356W	56.3	30.41	34.4	30.14	7.6	29.32
F410M	79.3	30.04	48.6	29.77	9.2	28.87
F444W	79.3	30.15	49.3	29.89	10.1	29.03

Sample Spectra and Slit Maps



R~100 Prism spectra Bunker et al. arXiv 2023.nnnnn

One MSA Quadrant

1.8’

Green = both R~100 and R~1000 Red = R~100 only

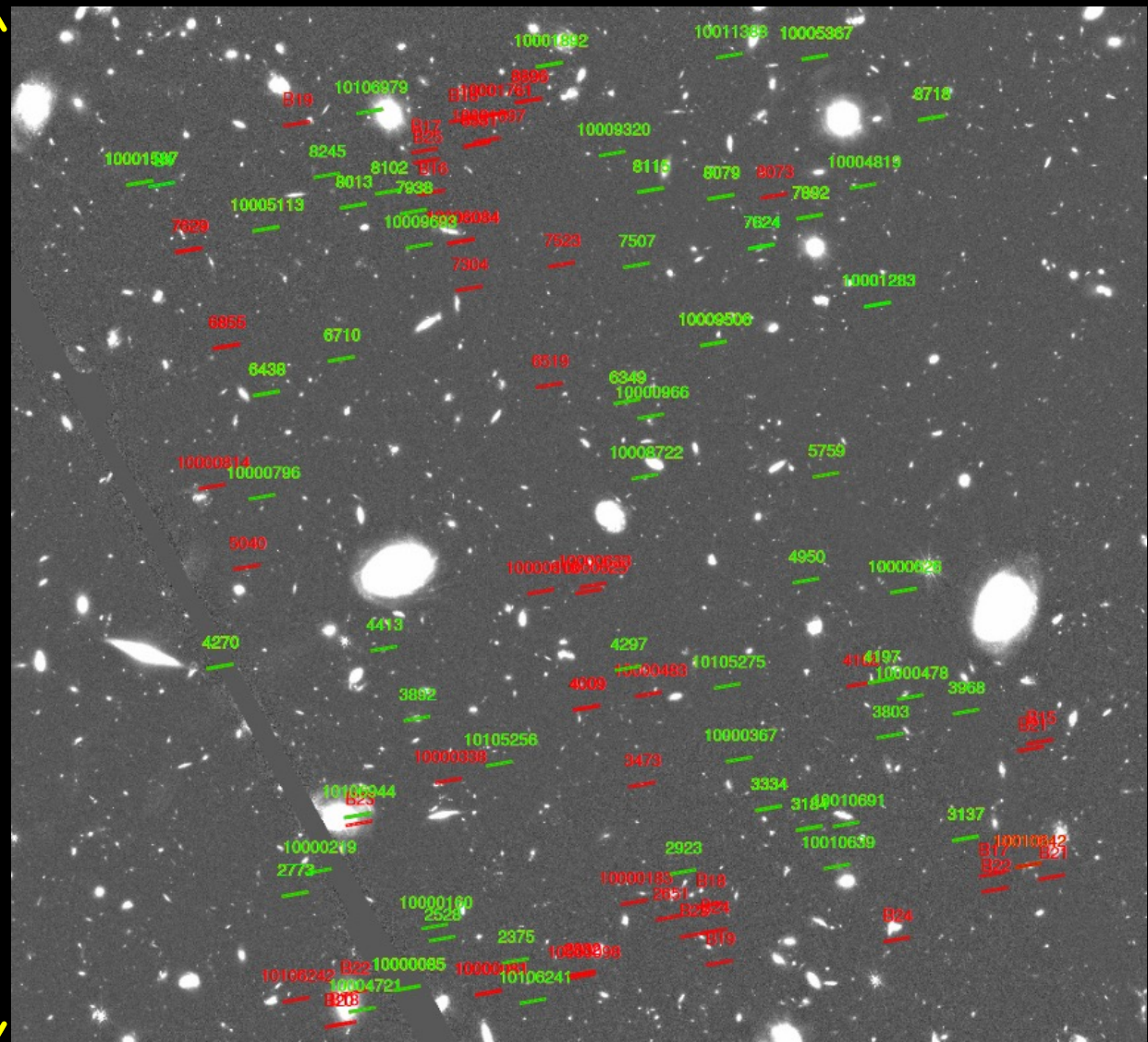
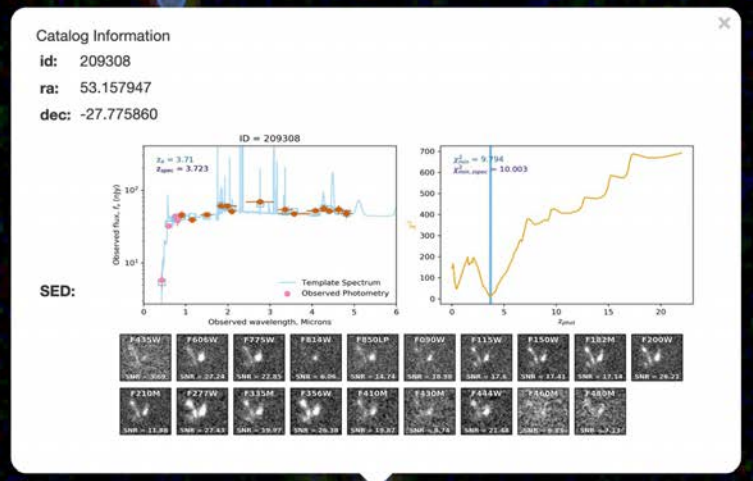


