

A search for $z > 5.7$ quasars in the southern hemisphere

Targeted science

Quasar formation – galaxy formation

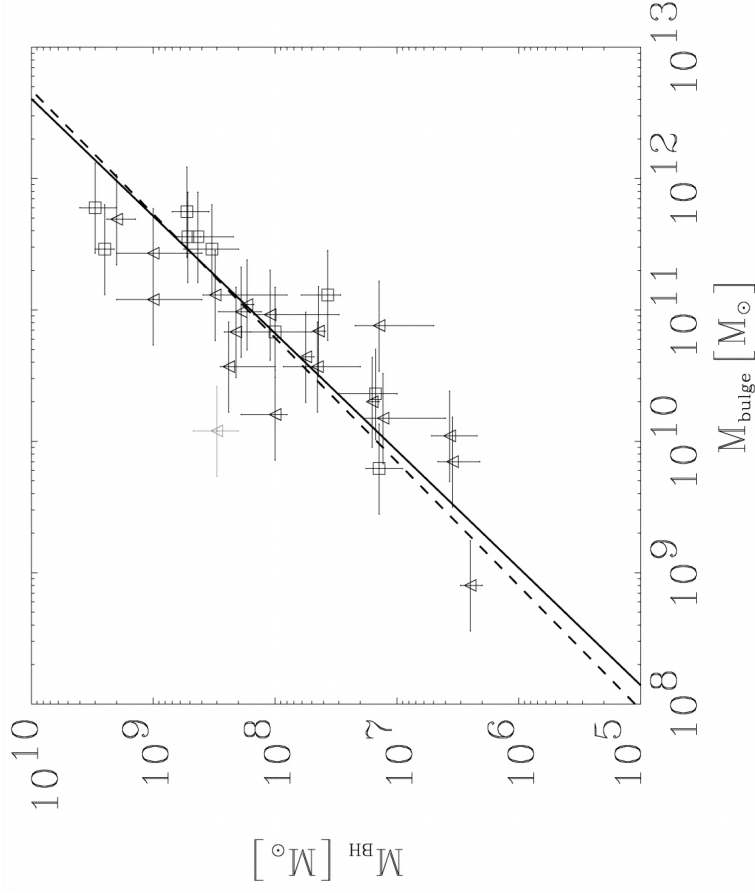
Ionization of intergalactic matter

Chemical evolution in high- z universe

川良、浅見、松岡、鮫島	--	UT-10A
大藪	--	ISAS/JAXA
B. A. Peterson	--	ANU/RSAA
et al.		

