Constraints on Star Forming Galaxies at z>6.5

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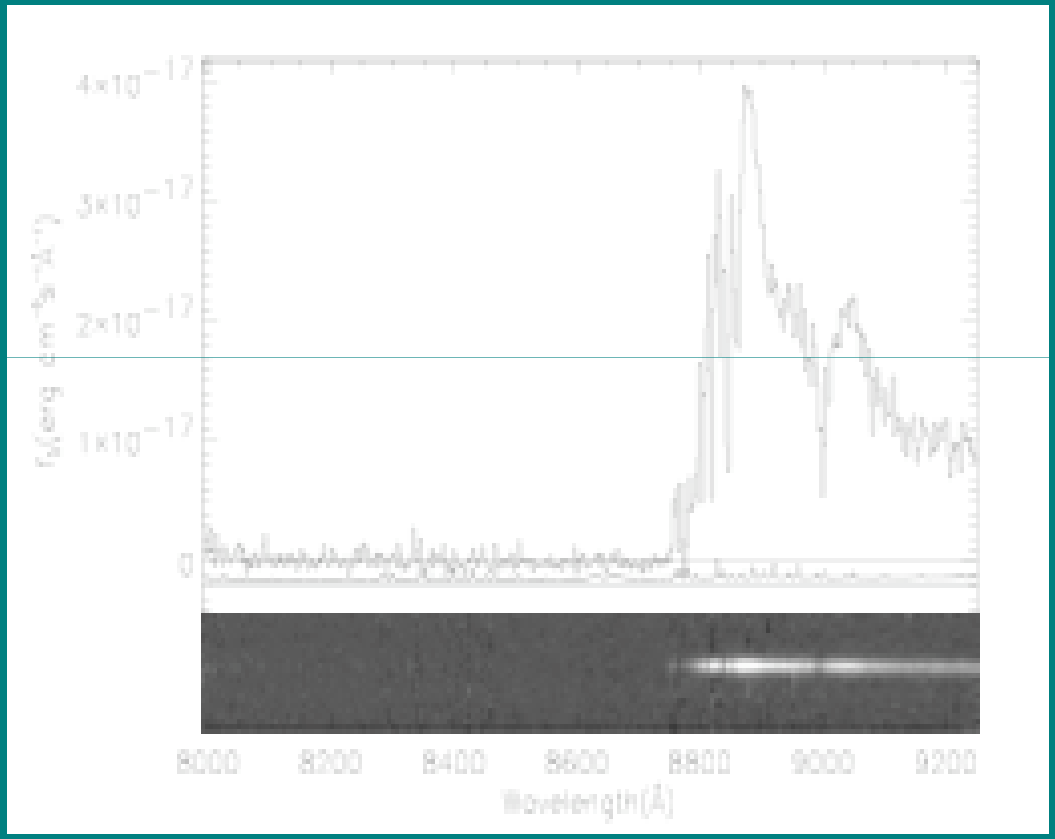
Introduction