Image Browsing Tool: FITSMap



Available at

http://jades.idies.jhu.edu/

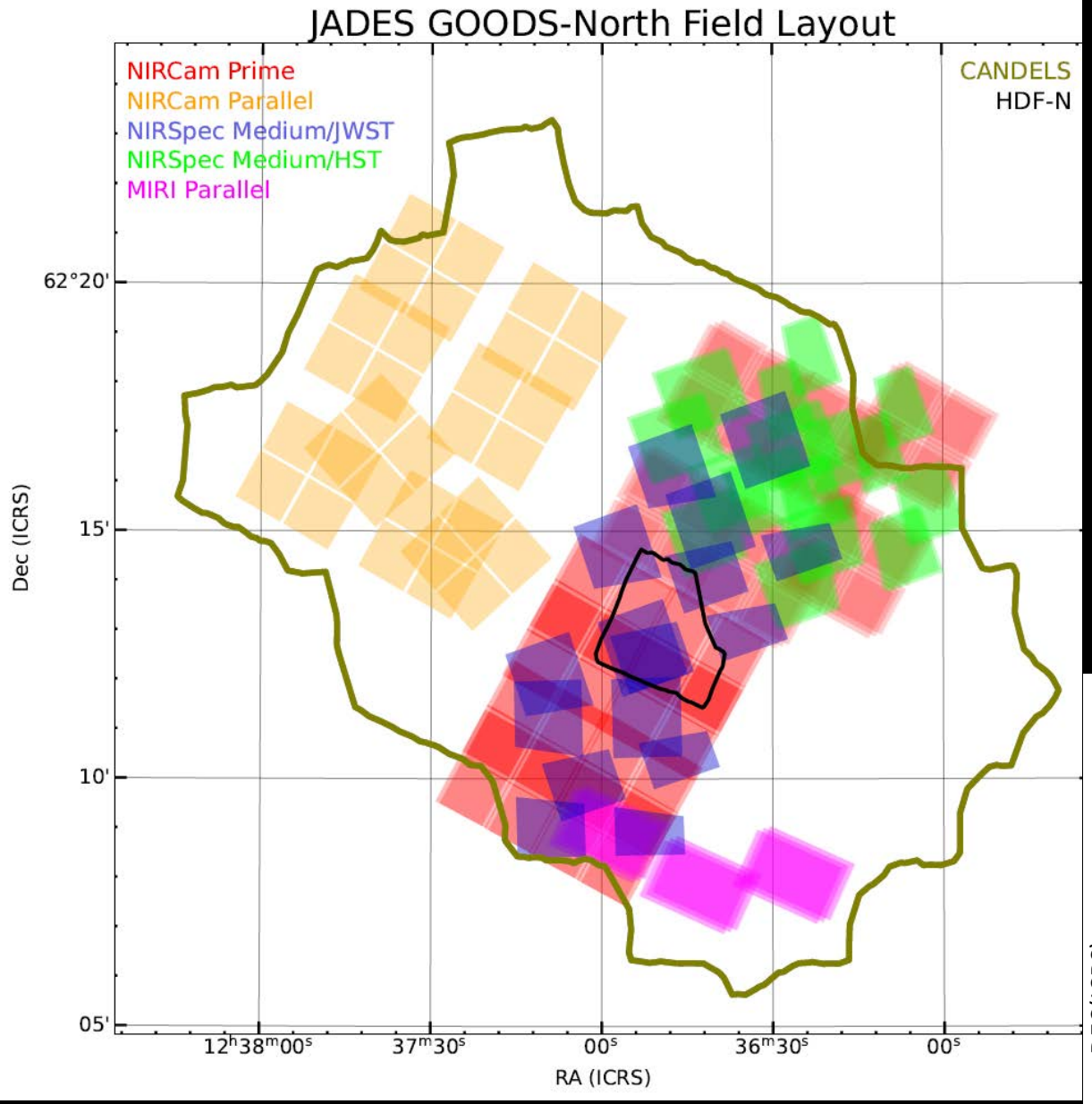
The JADES team has found this tool to be very convenient for quickly examining an object on all of the available images (can be fun to just look around!).