M(bh) – M(bulge) relation

Direct link of Quasar formation to galaxy formation



$$M(\text{bh}) \sim M(\text{bulge})^{1.12}$$

$$M(\text{bh}) \sim M(\text{bulge})/1000$$

$M(\text{bh}) \sim 10^{9.5} M(\text{sun})$
discovered at $z > 6$
→

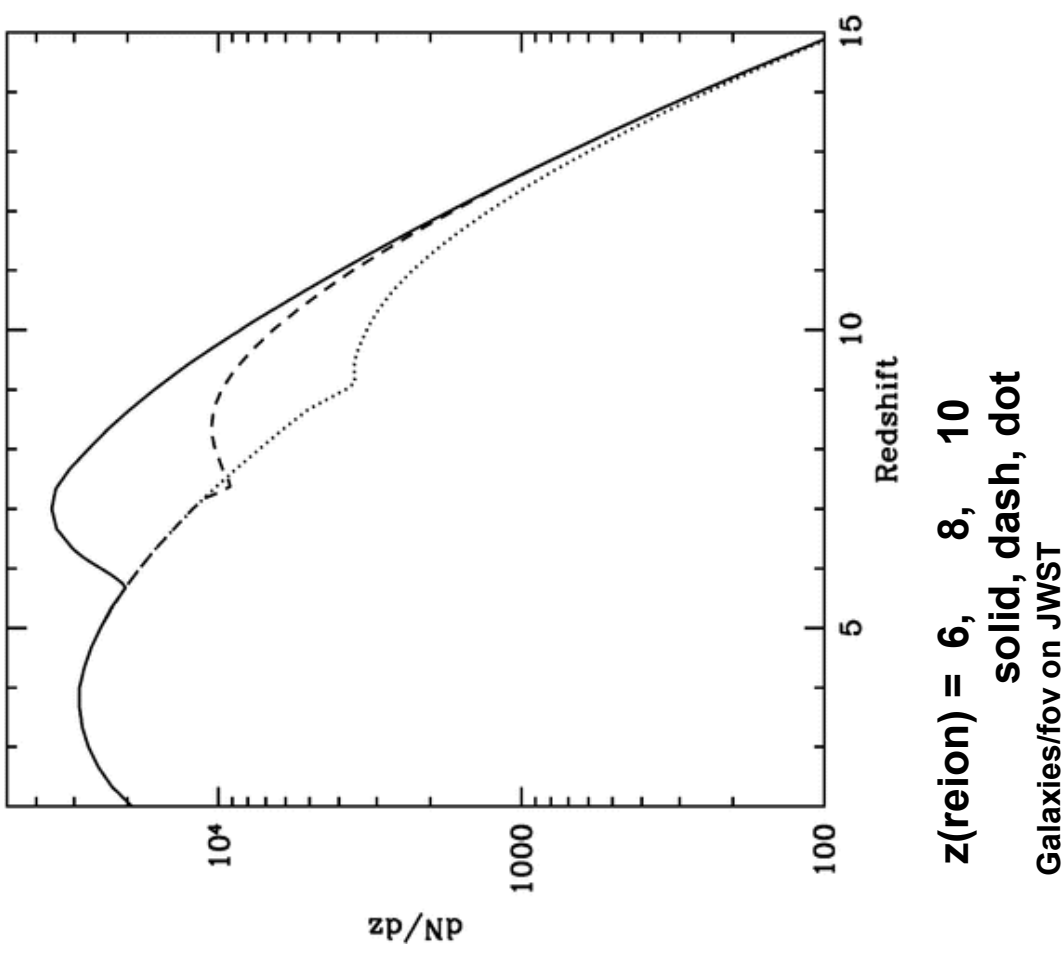
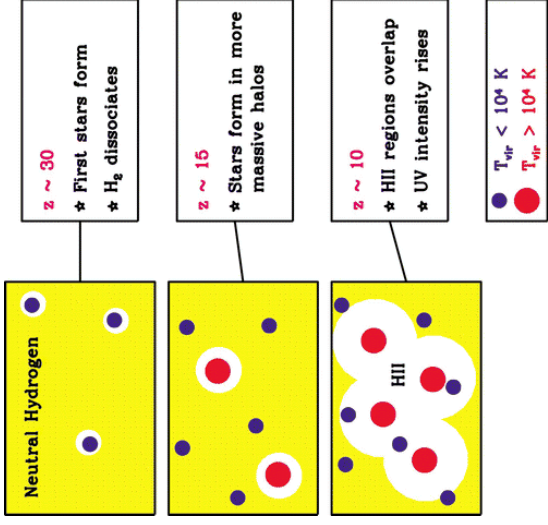
$M(\text{bulge}) \sim 10^{12.5} M(\text{sun})$
 $M(\text{dark m}) \sim 10^{13.5} M(\text{sun})$
at 0.8 Gyr after big bang
→

$$\text{SFR} = 4000 M(\text{sun})/\text{yr}$$
$$L = 4 \cdot 10^{13} L(\text{sun})$$

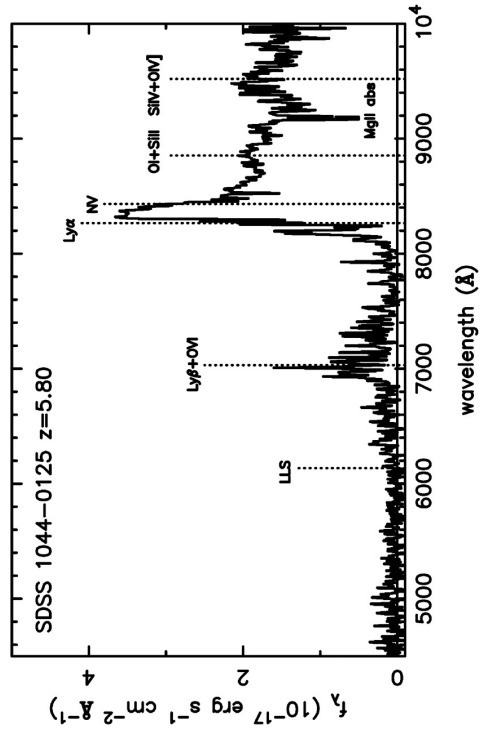
母銀河の形成は観測できる！

Haring & Rix (2004, ApJL)

