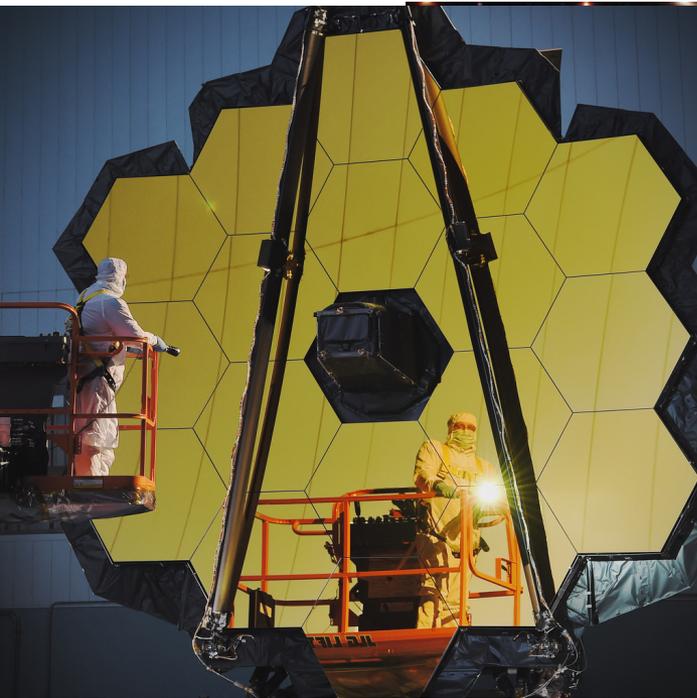
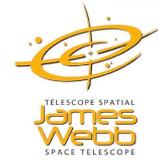




