The Luminosity Function of 3.5<z<5.2 QSOs

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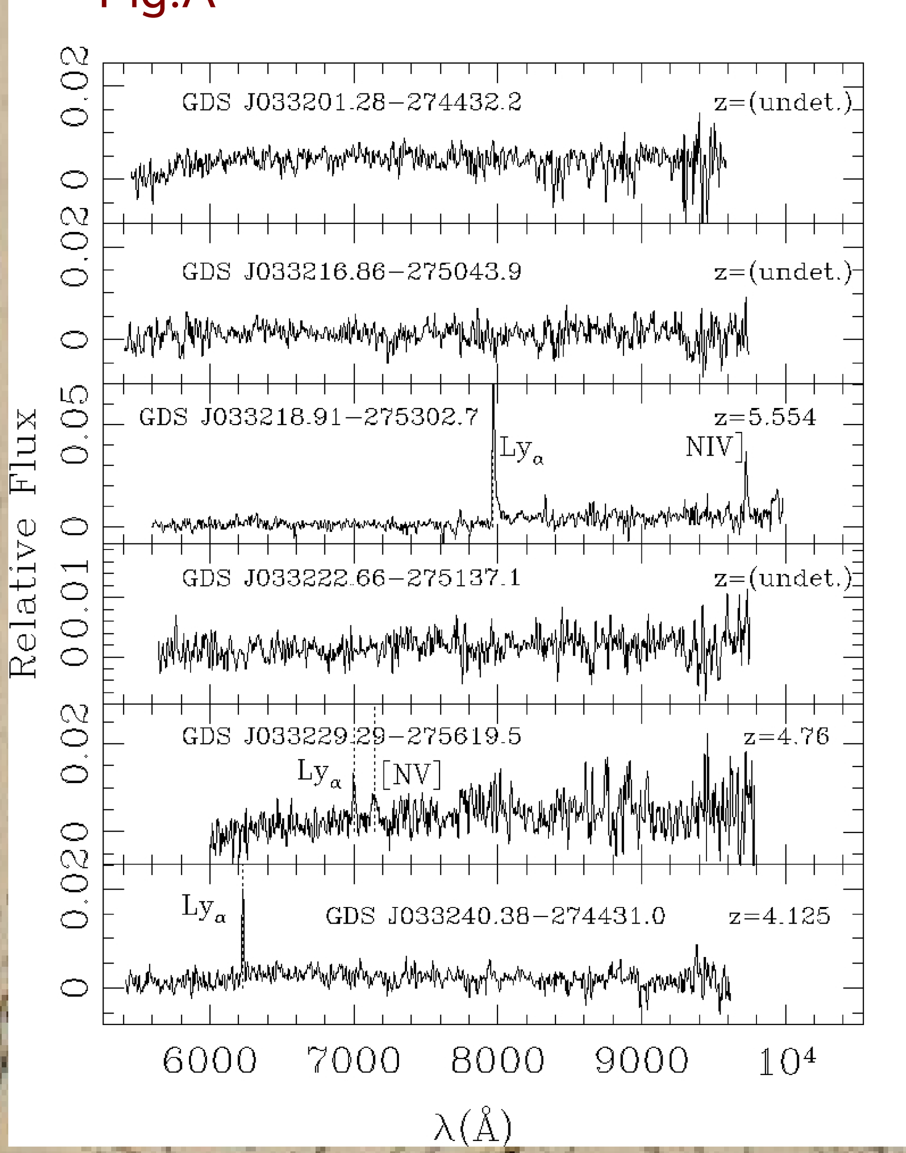