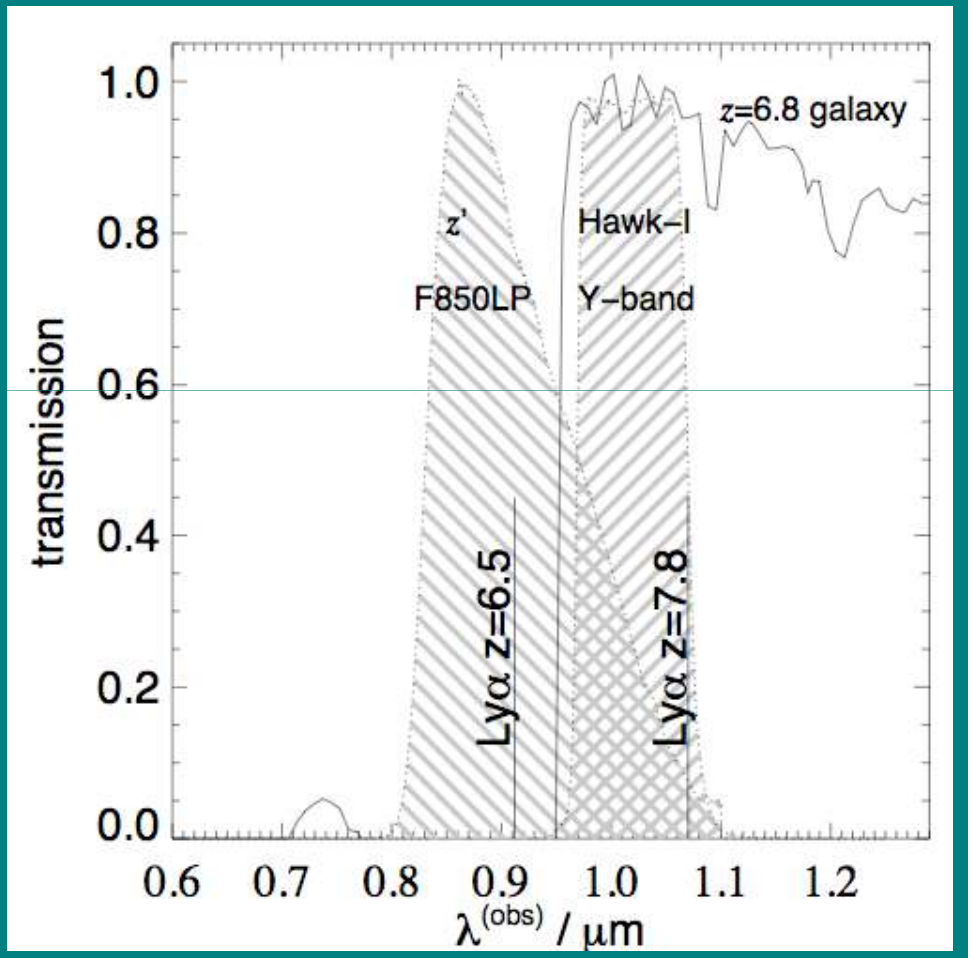
- The universe is neutral at z>10 (Kogut et al. 2003)
- Complete absorption of QSO spectra at z~6.2 (Becker et al. 2001)
- 6<z<10 is a crucial time for understanding reionisation
- Main candidate for reionisation is star formation (Eyles et al. 2007)



