AKARI Far-Infrared All Sky Survey

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ABSTRACT

We demonstrate the capability of AKARI for mapping diffuse far-infrared emission and achieved reliability of all-sky diffuse map. We have conducted an all-sky survey for more than 94 % of the whole sky during cold phase of AKARI observation in 2006 Feb.- 2007 Aug. The survey in far-infrared waveband covers 50 μ m - 180 μ m with four bands centered at 65 μ m, 90 μ m, 140 μ m, and 160 μ m. Its spatial resolution is 43" - 72" and detection limit is 0.6 - 6 [Jy] with one scan, 5 σ . This survey has allowed us to make a revolutionary improvement compared to the IRAS survey that had been conducted in 1983 in both spatial resolution and sensitivity after more than quarter of century. Additionally, it will provide us the first all-sky survey data with high-spatial resolution beyond 100 μ m. As the end of the cold-phase of observations with AKARI, the all-sky survey data have been processed to make infrared point source catalog. Along with that, it goes without saying that image data of infrared diffuse emission are also extremely beneficial fundamental data for broad range of astronomy. These data provide a panchromatic view of the beauty, structure and complexity of the spatial distribution diffuse sky emission, and the powerful combination with the longer wavelength filters allows us to make a considerable advance in our capability to study low-temperature interstellar medium close to the wavelengths where the blackbody emission of cool dust is strongest. Considering this extreme importance of the farinfrared diffuse emission map, we are now investigating carefully the quality of the archival data. Critical subjects in making image of diffuse emission from detected signal are the transient response and long-term stability of the far-infrared detectors. Quantitative evaluation of these characteristics are the key to achieve sensitivity comparable to or better than that for point sources (<20 - 95 [MJy/sr]). We describe current activities and progress that are focussed toward making high quality all-sky survey images of the diffuse far-infrared emission.

Photometric survey with 4 FIR bands

*AKARI project is carried out with the main participation of the following institutes: the Nagoya University, the University of Tokyo, the National Astronomical Observatory Japan, the European Space Agency (ESA), the Imperial College of London, the University of Sussex, the Open University (UK), the University of Groningen / SRON (The Netherlands), the Seoul National University (Korea). Calibration support is provided by Dr. Thomas Mueller (MPE/Germany) and Dr. Martin Cohen (UCB/USA).

Continuous wavebands cover the major dust emission



AKARI 90um+140um Cygnus

Direct measurement of the total FIR emission













ig. 5. Estimated fraction of far-infrared continuum flux observed in the AKARI waveband (50–180 μ m) 2009) The templates are keyed to the $\log(L(TIR))$ of the galaxies calculated as by Sanders et al. over the total far-infrared flux ($F_{\rm FIR}$: 40–400 μ m) and the total infrared flux ($F_{\rm TIR}$: 8–1000 μ m) based alized to the same integrated flux. The templates for the three highest lumino numerical template SED calculation by Rieke et al. (2009



Covering the Whole Sky



AKARI, Spitzer, and Herschel



AKARI covers the whole sky with arc-minute spatial resolutions Spiral Galaxy M51 ("Whirlpool Galaxy") in the Far Infrared (160µm)

Spatial resolution comparable to Spitzer

Detailed SED with 4 bans, **Good evaluation of T(dust)**



M83 Dust Color Temperature (WideL/WideS) β=1.5















WideL (100825 with offset)





CDS



A signpost to the future missions

- AKARI provides a brand-new FIR all-sky survey image with the first-ever wavelength coverage beyond 100um with high spatial resolution.
- The data have been team-released, available through collaboration with project members.
- Good estimation of total energy output, good evaluation of dust colour temperature.
- Good precursor data for the future missions, including currently active Hershel and a much-anticipated future mission SPICA.