

Pilot Survey of MIR-Selected Quasars with Subaru/FMOS

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1. Motivation

- It is considered that reddened quasars are significantly missed by optical quasar survey.
- Reddened quasars may be dominant among the most luminous quasars.
- The longer wavelength selection is necessary for overcome.

2. Mid-IR Selection of Quasars

- Different color from stars. No need of point source.
- Robust against extinction. Expect to discover reddened quasars missed by the optical survey.

3. Our selection

- WISE data are used.

Whole sky was covered with 3.4, 4.6, 12 & 22 μ m photometries.

- SDSS quasars are training set for the selection.

SDSS quasars' colors are concentrate on the color-color plane. Consistent with quasars' SED (Fig. 1a).

Star forming galaxies are contaminant on this color-color plot.

- We defined the selection region as the hexagon in Fig. 1b to avoid severe contamination of star forming galaxies.

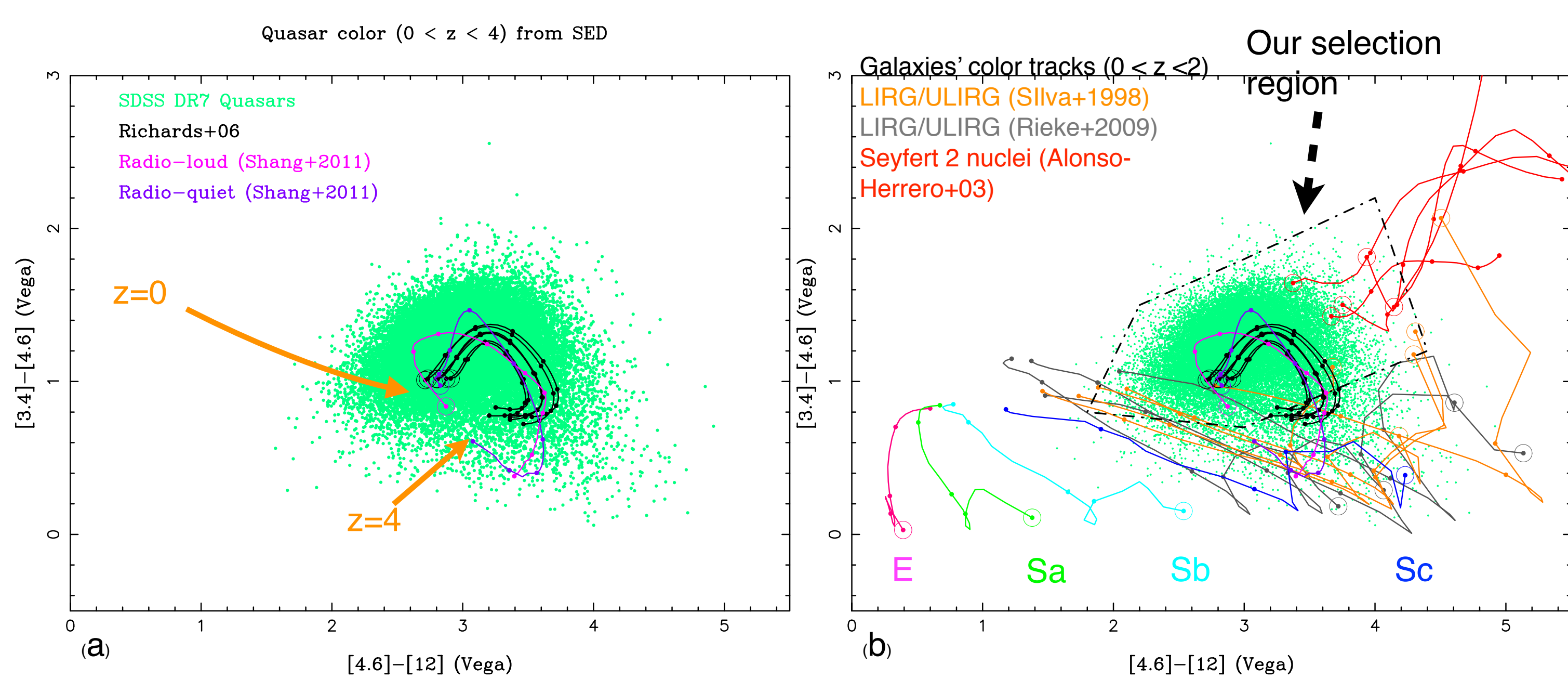


Fig. 1 (a) WISE colors of SDSS DR7 quasars (green dots). The $0 \leq z \leq 4$ color tracks are drawn from SEDs by Richards et al. (2006) in black, radio-loud and radio-quiet SEDs by Shang et al. (2011) in magenta and in blue, respectively. (b) The $0 \leq z \leq 2$ color tracks of several types of galaxies are illustrated. The hexagon (dot-dashed line) indicates our MIR color selection for quasars.

This criterion includes 80% SDSS quasars at $z < 2.5$.

4. FMOS observation

- 2012 June 5th. Low resolution mode ($R \sim 500$). JH-band.
- 6 FMOS FOVs with 30 min. integ. each.
- 85 candidates & 535 non-candidates were observed over 1.3 deg².
- Non-candidates were observed in order to check our criterion's completeness.

5. Results

- 30 quasars were identified among 85 observed candidates (Fig. 2).
- 10 more quasars are found in SDSS & BOSS in our FOV.
- 40 MIR-selected quasars in total are spectroscopically identified.
- Only six quasars were identified among 573 non-candidates. Our criterion has a good completeness.