Exploring ionization of IGM : Loeb & Barkana 2001

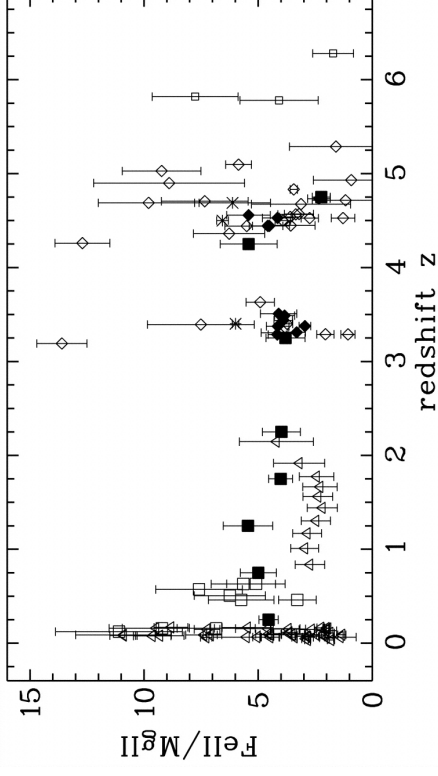
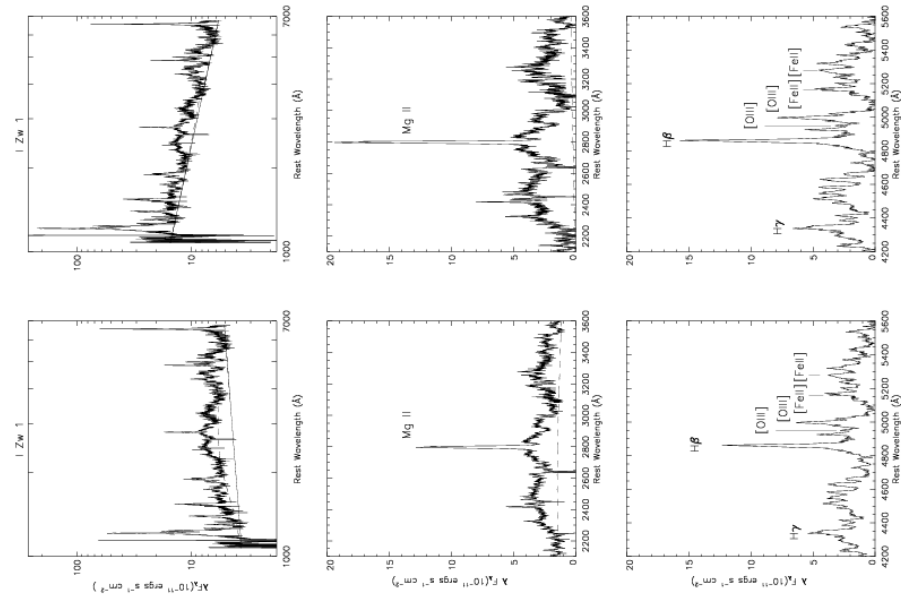


HI-zに向かって銀河の数が増大

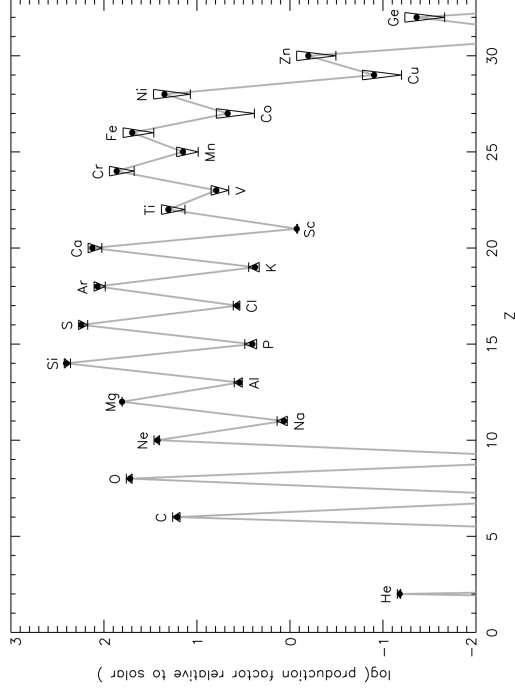


First stars and chemical evolution

Are we looking at a signature of pop.III stars in high-z quasars?