CANUCS: Canadian NIRISS Unbiased Cluster Survey

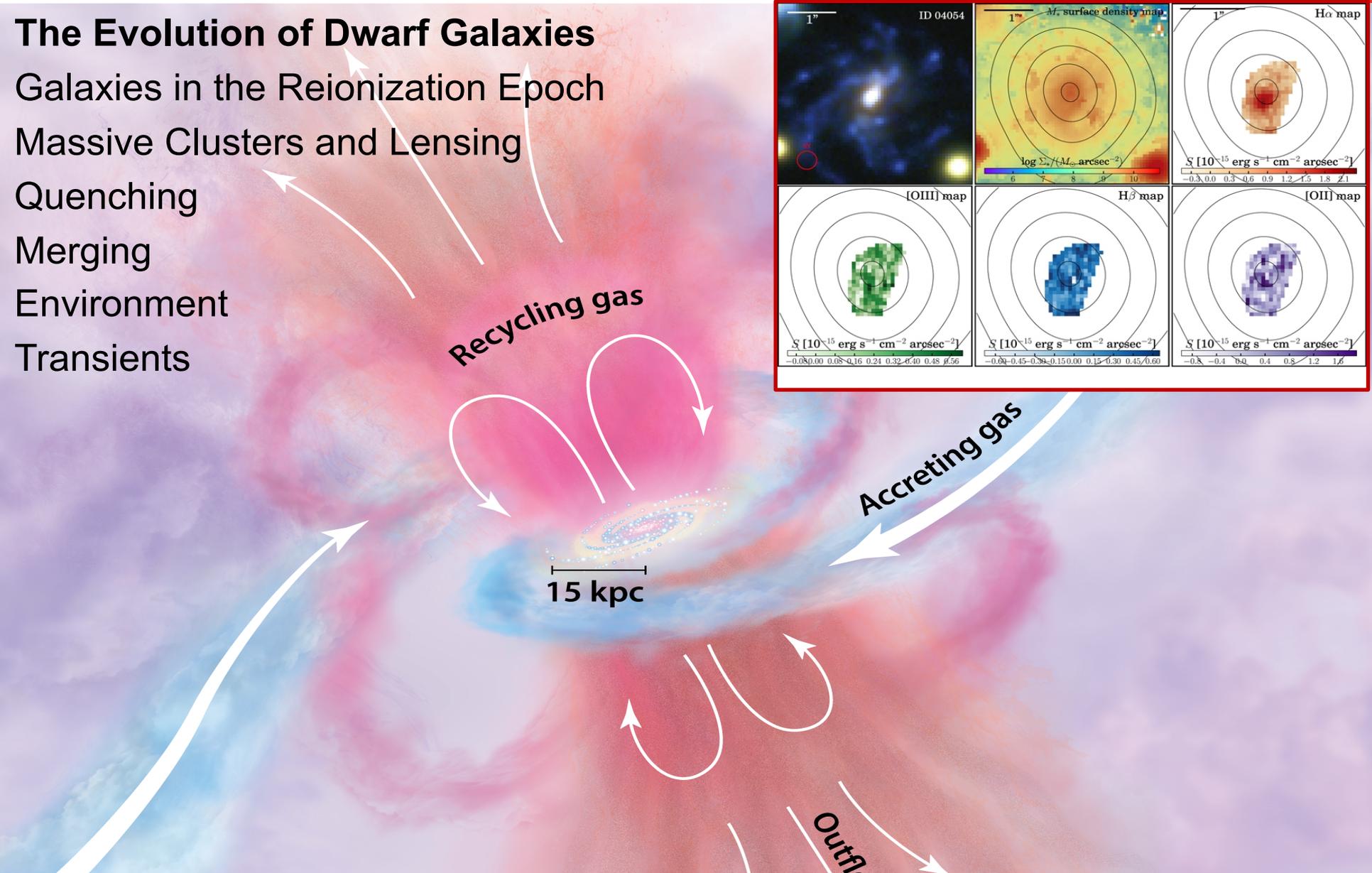
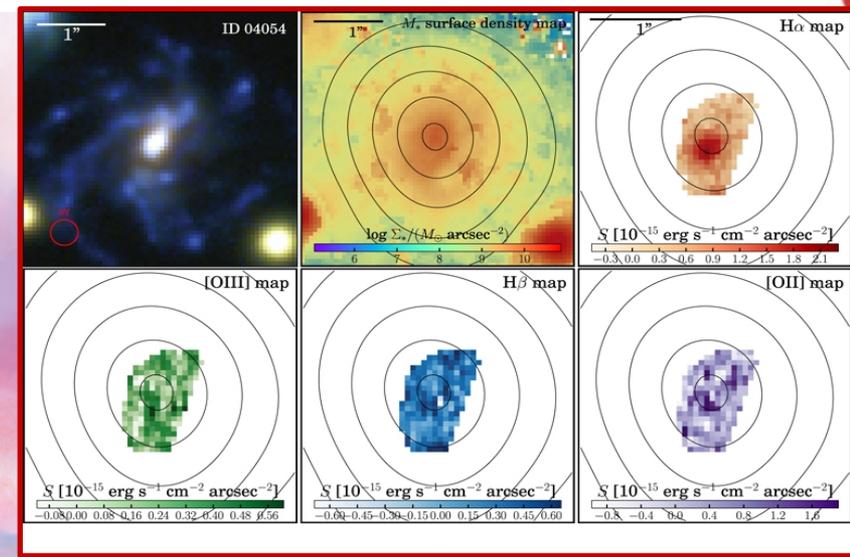


NIRISS GTO High-z Working Group



- Bob Abraham
- Loic Albert
- Marusa Bradac
- Gabe Brammer
- Pierre Chayer
- Van Dixon
- Rene Doyon
- Jean Dupuis
- Laura Ferrarese
- Paul Goodfrooij
- John Hutchings
- Andre Martel
- Gaël Noirot
- Swara Ravindranath
- Marcin Sawicki
- Chris Willott

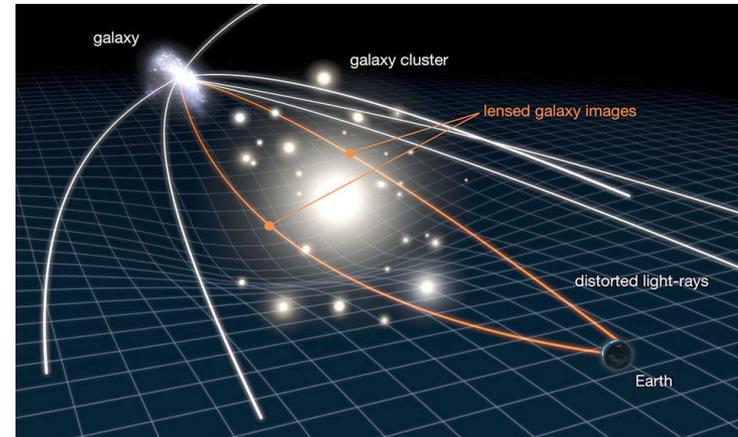
The Evolution of Dwarf Galaxies
Galaxies in the Reionization Epoch
Massive Clusters and Lensing
Quenching
Merging
Environment
Transients