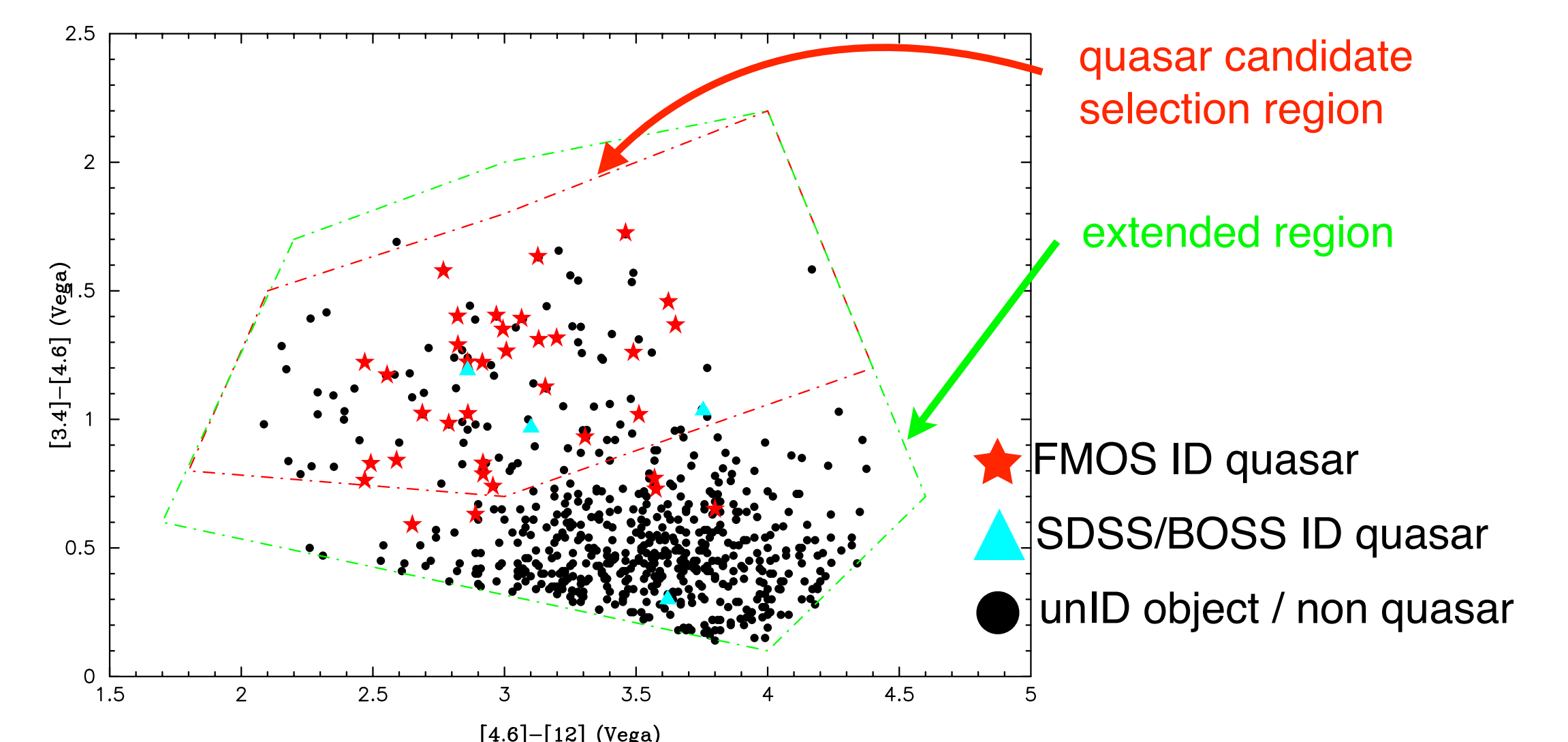


Fig. 2 WISE color of observed targets.