The tool is linked to the photometric and photo-z catalogs.

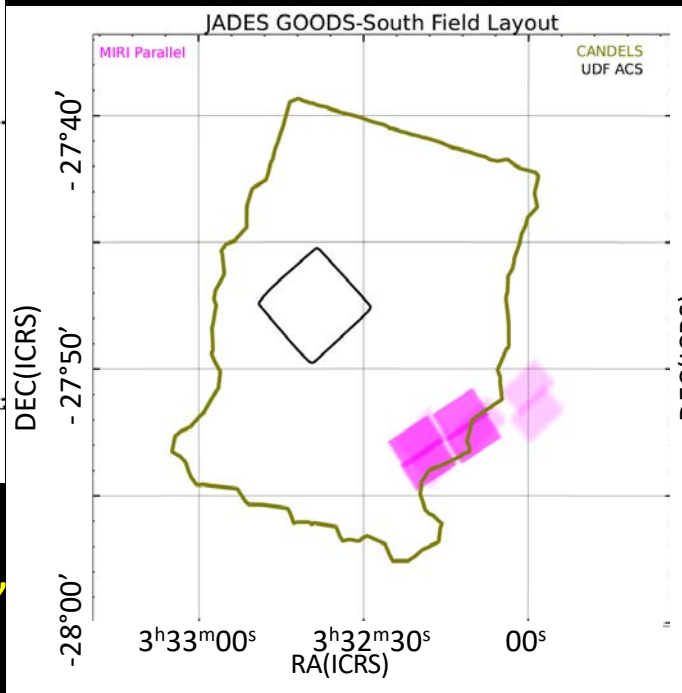
Image Controls Zoom Mosaic choice & catalog access

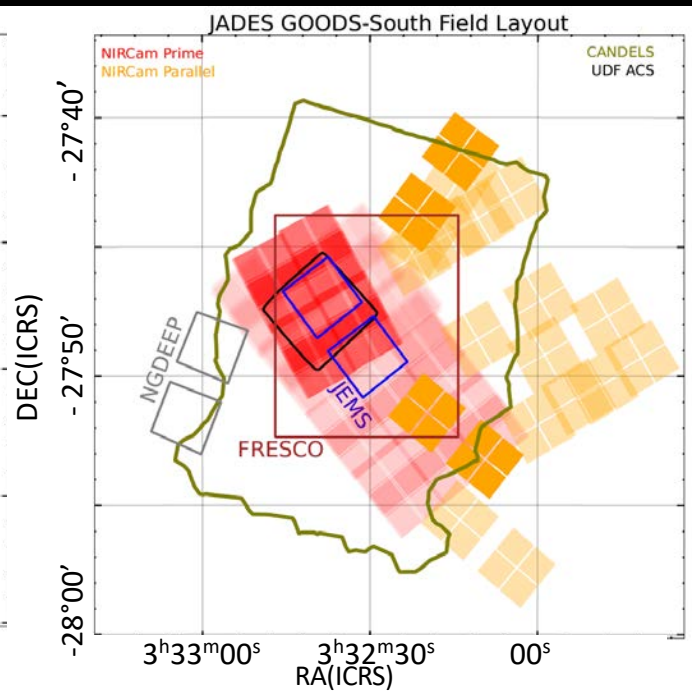
Future Data Releases

The full JADES observing program includes GOODS-North at medium depth (AB~29) and with the full complement of NIRCam filters. Sept-Oct will also see a doubling of the image depth on GOODS-S and many more spectra.