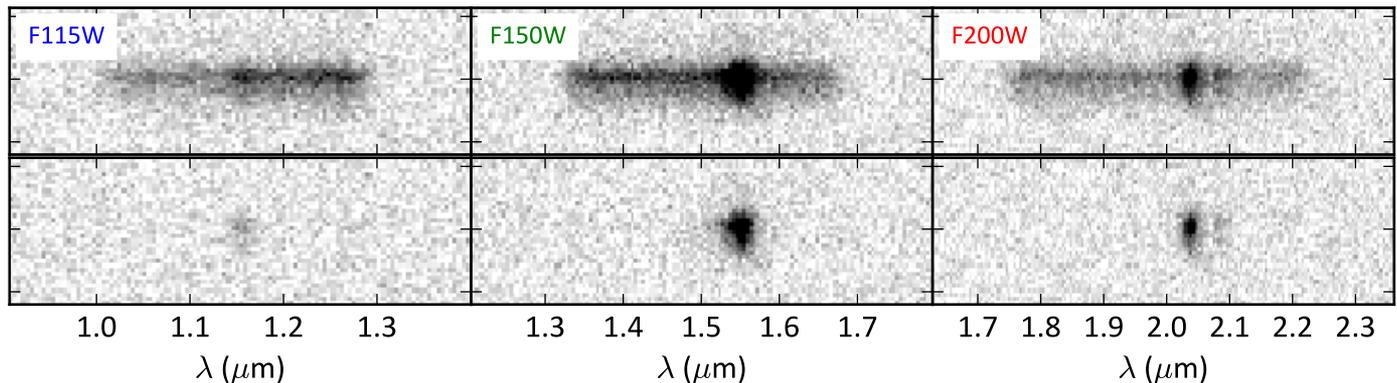
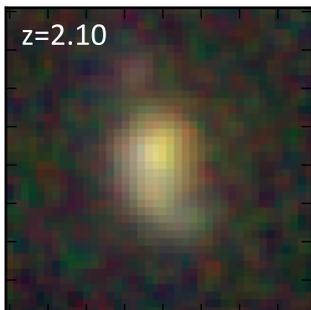
CANUCS Design

- Observe **five strong-lensing galaxy cluster** fields at $0.37 < z < 0.55$.
- Provides **large sample** of distant, low-mass galaxies:

- ~3000 at $z > 1$
- ~1000 with metallicities
- ~100 resolved metallicities
- ~200 at $z > 7$



- NIRISS 6 hours per filter produces unrivalled **deep slitless spectroscopy** > 10x deeper than previous Hubble studies with much **higher spatial resolution** and **wider wavelength range**.



