The highest redshift galaxies at z>6





WMAP Spergel et al 06



Questions

- What sources cause reionization AGN, Galaxies, which L
- What are their physical properties?
 - Pop III ?
- In what kind of halos do they reside ?

Needed

- Good Luminosity Functions at various z [JWST]
- Spectroscopic confirmation
 - [JWST, R=100]
- Higher resolution spectroscopy for physical parameters [ELT]



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Table of Contents	This is the online edition of In the Beginning: Compelling	
Endorsements	(7th Edition) by Dr. Walt Brown.	
Part I: Scientific Case for Creation	Copyright © 1995-2007, Center for Scientific Creation. All rights reserved.	
Life Sciences	Click here to order the hardbound print edition of this	
Astronomical and Physical Sciences	online book.	
Earth Sciences	[The Scientific Case for Creation > References and Notes > 56. Big Bang?]	
References and Notes		
Part II: Fountains of the Great Deep	" "Astronomers have never seen a pure Population III star, despite	
The Hydroplate Theory: An Overview	years of combing our Milky Way galaxy." Robert Irion, "The Quest	
The Origin of Ocean Trenches	for Population III," <i>Science</i> , Vol. 295, 4 January 2002, p. 66.	
Liquefaction: The Origin of Strata and Layered Fossils		
The Origin of the Grand Canyon	Supposedly, Population II stars, stars having slight amounts of	
The Origin of Limestone	some heavy elements, evolved after Population III stars.	
Frozen Mammoths	Predicted characteristics of Population II stars have never been	
The Origin of Comets	observed.	+
		-

How to find candidates ?

- Spectrum cuts off below 1216 Angstrom
- Select from multi-wavelength imaging, require a sharp cutoff
- Z-drops, Y-drops, J-drops, ...

Brightnesses, number densities

- Hab < 26, z>6.3: 0.4/sq arcmin
- Obtain targets from ULTRA-VISTA survey
 - z,Y,J,H,K imaging of COSMOS field, 0.73 sq degree
- > 1000 targets to Hab=26

Going Deep

- Hab=28 (from JWST imaging)
- 2 per sq arcmin

Required integration time

- Assume GLAO spectroscopy
- Galaxies are small [0.2 arcec,

pointsource]

- Hab=26 : 10 hours for S/N=10
- Hab=28: 100 hours for S/N=5

Compare to JWST

- JWST very fast for R=100 [photon limited]
- R=1000, Hab=28, 100 hours
 - JWST: S/N=0.5-1
 - ELT: S/N=4-5

But...

- JWST observes full decade wavelength
 - 1-1.8 micron in one shot
- JWST has very large multiplex
 - > 100 galaxies at the same time
 - Not so efficient on the bright end
 - Still 18 galaxies at Hab=28

Required for ELT

• Complete program:

- Hab=26: 1000 spectra total over area of 0.7 sq degree,
 - 10arcmin useful field -> 30 pointings, 300 hours
- Hab=28: 100 hours, 10 arcmin fov -> 200 galaxies
 - 500 hours -> 1000 galaxies

Required

- Large field of view (10 arcmin)
- High multiplex (up to 200)
- Large instantaneous wavelength coverage

[Y,J, H] – 0.9-1.8 micron

work needed

- Performance of GLAO + sizes of galaxies -> efficiency
- Instrument concept ?