

PRESS RELEASE

Released on 3 May 2010

A&A special feature: Science with AKARI

Astronomy & Astrophysics, volume 514, May 2010

This week, *Astronomy & Astrophysics* is publishing a special feature devoted to the new results obtained with the infrared satellite AKARI, a JAXA project with the participation of ESA. It includes 17 articles dealing with various subjects. Some papers are based on the AKARI all-sky survey, which has just been released. Others are dedicated to pointed observations of many astronomical targets from solar system bodies to distant galaxies.

Astronomy & Astrophysics is publishing a special feature this week dedicated to the new results obtained with AKARI, the first Japanese infrared satellite. AKARI is a project of the Japanese Aerospace Exploration Agency (JAXA) with the participation of the European Space Agency (ESA). It was launched in February 2006. It is equipped with a 68.5 cm cooled telescope and two instruments: the infrared camera (1.8-26 μm) and the far-infrared surveyor (50-180 μm). AKARI surveyed the whole sky in six infrared bands from May 2006 to August 2007. Two AKARI all-sky survey catalogs have just been released to the astronomers' community (see the [ESA press release](#) on 31 March 2010). The new catalogs contain more than one million celestial sources and will be a major tool for astronomers, after having to rely on the IRAS atlas for more than 25 years.

The article by [Ishihara et al.](#) describes the mid-infrared catalog derived from the all-sky survey. [Ita et al.](#) combined AKARI catalogs with other stellar catalogs such as 2MASS or Hipparcos, with the aim of identifying unclassified sources. [Pollo et al.](#) developed a method of distinguishing between stars and galaxies, using the far-infrared catalogue.

In addition to the all-sky survey, AKARI performed two deep surveys located at the ecliptic poles of the sky, which were observed throughout the mission. One of them, the AKARI deep field south (ADFS) is located in the sky region where the density of dust clouds belonging to the Milky Way is the lowest. This means that this special part of the sky is particularly suitable for observations of extragalactic objects in the far-infrared. More than 2000 far-infrared bright sources have been detected in the ADFS. Are these sources stars from the Milky Way, nearby or distant galaxies, or more exotic objects? This issue is addressed by [Malek et al.](#), who finds that most of these bright far-infrared sources are actually nearby galaxies. The main feature that makes them different from other local galaxies is that they often bear a trace of recent, close interactions with other galaxies. Such interactions were probably the mechanism that triggered star formation in these galaxies. Newly-formed stars, hidden in dust clouds, illuminate this dust, which then shines brightly but only in the far-infrared.

[Goto et al.](#) made use of the north ecliptic pole survey to study the star formation history in the early Universe (about 10 billion years ago). Thanks to the continuous coverage of AKARI in the mid-infrared wavelengths, they reveal when and how many stars have been born in the history of the Universe. [Takagi et al.](#) also used the north ecliptic pole survey

to discover a unique population of infrared galaxies in the distant past (about 7.7 billion years ago). This population has the reddest color in the mid-infrared wavelengths among galaxies, because it contains organic matter known as polycyclic aromatic hydrocarbons (PAHs). PAHs are very popular among astronomers who study the interstellar medium, because they are believed to be the building blocks for life.

AKARI was also used like any other observatory that allows astronomers to apply for observing time and study their object of interest in detail. Thus, [Onaka et al.](#) discovered evidence of organic matter (PAHs, again) produced by a shocked gas flowing out from the dwarf galaxy NGC 1569.