CANUCS Design

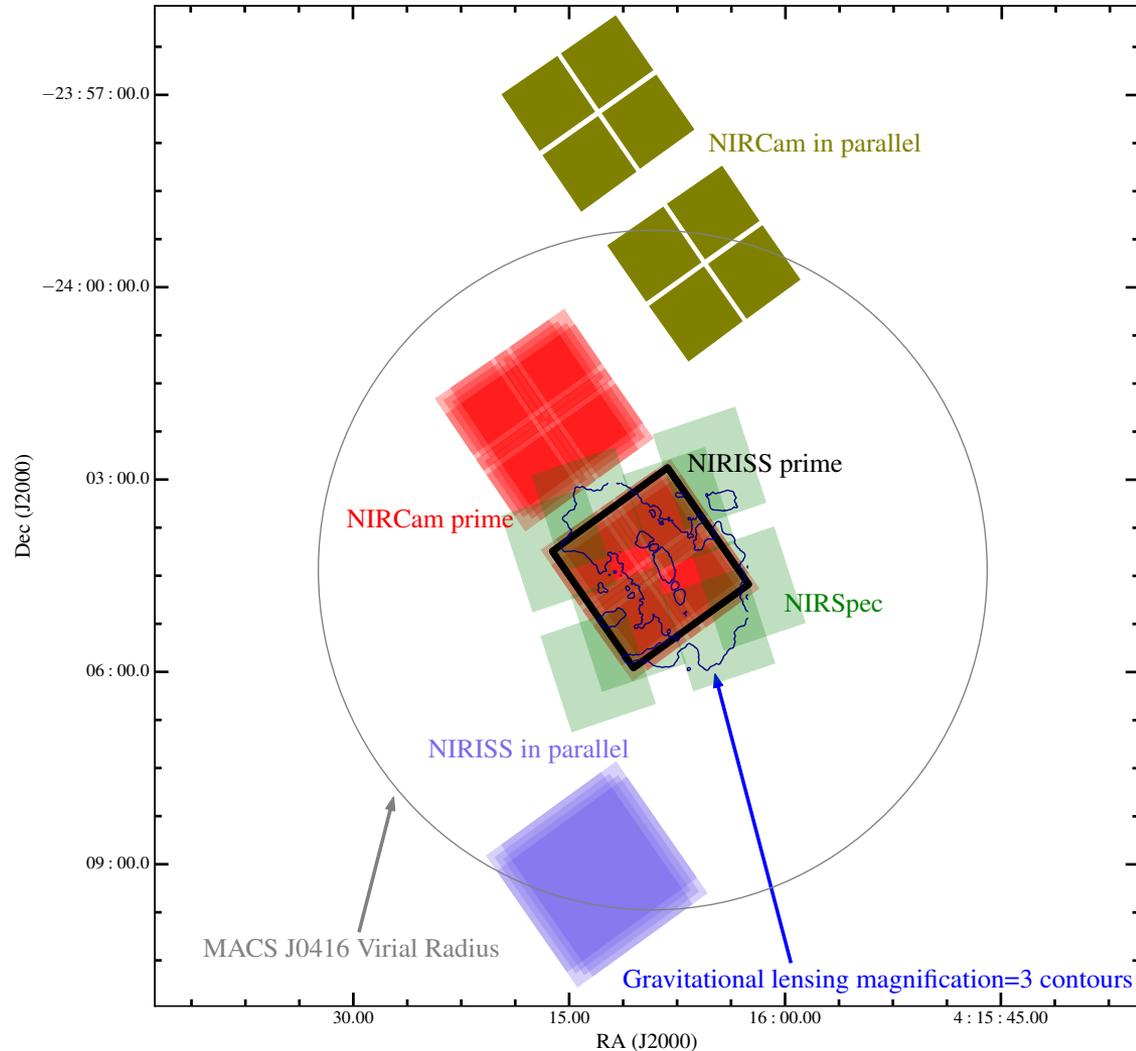
CANUCS emphasizes two unique features of Wide Field Slitless Spectroscopy with NIRISS:

- **High multiplex** factor
- **Spatially-resolved** emission lines

Includes NIRCам imaging and NIRSpec spectroscopy to sample the 2.5 to 5 microns range.

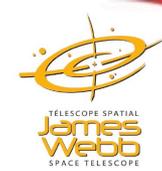
Parallel observing to maximize efficiency and sample cluster outskirts.

Reach AB=29 in imaging.