Pentricci et al. 2002

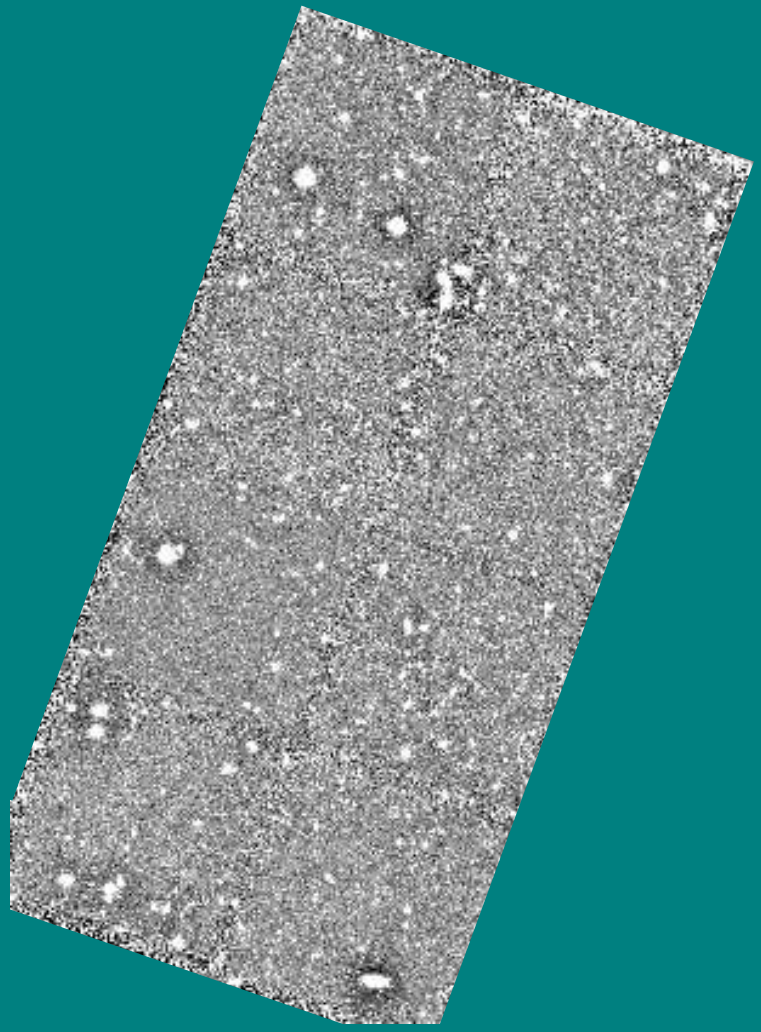
The method

- Lyman Break caused by absorption due to intervening clouds of neutral hydrogen short-ward of ~1216Å
- Search for a significant spectral break in photometry
- For higher redshift objects look to longer wavelength filters
- At z>6.5 LB is shifted to NIR wavelengths