Strong Fe II emission at high-z
(Dietrich et al. 2003)



Tsuzuki et al. 2006

Pop.III stars $M(\text{He})=65\text{-}130M(\text{sun})$
Heger & Woosley 2002

SDSS高赤方偏移($z>6$)クエーサー探索

6600平方度の探索

総天体数 ... 180,000,000

i-dropouts ($i-z > 2.2$, $z < 20.2$)
...377

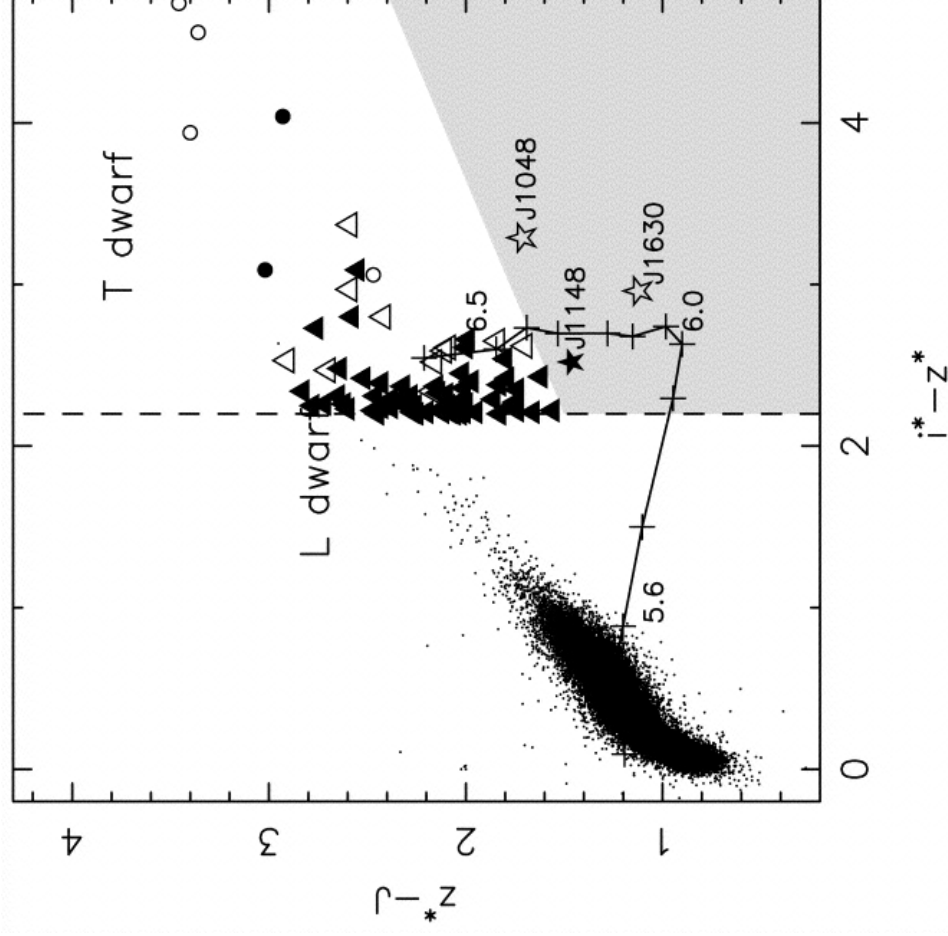
L, T型矮星 ...357
BALクエーサー ... 1
クエーサー ($z > 5.7$) ... 19
クエーサー ($z > 6$) ... 9