Fig.A

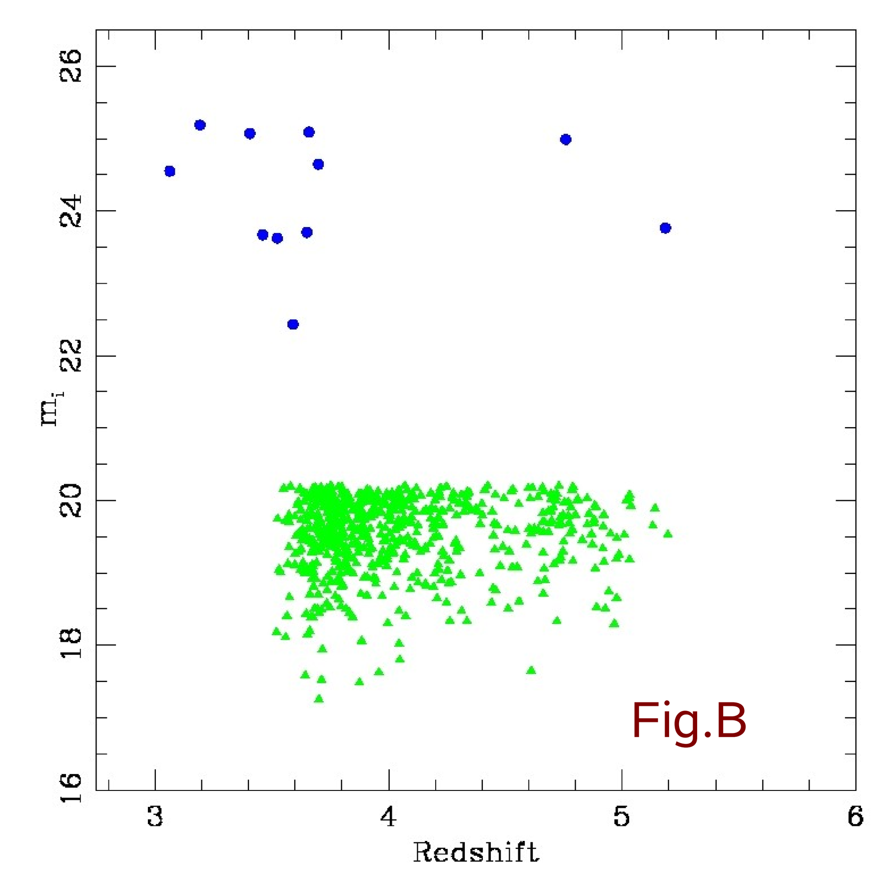

Fig.B

A) Candidate selection:

We have defined suitable criteria to select faint QSOs in the GOODS fields (based on optical and X-ray information), checking their effectiveness and completeness in detail (Cristiani et al., 2004).

A spectroscopic follow-up of the resulting QSO candidates was carried out (Fig.A), leading to the confirmation of 13 candidates (out of 16).

The confirmed sample of faint QSOs was compared with a brighter one derived from the SDSS (Fig.B). The two samples cover non-overlapping regions of the magnitude-redshift space.