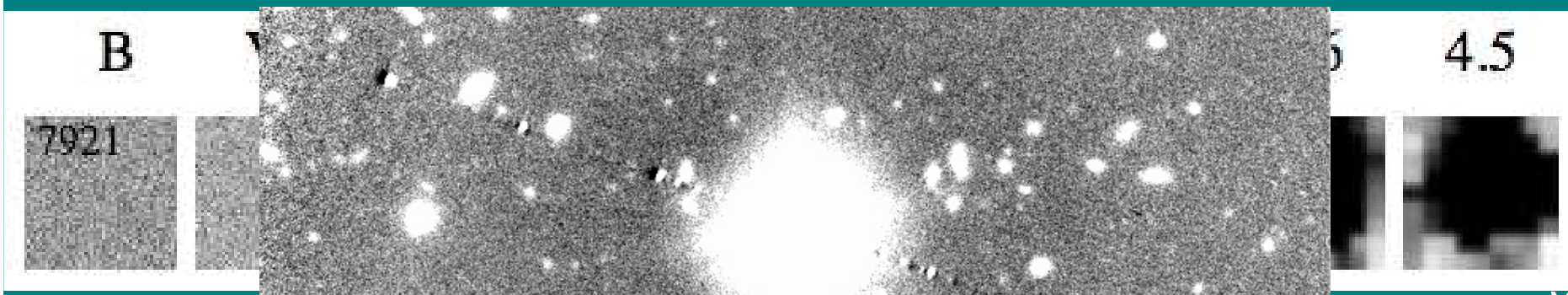


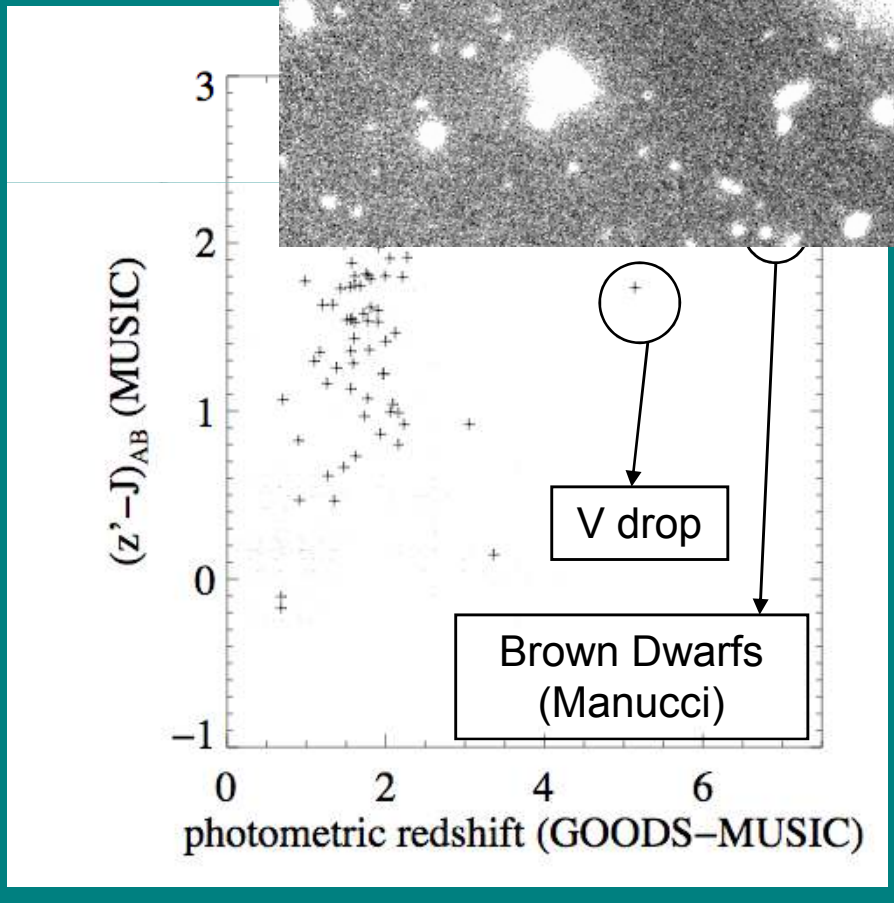
The data

- New VLT/HAWK-I Y-band science verification data (Fontanna et al. and Venemans et al.)
  - ❖ Covers an area of ~119 sq. arcmin
  - ❖ 5 sigma limiting magnitude 26.3 for deepest region
- VLT ISAAC J & Ks
- HST/ACS B,V,i',z'
- Spitzer/IRAC
- All data is over GOODS-South field