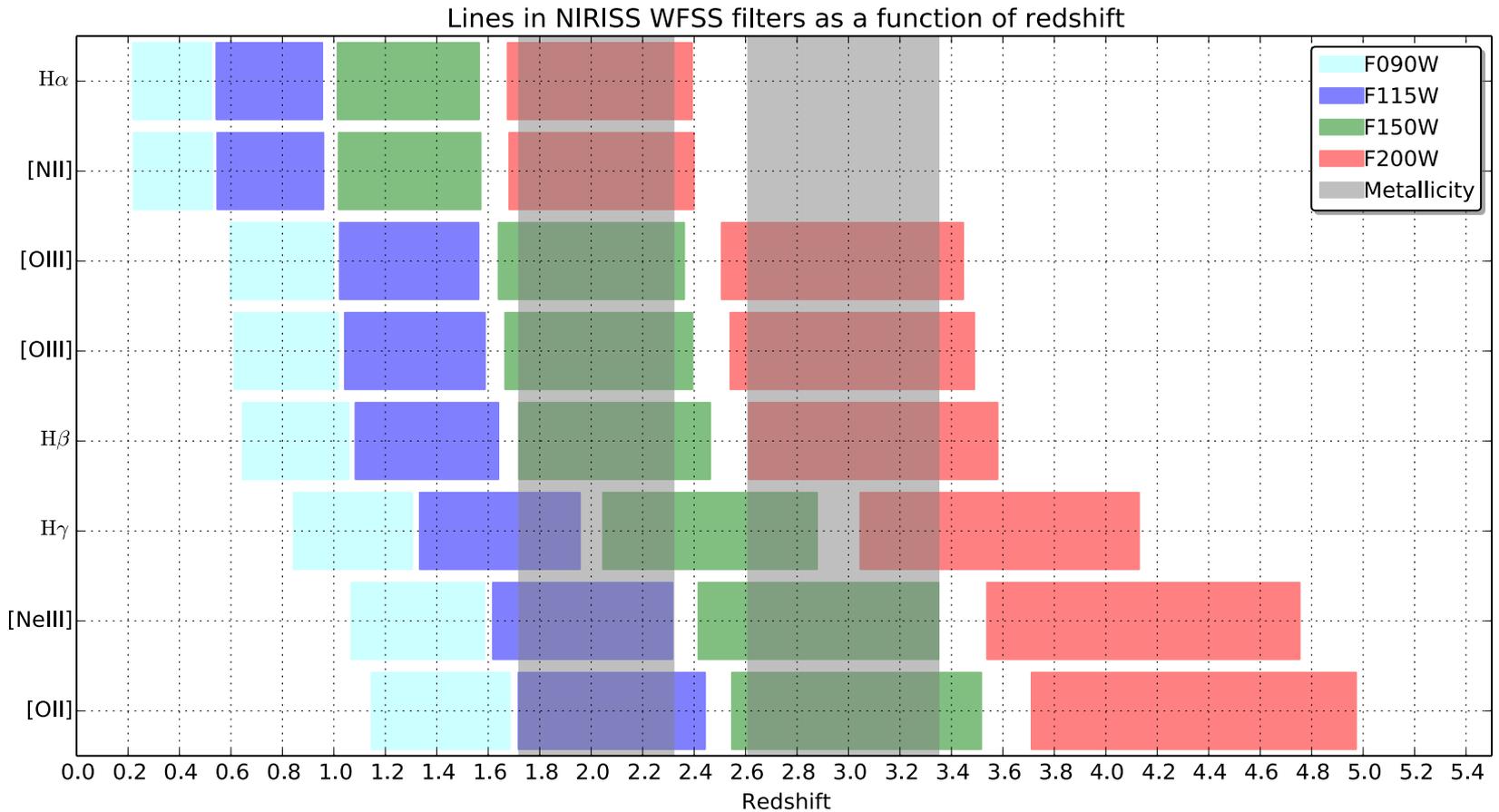




NIRISS Slitless Wavelength Coverage

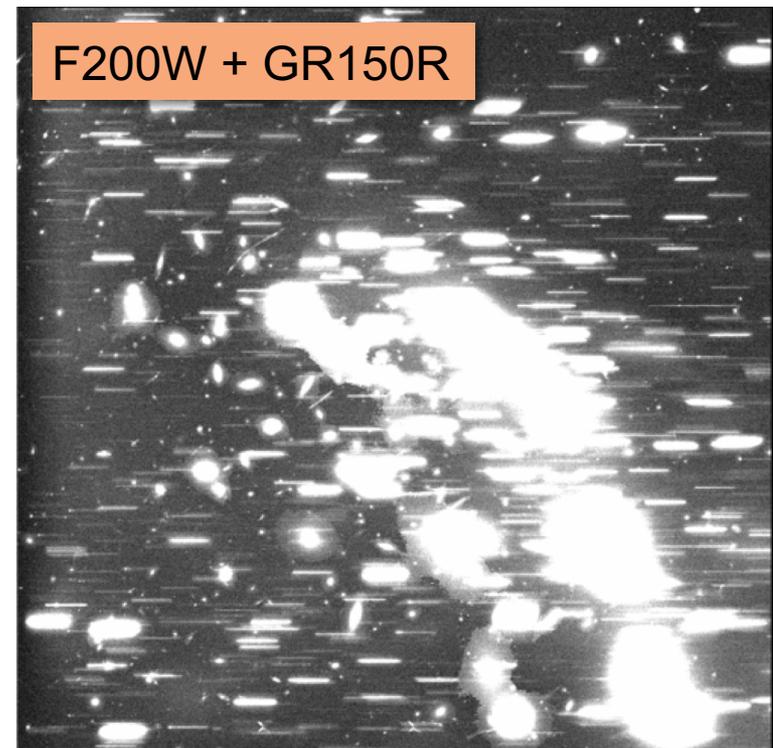
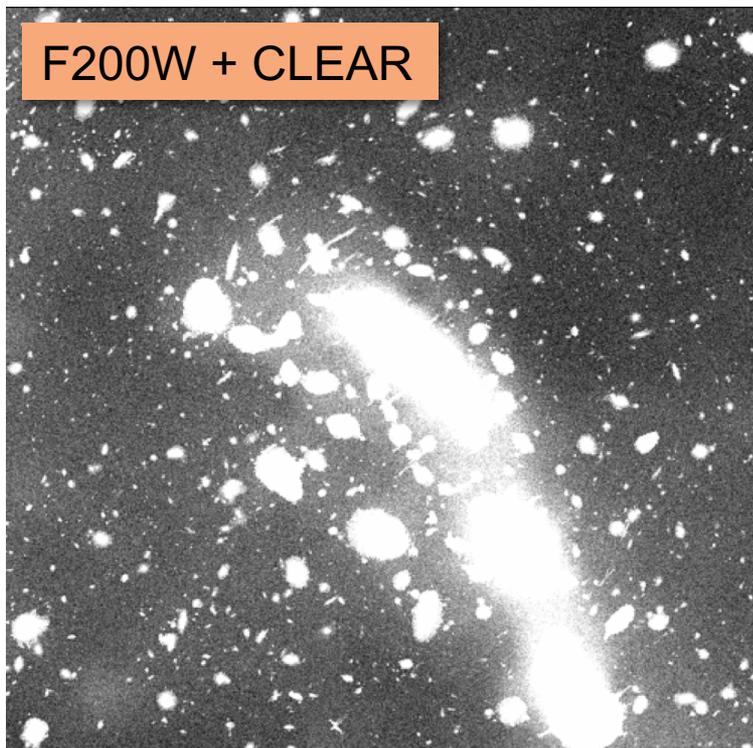


- Oxygen, Neon and H Balmer emission lines at redshifts 1 to 3.3 to determine gas-phase metallicities and study the inflow/outflow histories of galaxies.
- Slitless mode more reliable than slit spectroscopy.