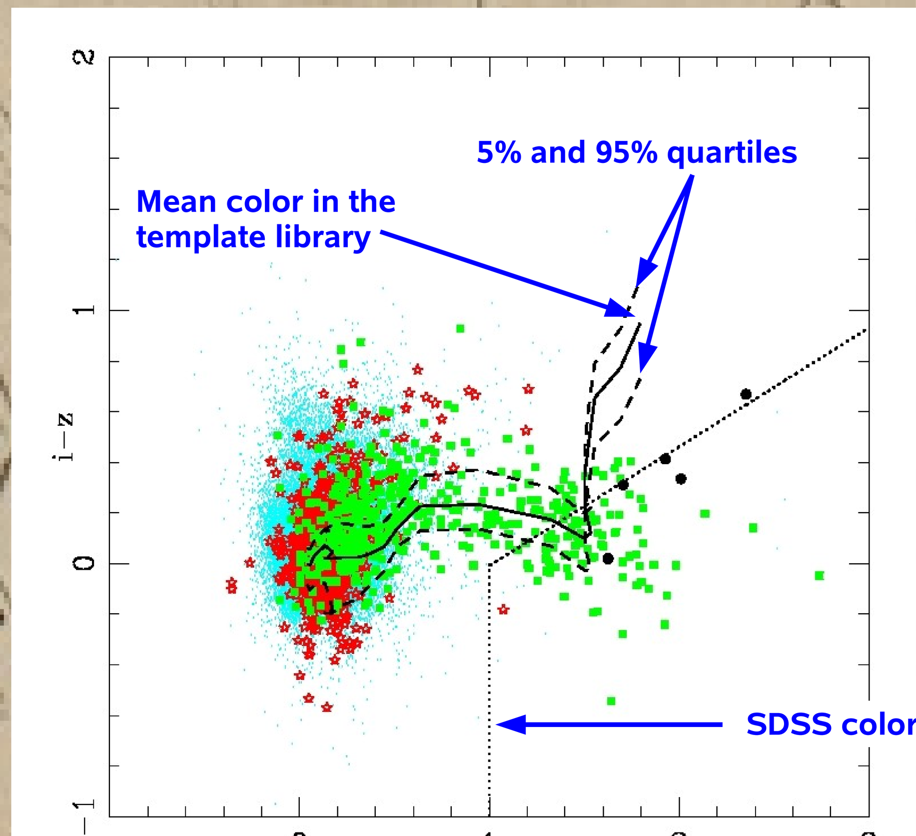

Fig.C

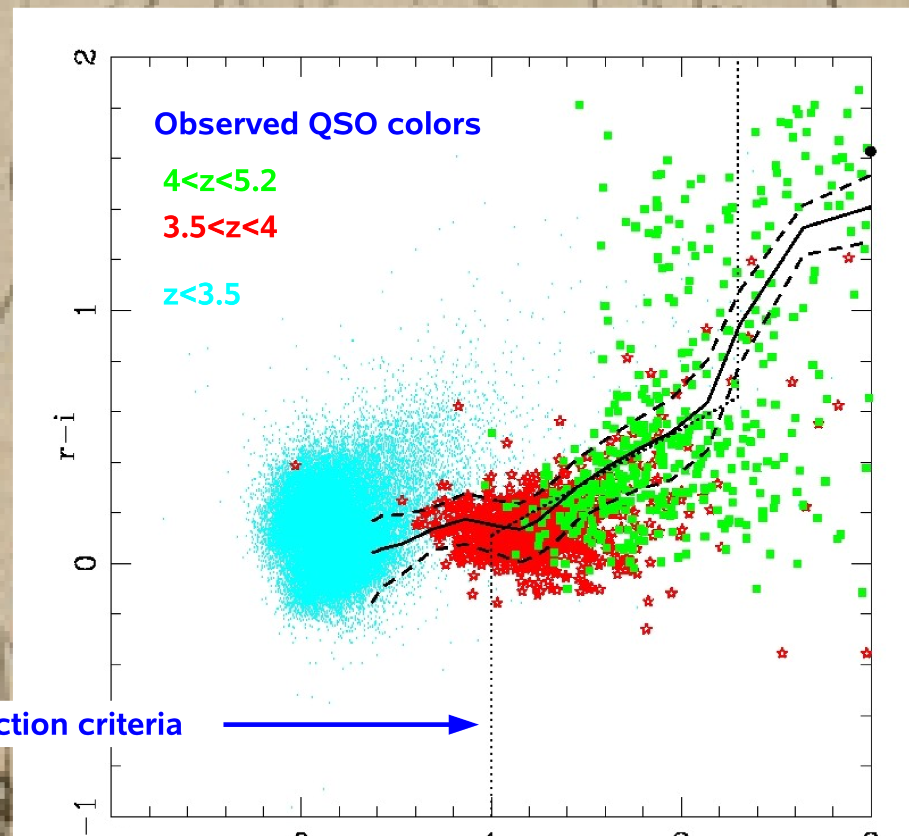

Fig.D

B) Cloning QSO colors:

We defined a statistical sample of 215 QSOs extracted from the SDSS database (redshift interval 2.2<z<2.25 is chosen for high completeness combined with complete sampling of Ly alpha in SDSS spectrograph)

We reconstructed the restframe SEDs by using a continuum fitting technique.

We cloned QSO colors as a function of redshift and we estimated their statistical distribution (fig. C and D).

C) Monte-Carlo simulations:

We generated mock QSO catalogues in GOODS and SDSS photometric systems, starting form:

1) the shape of the LF (double power law);
2) an assumed parametrization of the LF parameters and their evolution with redshift (PLE or PDE);
3) the cloned QSO colors
4) the selection criteria in SDSS and GOODS

From the statistical comparison of mock and real catalogues we estimate the best fit parameters for the LF and its redshift evolution.

D) Results:

Models based on pure density evolution (Fig. E) show better agreement with observation than do models based on pure luminosity evolution. However, a different break magnitude with respect to z~2.1 is required at 3.5<z<5.2. Models with a steeper faint-end score a higher probability. We do not find any evidence for a bright-end flattening at redshift z>3.5 with respect to lower redshift LFs.

