Optical~MIR survey at NEP field

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Introduction | Galaxy-SMBH relationship at z=1~2

■ Super Massive Black Holes (SMBHs) mass have tight correlations with their host galaxies' properties in local universe, suggesting the process of SMBHs growth make an important influence on the galaxy-formation history.

- Star formation (SF) properties at z=1~2 are dramatically changed from those at z=0 (Hopkins et al. 2006, Elbaz et al. 2007).
- Both relatively massive SMBHs and galaxies are rapidly-grown at z=1~2 (Ueda et al. 2003, Hopkins & Beacom 2006).
- The more active SF and Active Galactic Nuclei in galaxies, the more dust the galaxies have (Imanishi et al, 2010).

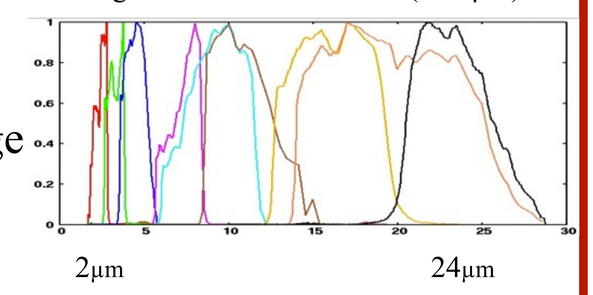
★ **To understand the galaxy-formation history, study the galaxy-SMBH relationship at z=1~2 using infrared wavelength is essential.**

AKARI NEP-Deep survey

■ **AKARI Satellite**
(Operation : 06/02/22~11/11/24)

IRC: near-mid IR Camera
Continuos wavelength coverage between 2-24μm with 9 filters

Fig.1 AKARI/IRC 9 filters (2-24μm)



■ **AKARI NEP survey**
Pointing observation over 700 times toward North Ecliptic Pole (NEP) using the IRC

- **Deep survey : 0.5deg², 100μJy@15μm (Image region)**
- Wide survey : 5.8deg², 130μJy@15μm (Green region)

■ **NEP-Deep survey field has continuous IR photometric deep data (100μJy@15μm) within larger (0.5deg²) area comparison with other deep survey.**

■ 28,613 AKARI sources including 9,559 MIR sources, with optical counterpart (Murata et al. in prep).

Multi-λ survey @NEP

Imaging	Observatory/Instrument
X-ray	Chandra
UV	GALEX
Optical	Subaru/S-Cam
	CFHT/MegaCam
NIR	CHFT/WIRCam
	KPNO2.1m/Flamingos
FIR	Herschel/SPIRE
Submm	JCMT/SCUBA-2

spectroscopy	Observatory/Instrument
Optical	Subaru/FMOS
	Keck/DEIMOS
	MMT/Hectspec

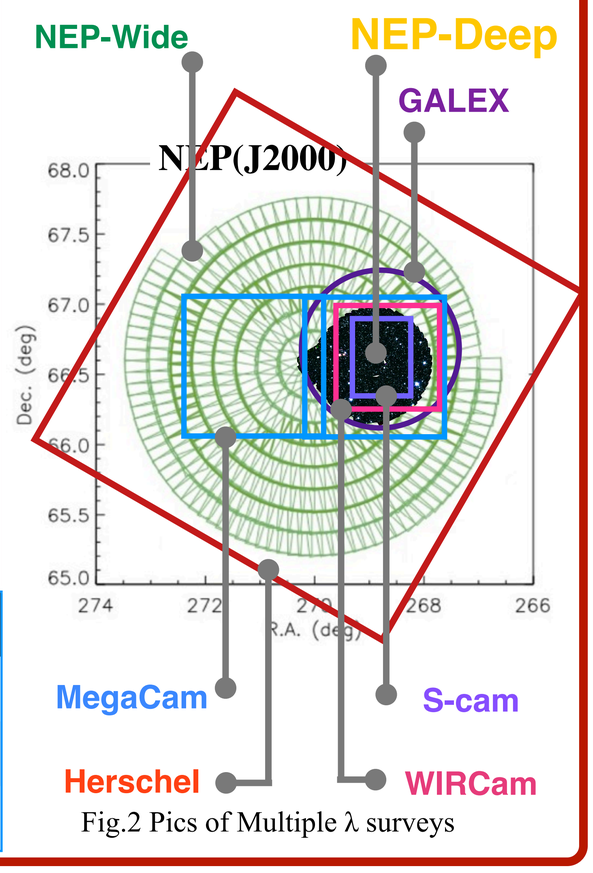


Fig.2 Pics of Multiple λ surveys

Current status

① We calculate photoz for optical sources in the NEP-Deep field using LePhare code (Oi et al. in prep).

- Model: Averoin, modified empirical CWW templates.
- Comparison the photoz with specz we observed.