Selection & Contaminants





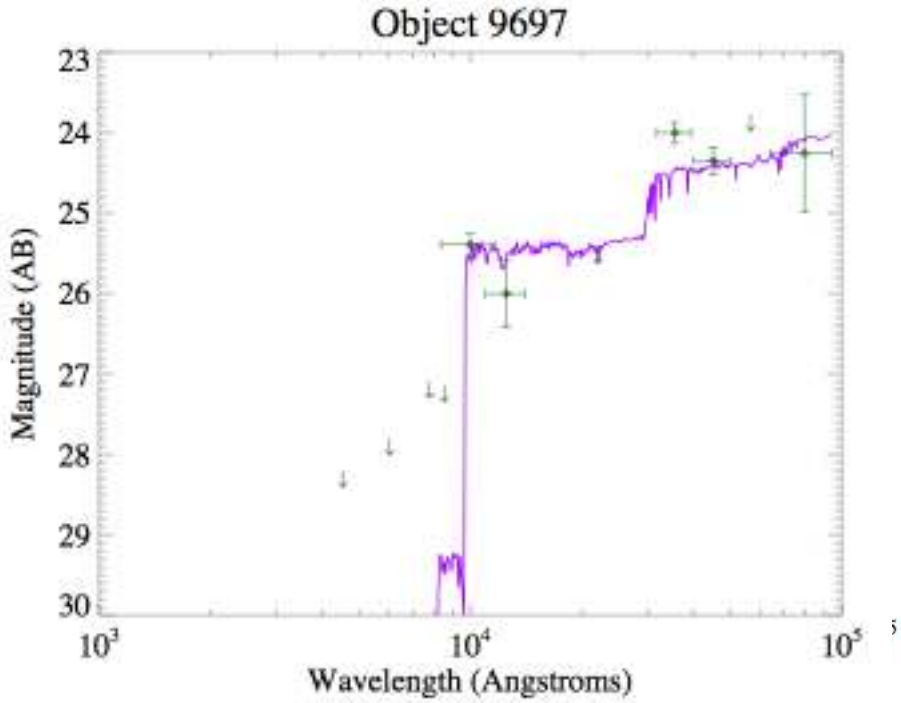
> 2.5 hours

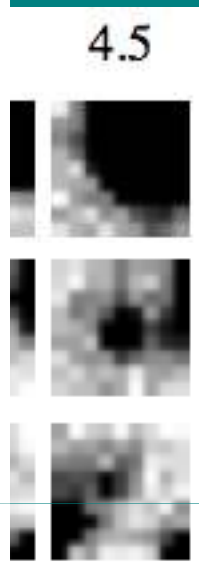
Main Contaminants

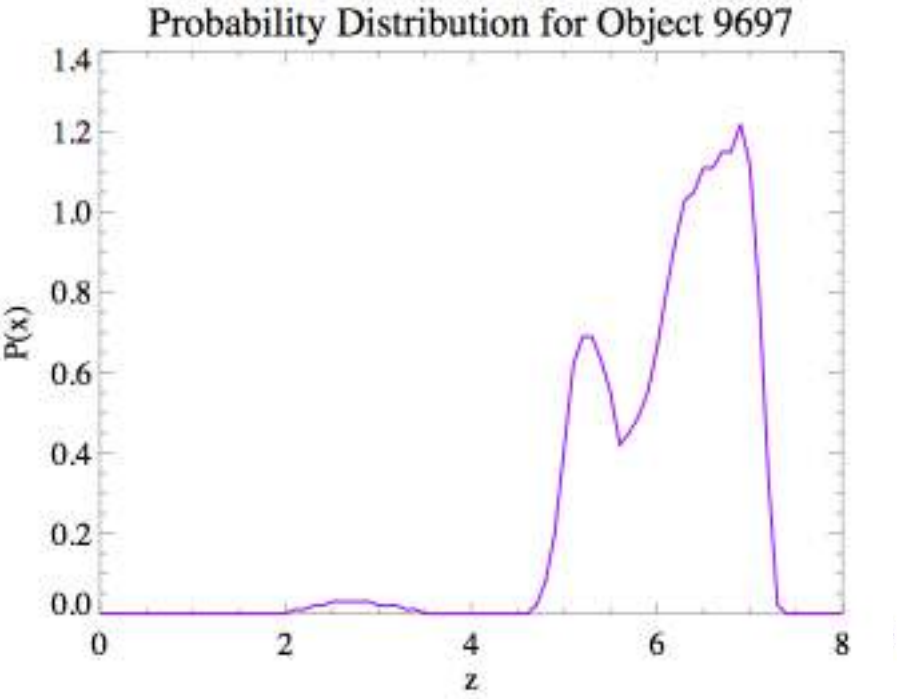
- ❖ Detector artifacts
- ❖ Ghost image haloes
- ❖ Low redshift interlopers

(identified via optical detections)