Examples of FMOS spectra

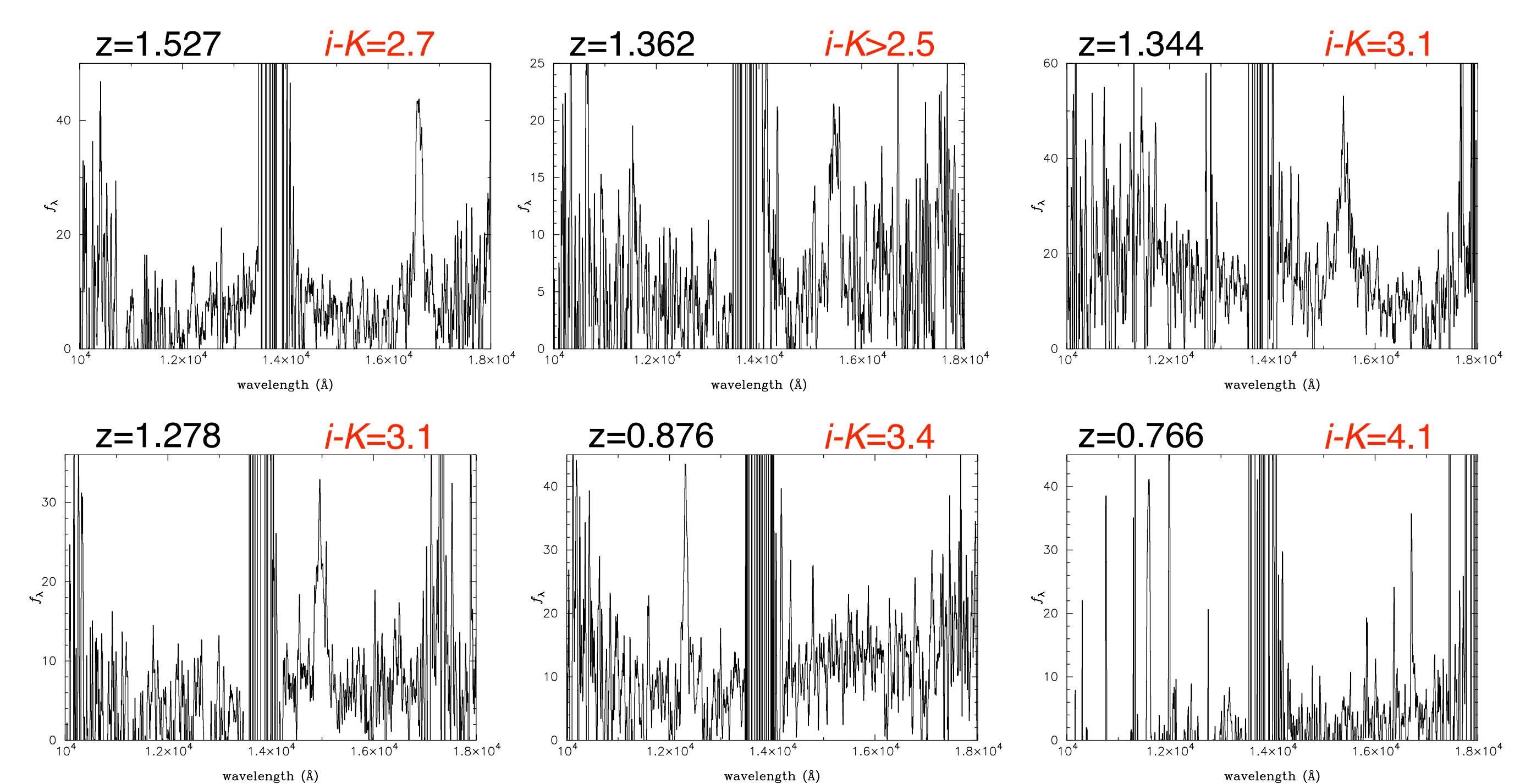


Fig. 3 FMOS spectra of some quasars. They are selected according to red colors of (*i-K*). See the next section.

6. Discussions

- color vs. redshift (Fig. 4a)

Point sources tend to be higher redshift sources.

Extended sources are $z < 1$.

Significant number of UKIDSS extended sources.