→Δz/(1+z)~0.052

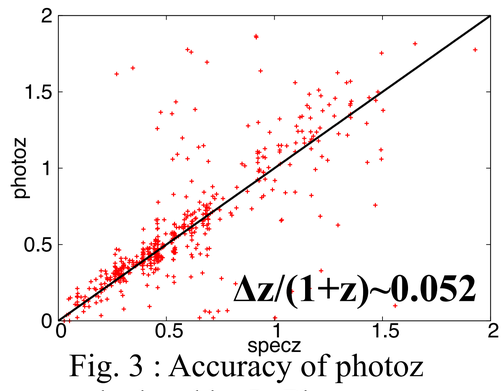


Fig. 3 : Accuracy of photoz calculated by LePhare (Oi et al. in prep)

② The photoz distribution up to z=2

- We found that over 20,000 sources at z=1~2 are detected (Oi et al. in prep).

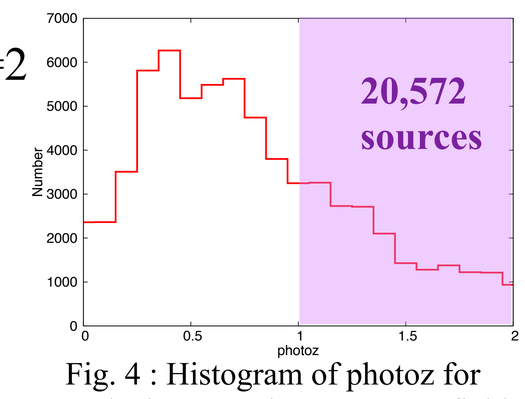


Fig. 4 : Histogram of photoz for optical sources in NEP-Deep field. (Oi et al. in prep)

③ We find QSO candidates using **optical** color-color -diagrams (Finlator et al. 2000)

- (u*-g') vs (g'-r') [*1]
- stellarity > 0.8

→ 127 candidates (z~0)

1: we have assumed g'≈g, r' ≈r*

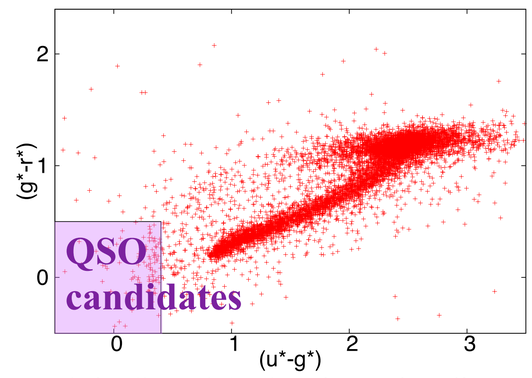


Fig. 5 : (u*-g') vs (g'-r') color-color-diagram. QSOs at z~0 could be in the pink square region.

④ We find QSO candidates using **IR** color-color-diagrams (Oyabu et al. 2011)

- $F_{(S9W)}/F_{(Ks)}$:$F_{(L18W)}/F_{(S9W)}$

→ 1,152 candidates (z~0-3)

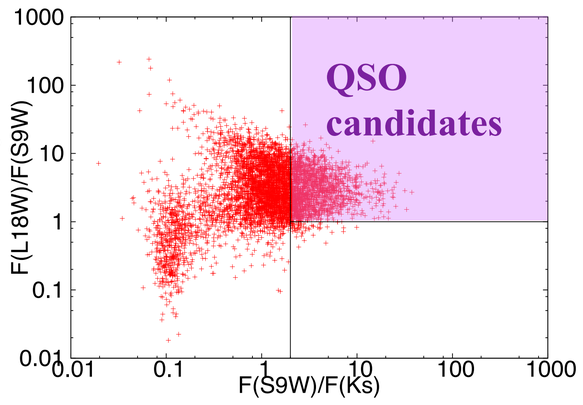


Fig. 6 : f(9μm)/f(Ks) vs f(18μm)/f(9μm) color-color-diagram. QSOs at z=0~3 could be in the pink square region.

Future work

■ SED fitting the QSO candidates
①stellar component (visible)
②host dust component (NIR) → AGN activities
③PAH component (MIR) → SF rate
④cold dust component (FIR) → amount of dust

at each of redshift between z=1-2,

- Number density of buried AGN
- Spatial distribution of buried AGN and star-forming galaxy

→ **Study of the Relationship between AGN and SF at z=1-2.**

■ Reference

- Elbaz et al. 2007, A&A, 468, 33
- Finlator et al. 2000, AJ, 126, 2615
- Hopkins et al. 2006, ApJ, 651, 142,
- Hopkins & Beacom 2006, ApJ, 651, 142
- Imanishi et al, 2010, ApJ, 709, 801
- Oyabu et al 2011, A&A, 259, 122
- Ueda et al. 2003, ApJ, 598, 886
- Oi et al. in prep
- Murata et al. in prep