GOODS-N observations were taken under PID 1181. Future GOODS-S data will be acquired under PIDs 1180, 1286, and 1287.





Data Quality Issues

NIRCam issues:

Astrometric corrections

Wisps

- To separate wisps from persistence, best to observe either F090W or F115W before F150W or F200W which have stronger wisps

Rings from NIRSpec glow

Glints from objects just outside the field of view

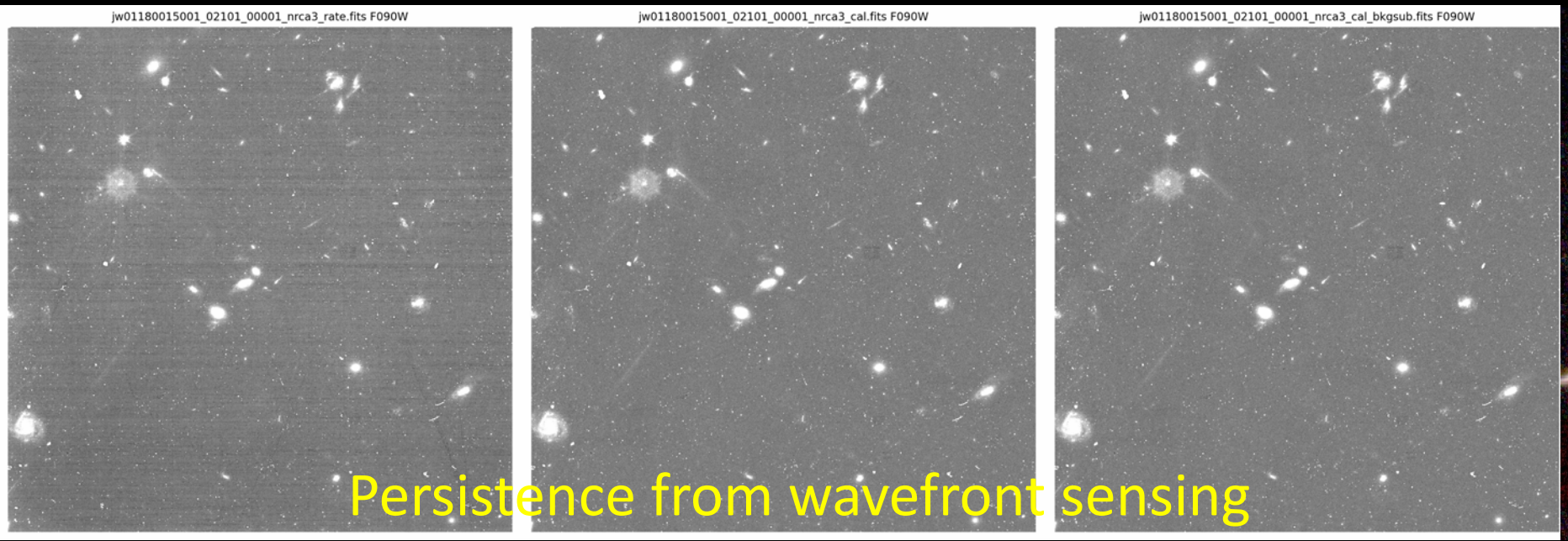
Also for NIRSpec:

Persistence

Flatfield quality

Snowball residuals

NIRSpec data also suffer from an occasional shutter that does not open when commanded