NIRISS Slitless Data Analysis

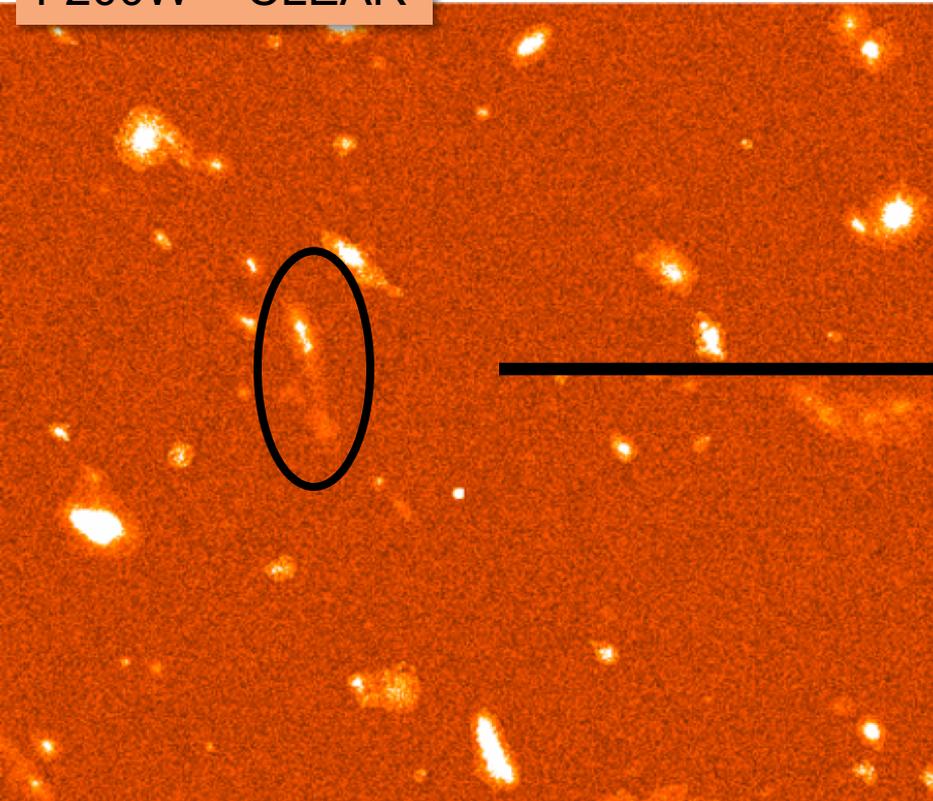
- JWST pipeline will do basic processing steps and some advanced processing for quick look or 'easy' cases.
- Expert users will reprocess offline using combination of pipeline and other tools. Not trivial!
- Full contamination modelling required for most situations.