- ❖ Transients

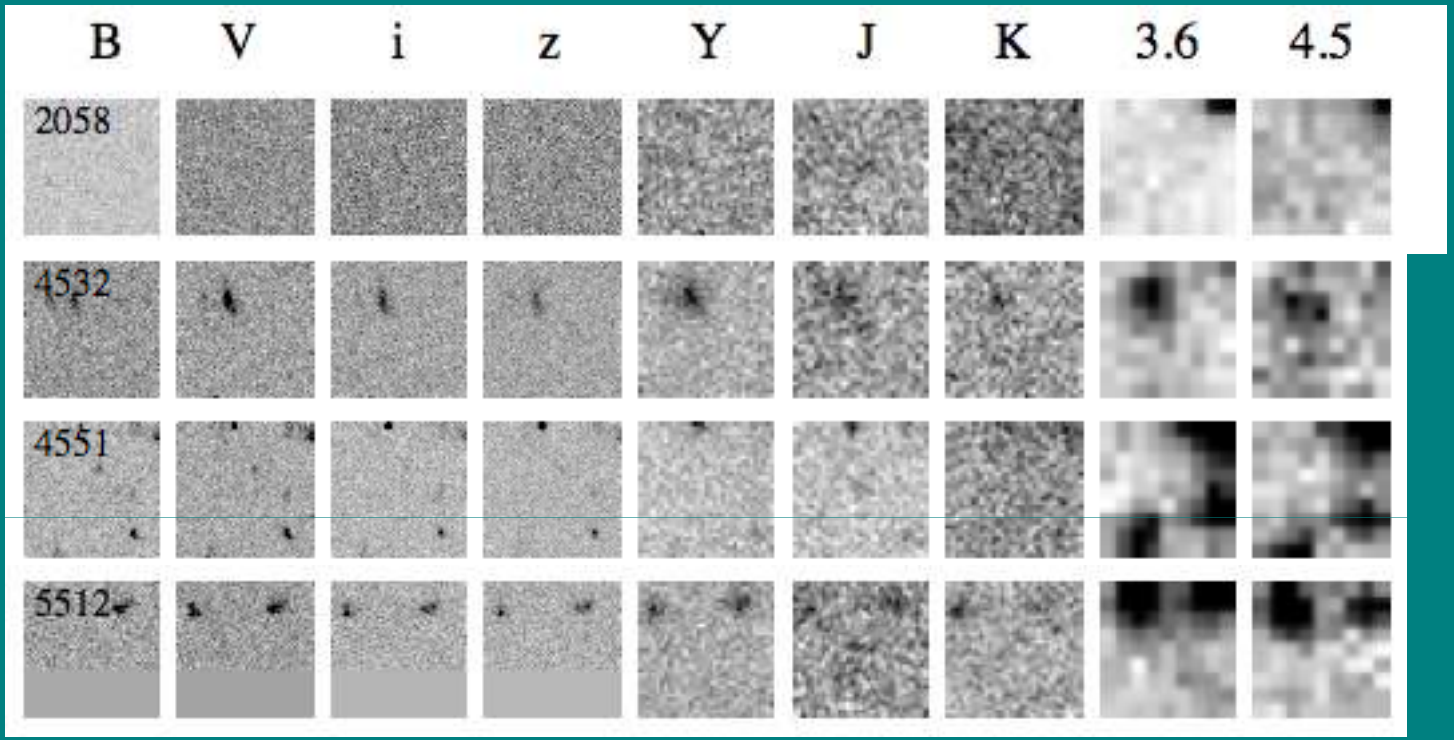






- 2200 Sta .73 galaxy
- 9136 z=7
- 9697 z=6

Y-drops



- Only well detected in J-band
- Not easily explained by spectral slope
- Possible result of line emission but would require extremely bright Lya EW_{rest} > 430Å
- No robust Y-drops