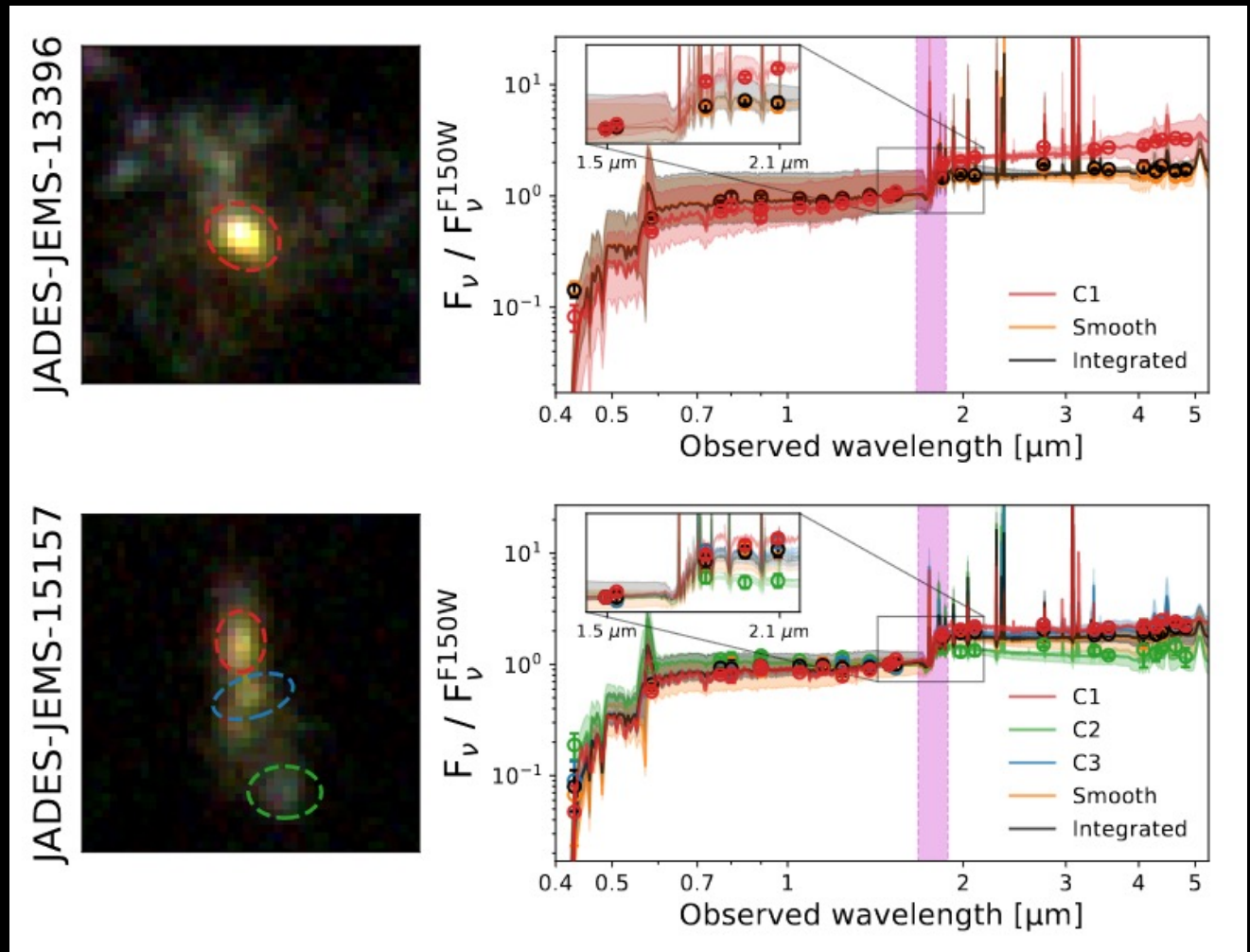
Persistence from wavefront sensing

Ring Example

Science Highlights

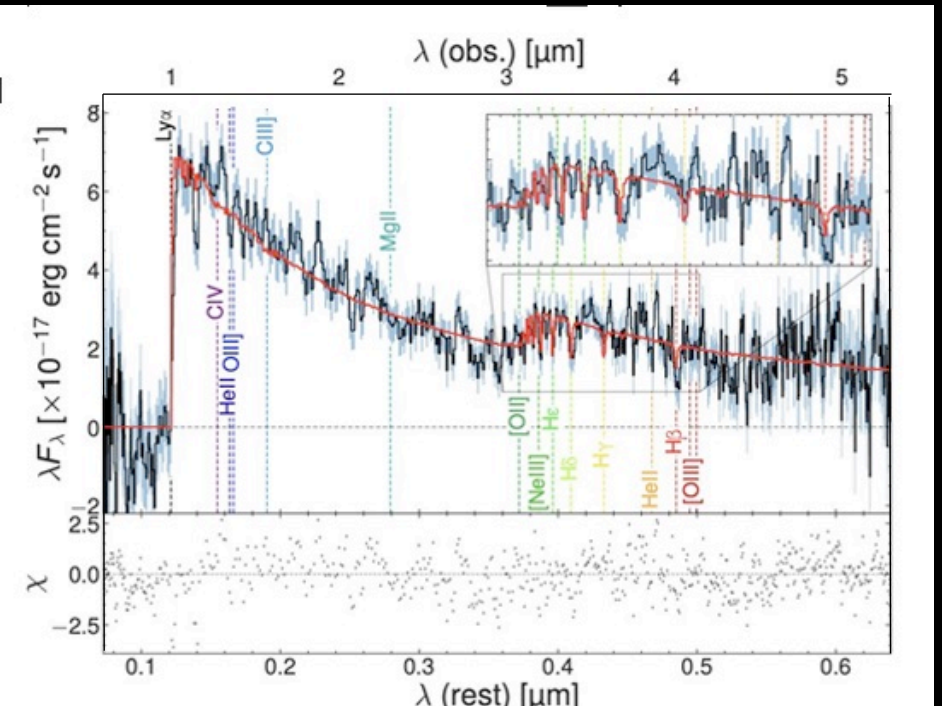
The first JADES papers saw the discovery of high redshift galaxies chosen by NIRCam imaging and photometric redshifts which were confirmed by spectroscopy.

