

Cosmic star formation history revealed by AKARI and Hyper Suprime Cam

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At $z < 1$, 90% of star formation is obscured by dust. To fully understand the cosmic star formation history, it is critical to investigate infrared emission. AKARI performed deep mid-infrared observation with its continuous 9-band filters in the NEP field (5.4 deg²), using $\sim 10\%$ of the entire pointed observations available throughout satellite's lifetime. AKARI's mid-IR data are truly unique in that Spitzer and WISE have filter gaps in mid-IR. No other telescope can provide continuous 9-band photometry in mid-IR wavelength (2-24 μ m) in foreseeable future.

However previously, we only had shallow optical imaging (with CFHT, $r \sim 25.9$ ABmag) in a small area of 1.0 deg². As a result, there remained 11,000 AKARI's infrared sources undetected in optical. Redshift and IR luminosity of these sources are unknown. They may carry a significant amount of cosmic star-formation rate density (CSFRD). For example, if they all lie at $1 < z < 2$, the CSFRD will be twice as high at the epoch.

With the advent of Hyper Suprime Cam, we were able to obtain deep enough optical images of the entire AKARI NEP field in 5 broad bands ($g \sim 27.5$ mag). These provided photometric redshift, and thereby IR luminosity for the previously undetected 11,000 faint AKARI IR sources. Combined with AKARI's unique mid-IR AGN/SF diagnosis, and accurate mid-IR luminosity measurement, we performed a complete census of dust-obscured cosmic star-formation/AGN accretion history in the entire AKARI NEP field.