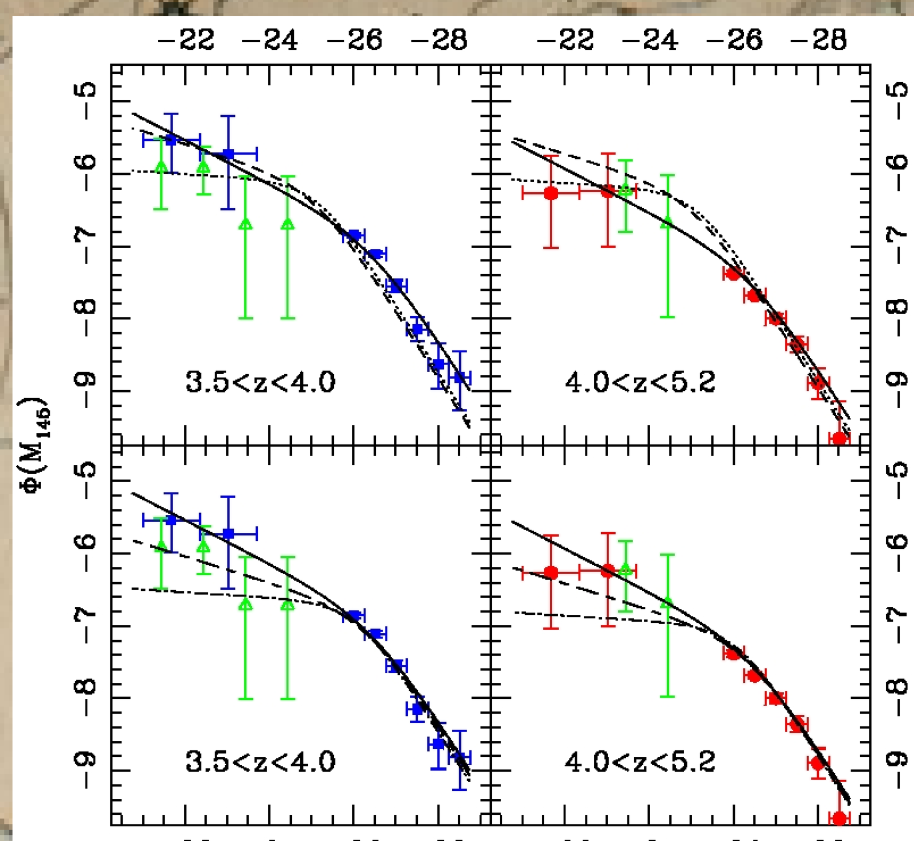

Fig.E

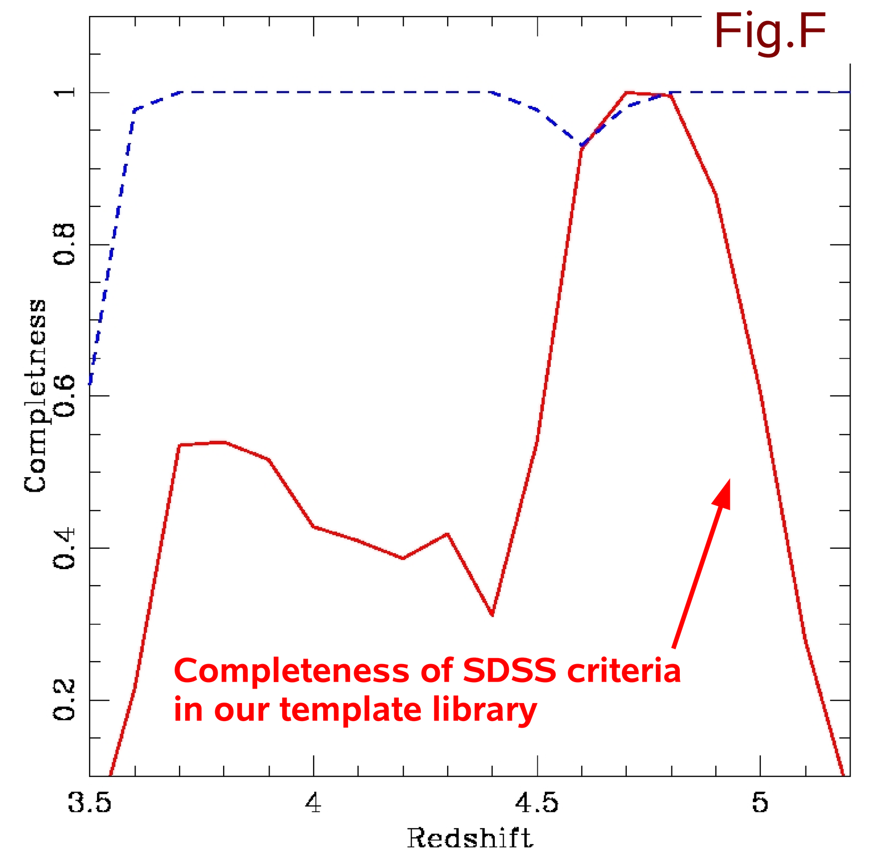

Fig.F

E) Discussion:

The disagreement between our results on the bright-end slope and Richards et al., (2006) is related to the different estimate of the completeness of the SDSS sample in our template library (fig. F). For a comparison Richards et al. estimate a completeness well above 90% in the whole redshift range.

This difference is related to the different QSO templates adopted: the SDSS selection criteria are tailored on QSO template spectra whose mean continuum slope is ``bluer'' (a power-law slope γ= -0.5) than the mean slope in our template library (γ= -0.7).

F) Conclusions:

The estimated space density evolution of QSOs indicates a suppression of the formation and/or feeding of supermassive black holes at these redshifts. The QSO contribution to the UV background is insufficient for ionizing the IGM at 3.5<z<5.2.

The space density of high-z QSOs provides useful constraints to model for the joint evolution of galaxies and AGNs (Fontanot et al., 2006, fig.G).

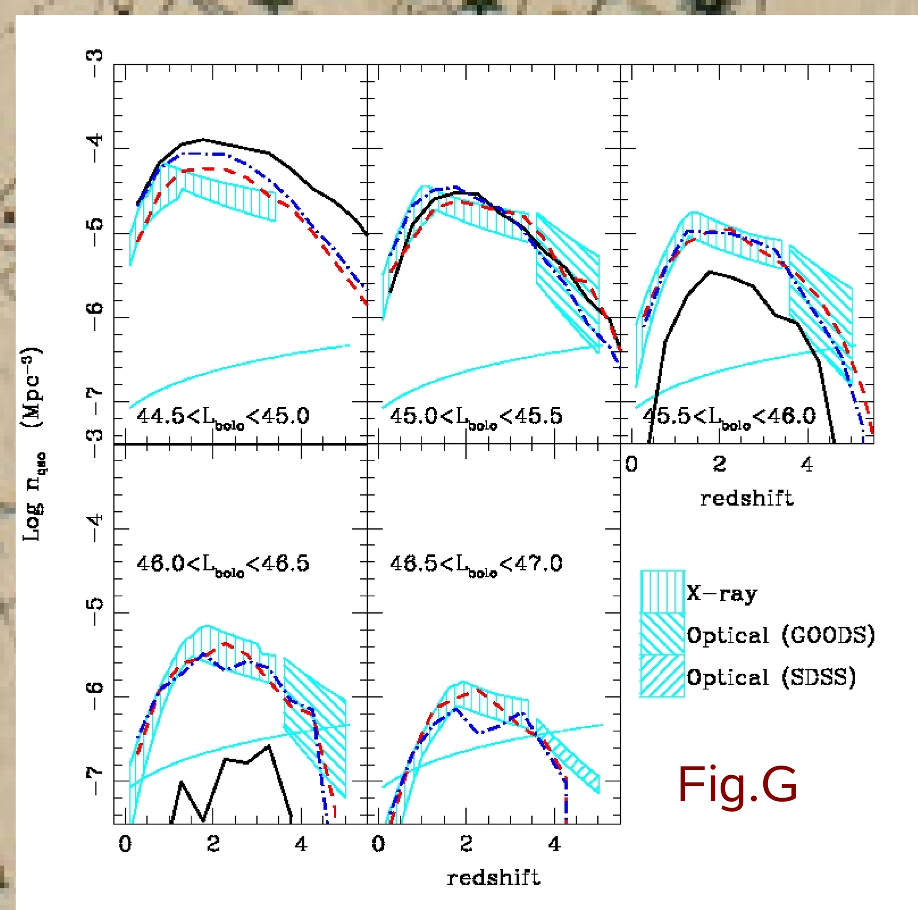

Fig.G

Bibliography:

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Cristiani et al., 2004, ApJ, 600, L119
Richards et al., 2006, AJ, 131, 2766
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