- differential color distribution (Fig. 4b)

$$\Delta i-K \equiv (i-K) - (i-K)_{\text{typical quasar @ same } z}$$

Different from SDSS quasars. Redder quasars are more. Perhaps due to host galaxy contribution or dust-reddened nuclei.

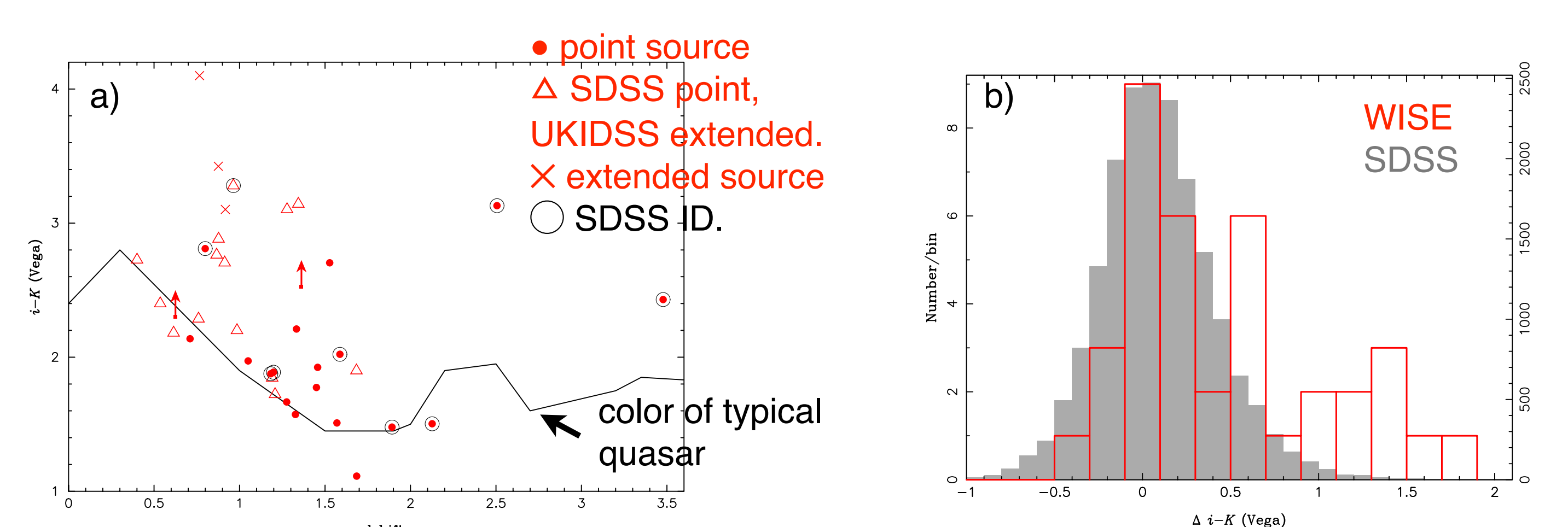


Fig. 4 a) (*i-K*) color vs. redshift of the sample. b) Histogram of differential color of the sample and SDSS DR7 quasars.