95%が矮星、5%がクエーサー

$z-J < 1.5 - 2.4$ で

ほとんどの矮星を除去

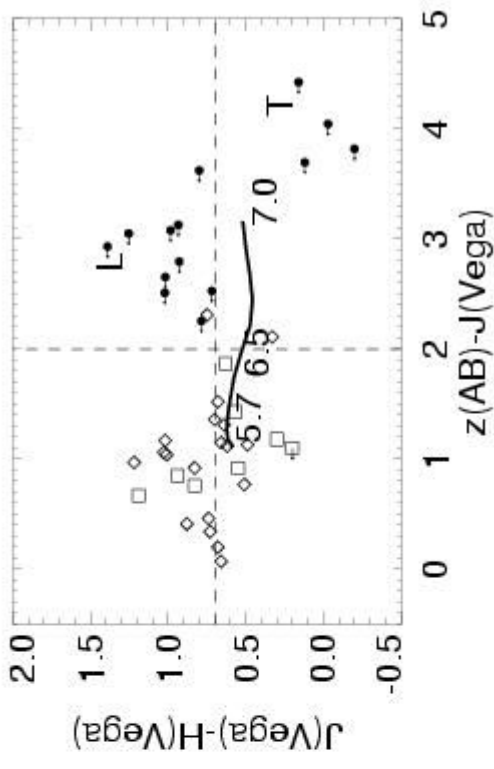
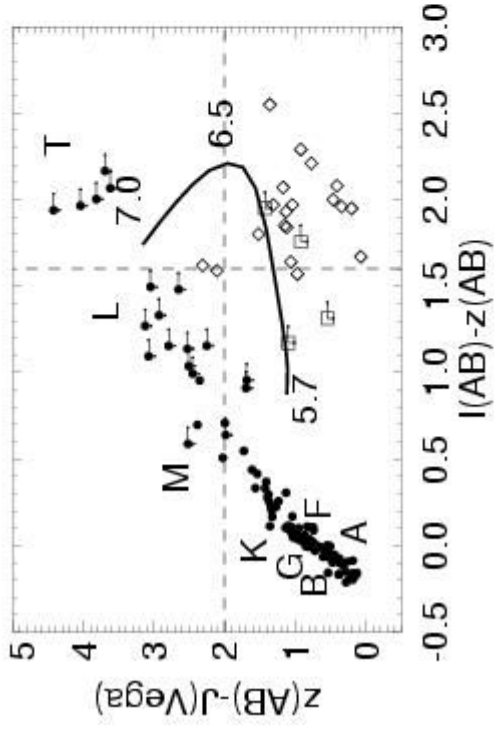
しかし、 **$z > 6.5$** を捨てている
SDSSのCCD ... $z=6.5$ までのびていない
Our survey...のびている



i/z/J/H photometric survey for finding $z = 7$ QSOs

i-dropouts of $I-z > 1.6$ combined with J/H color

We can separate dwarfs from $z = 6.5 - 7$ quasars in $i-z$ vs $z-J$ & $z-J$ vs J-H diagrams



Photometric survey

i/z CCD survey

UK Schmidt telescope with IoA camera

... 15 nights to cover 200 square degrees

SSO 40inch telescope with WFI

... 132 nights to cover 860 square degrees

Depth I (AB) ~ 22.5 mag, z (AB) ~ 21.5 mag

Detecting **0.7mag fainter i-dropouts** than SDSS

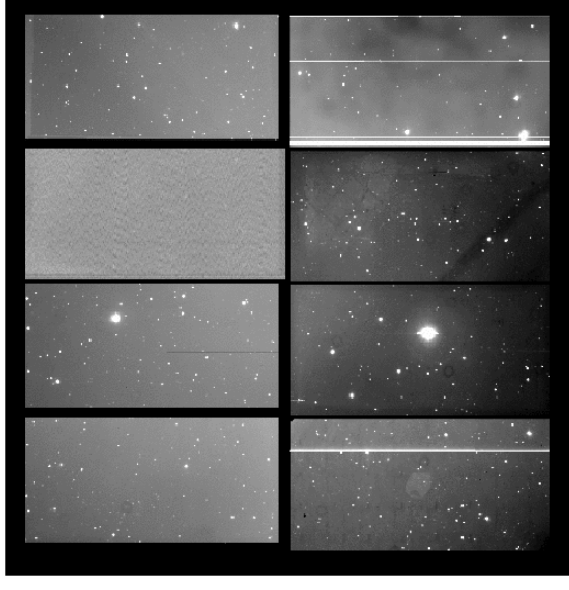
In total survey area of 1000 square degrees,
600 i-dropouts are found