Expected numbers

- The number of robust candidates can constrain the z~8 luminosity function

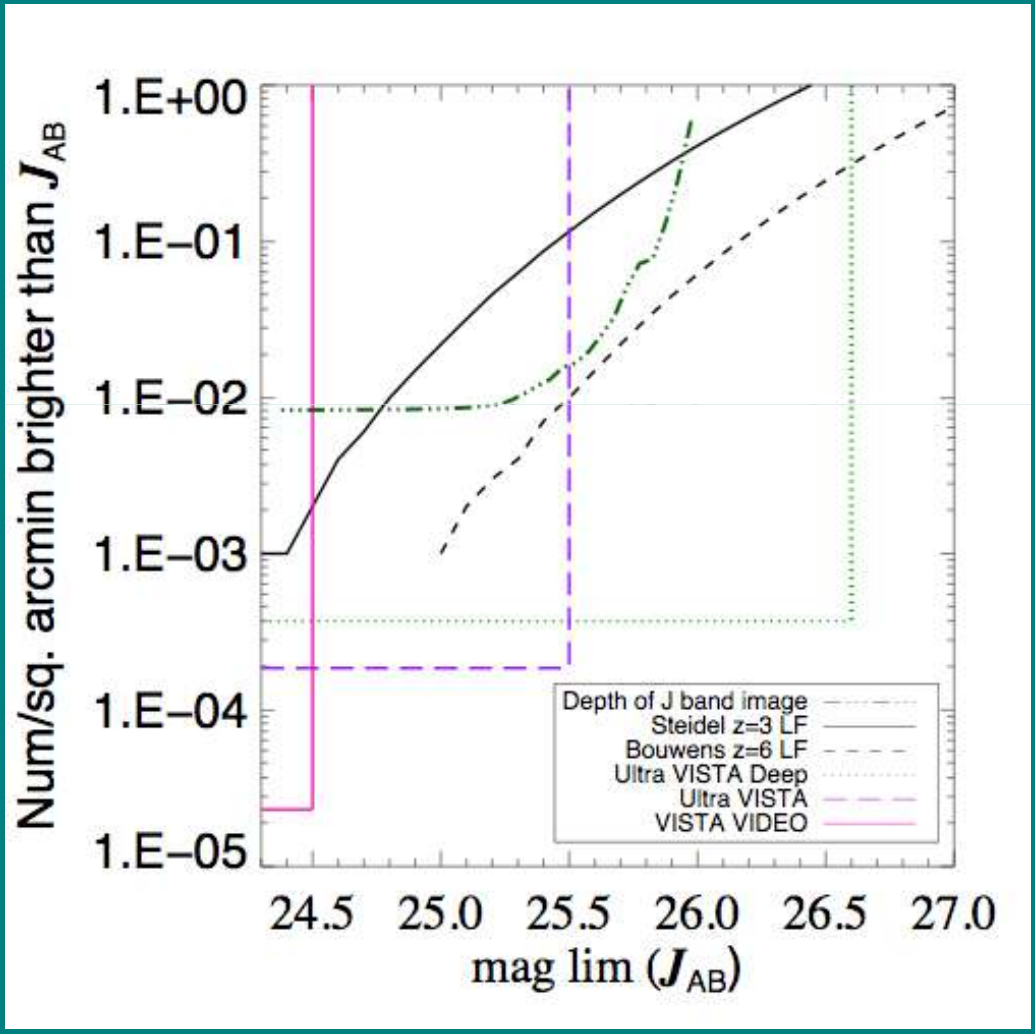
Y-drops
- Steidel z=3 predicts 10.5±3.2
- Bouwens z=6 predicts 1.1±1

Once again we find evolution in the LF since z=3

Need to go deeper and /or wider to detect Y-drops and constrain LF's at z=8

Ultra-VISTA and VIDEO will probe this region

z'-drops
- Steidel z=3 and Bouwens z=6 predict 29.5±5.4 & 5.2±2.3 z'-drops
- We find evolution in the LF since z=3 and we are consistent with the Bouwens et al. z=6 LF



Summary

- We found 2 z'-drop candidates both with strong IRAC detections, 2 robust candidates
- Comparing observations with expected numbers we rule out the case of no evolution in the luminosity function since z=3, but we are consistent with the Bouwens z=6 LF and the McLure z=6 LF
- We found a maximum of 4 possible Y-drop candidates (only detected in J) cannot rule out line emission although unlikely
- Need deeper and /or wider observations to probe the z>7 luminosity function. This is a possibility with Ultra-VISTA and VIDEO