Structures in Quiescent Galaxies at 3 <z<4.5 Ji et al. arXiv2305.18518

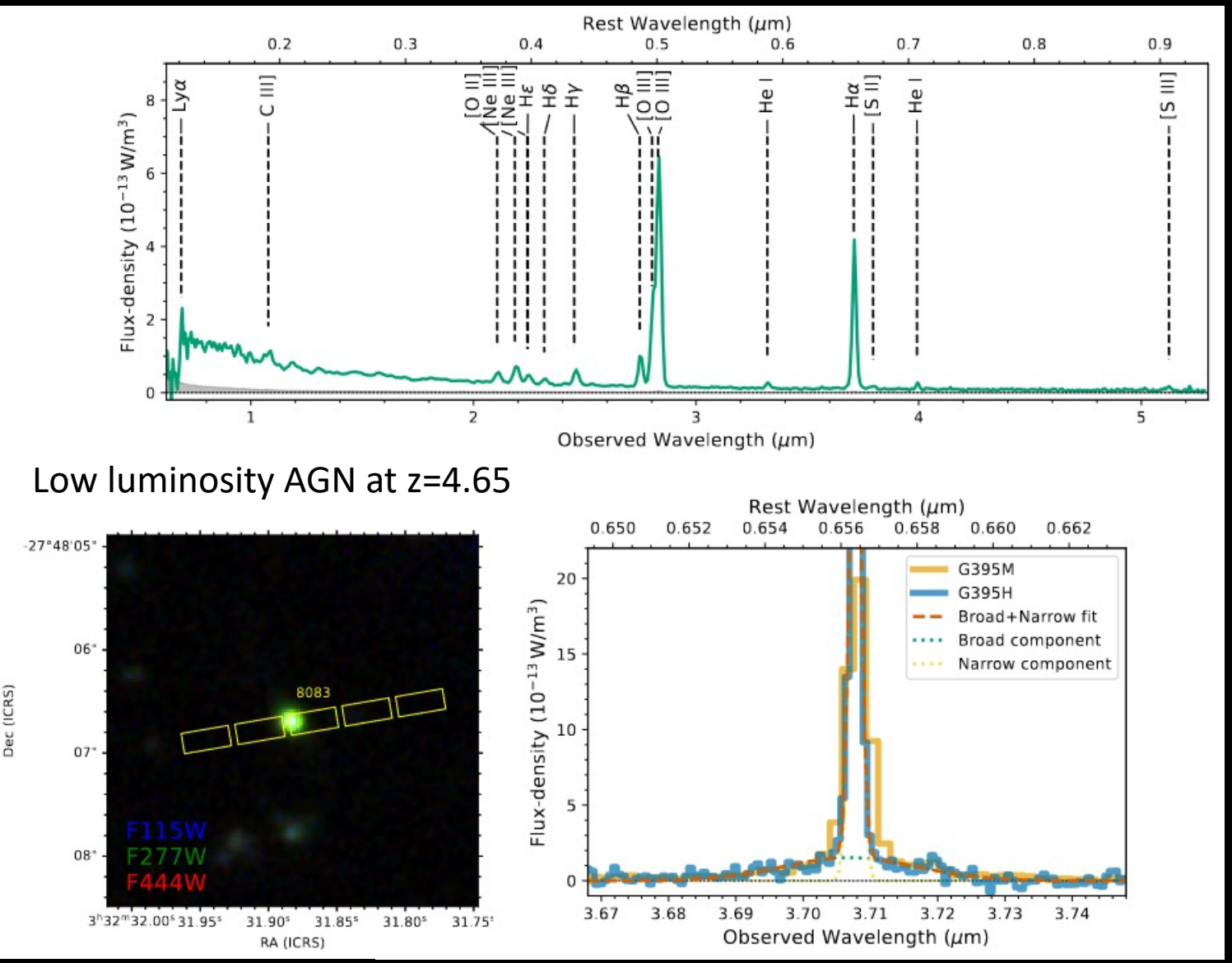


Other exciting results in addition to those presented in this Special Session:

Quiescent galaxy at z~7.3 (730 Myrs)
Looser et al. arXiv:2302.14555



Finding AGN



JADES will greatly expand the luminosity range of AGN found beyond "Cosmic Noon" (z~2).

Finding the connection between galaxy growth and black hole growth is a key driver which we hope to elucidate when our samples are more complete.

Eisenstein et al. 2023

JADES Paper Splash

arXiv No.	Authors	Title
Avail 6/6	Baker et al.	Inside-out growth in the early Universe: a core in a vigorously star-forming disc
Avail 6/6	Bunker et al.	JADES: NIRSpec Deep/HST Data Release Redshifts and Line fluxes from the deepest Cycle 1 NIRSpec MSA Spectroscopy of the Hubble Ultra Deep Field
Avail 6/6	Bunker et al.	JWST-NIRSpec Spectroscopy HST-Selected Lyman break galaxies at z>6 in the Hubble Ultra Deep Field and GOODS-South : Redshift Confirmation, Ionzing Escape Fraction and Implications for Reionization
Avail 6/6	Dressler et al.	Building the First Galaxies – Chapter 2. Starbursts Dominate The Star Formation Histories of 6<z<12 Galaxies
Avail 6/6	Eisenstein et al.	Overview of the JWST Advanced Deep Extragalactic Survey (JADES)