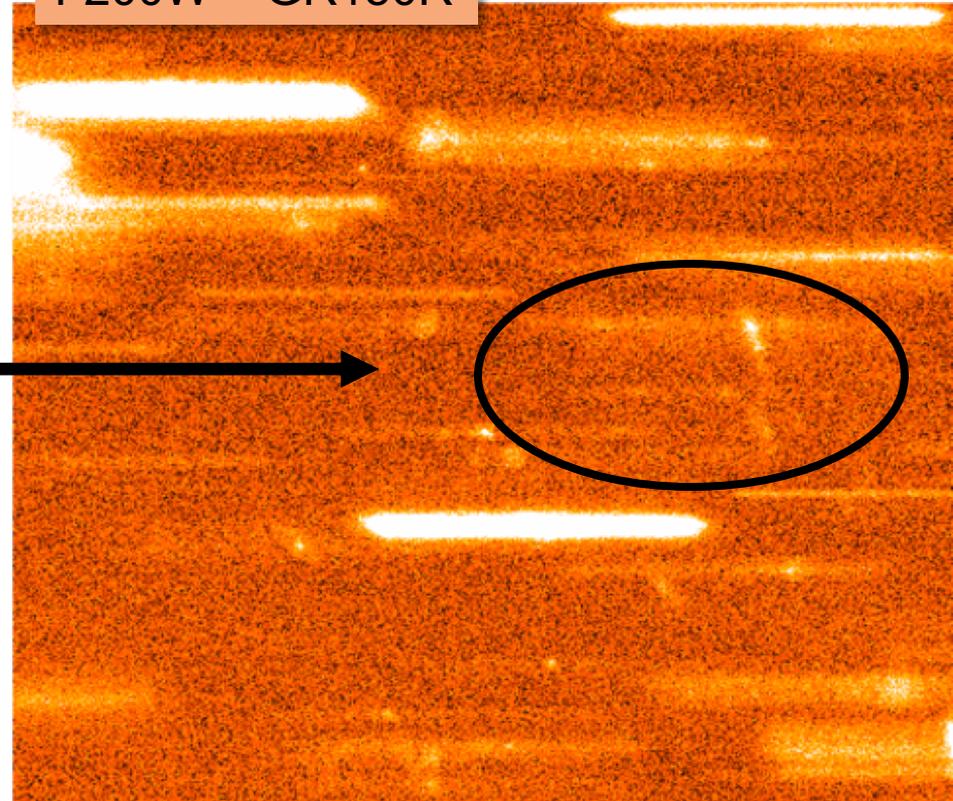
NIRISS Slitless Data Analysis

Zoom-in to 1% of the field shows many faint galaxies with emission lines

F200W + CLEAR



F200W + GR150R





Summary



- JWST will enable major breakthroughs in observations of distant galaxies due to improved sensitivity, spatial resolution and wavelength range.
- NIRISS Wide-Field Slitless Spectroscopy provides a powerful alternative/complement to NIRSpec MOS when high redshift completeness required, or galaxy emission line maps with no slit losses, or blind emission line surveys.
- NIRISS GTO team will perform a slitless spectroscopic survey of lensing clusters with several science goals including probing the properties of dwarf galaxies at the peak epoch of cosmic SFR and the earliest galaxies prior to cosmic reionization.

NIRISS simulation of Oesch et al. (2016) $z=11$ galaxy