J/H photometry of i-dropouts

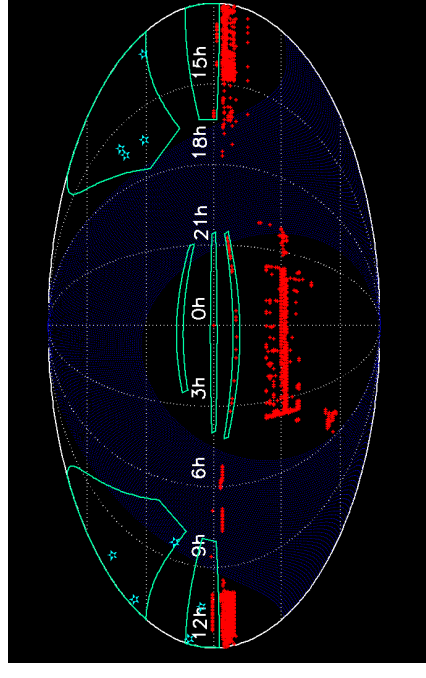
SSO 2.3m telescope...72 nights... 80 observed

IRSF 1.4m telescope...56 nights...201 observed

OAO 1.8m telescope... 7 nights... 7 observed



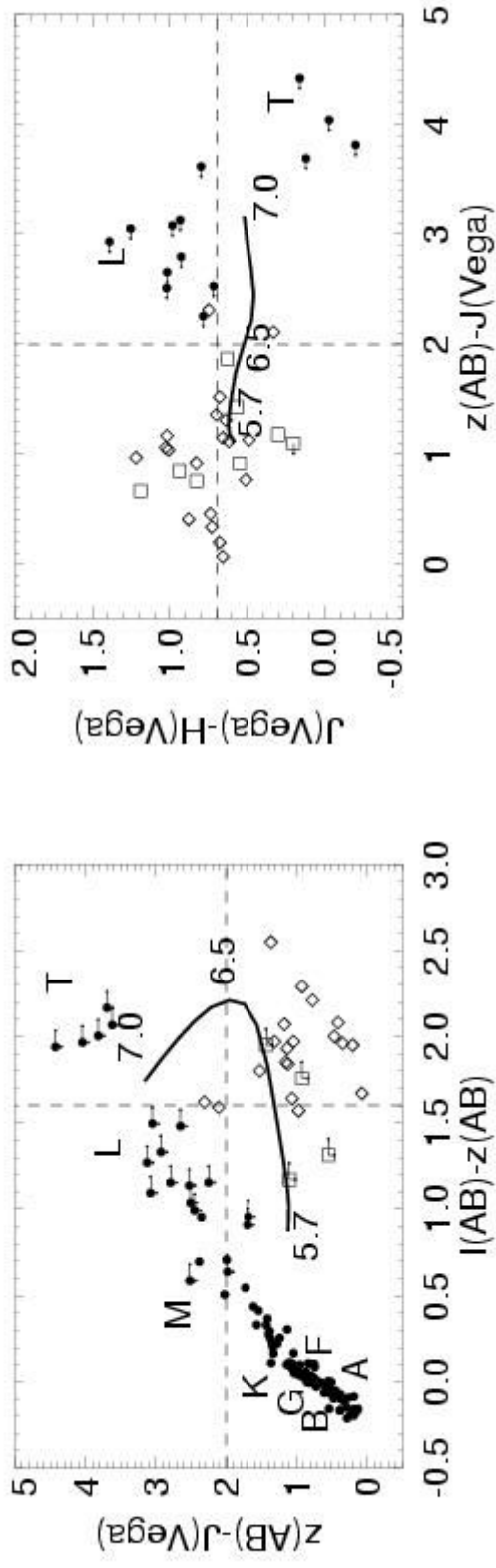
WFI: Wide Field Imager



Survey area

Spectroscopic Identification

SED analysis of 70 dropouts results in 20 candidates



We are now doing spectroscopy!

1st run with CT10 4m in July ... all clouded out
2nd run with CT10 4m in September...

In addition,
8hr run on Gemini-S in February – March