Avail 6/6	Endsley et al.	The Star-forming and Ionizing Properties of Dwarf z ~ 6 - 9 Galaxies in JADES: Insights on Bursty Star Formation and Ionized Bubble Growth
Avail 6/6	Hainline et al.	The Cosmos in its Infancy: JADES Galaxy Candidates at z > 8 in GOODS-S and GOODS-N

JADES Paper Splash -2

arXiv No.	Authors	TItle
Avail 6/6	Jones et al.	JADES: The emergence and evolution of Ly-α emission constraints on the IGM neutral fraction
Avail 6/6	Laseter et el.	JADES: Detecting [OIII]λ4363 and Testing Strong Line Calibrations in the High-z Universe with ultra-deep JWST/NIRSpec spectroscopy up to z ∼ 9.5
Avail 6/6	Looser et al.	JADES: Differing assembly histories of galaxies - Observational evidence for bursty SFHs and (mini-)quenching in the first billion years of the Universe
Avail 6/6	Rieke et al.	JADES Initial Data Release for the Hubble Ultra Deep Field: Revealing the Faint Infrared Sky with Deep JWST NIRCam Imaging
Avail 6/6	Sandles et al.	Balmer Decrement Scaling Relations at Cosmic Dawn with JADES
Avail 6/6	Saxena et al.	JADES: The production and escape of ionizing photons from faint Lyman-alpha emitters in the epoch of reionization
Avail 6/6	Witstok et al.	JADES: Exploring the environments of Lyman-α emitting galaxies

See also poster 206.1 by Helton et al., https://jades-survey.github.io/ and https://archive.stsci.edu/hlsp/jades

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SPACE TELESCOPE