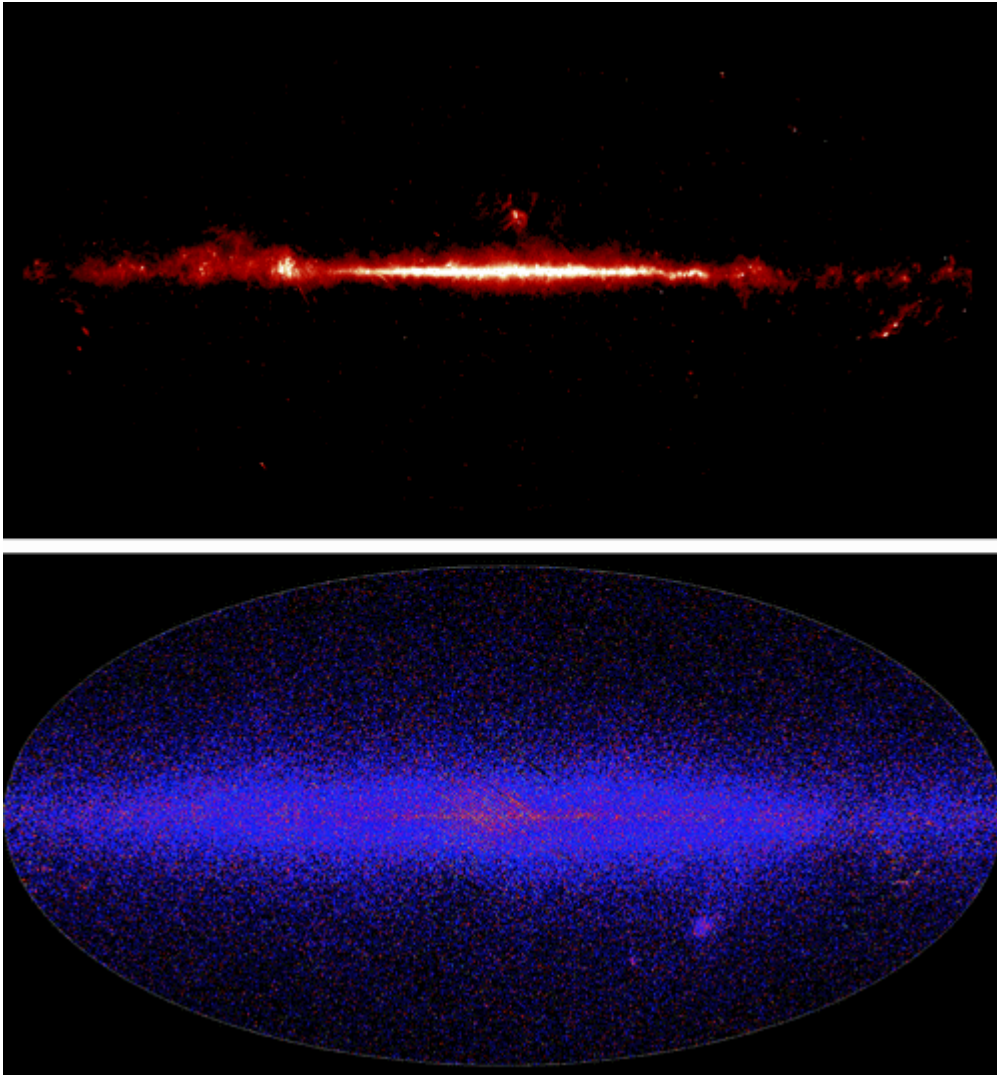


Fig. 1. **Top panel:** AKARI all-sky image in the 9 μm band. **Bottom panel:** Distribution of point sources detected in the AKARI mid-infrared all-sky survey (from [Ishihara et al.](#))

[Ueta et al.](#) studied the environment of the Mira-type star R Cassiopeiae, and especially the interaction of the stellar winds coming from the star with the interstellar medium. It causes dusty matter warmed up at the interface regions to become bright in the far-infrared.

[Fletcher et al.](#) show that AKARI has also been helpful for studying phenomena within our own solar system. They present new results for the composition of Neptune's stratosphere based on AKARI observations made in 2007. They find that the averaged

vertical temperature structure and stratospheric composition has remained constant in the ten years since it was observed by ISO, but that the cloud reflectivity has varied significantly during the same time period. They also observed a fluorescent emission of carbon monoxide (CO) on Neptune for the first time. Spectral modeling of this emission provides evidence that Neptune's CO originates in both external (e.g., from micrometeorites and dust) and internal sources (CO welling up from the deep interior).

The A&A AKARI special feature only presents a few examples of science results obtained with the infrared satellite AKARI. The AKARI catalogs provide important new data for a wide range of studies that cover topics from the properties of nearby stars to the formation of planetary systems and the star formation history of the distant Universe. These catalogs are directly important for follow-up observation with ESA infrared observatory Herschel. AKARI provides not only a new, detailed overview of the Cosmos in the infrared more than 25 years after its predecessor IRAS, but also a perfect complement to the ISO, Spitzer, and Herschel infrared space observatories.

Astronomy & Astrophysics special feature: science with AKARI, volume 514, May 2010

[Table of contents](#) of the AKARI special feature (free access)

Contacts:

- Science:

Dr. Alberto Salama
ISO & AKARI Project Scientist
European Space Astronomy Centre
Villanueva de la Canada Apartado 78
28691 Madrid, Spain.
Email: Alberto.Salama (at) esa.int
Phone: +34 91 8131 374

- Press office:

Dr. Jennifer Martin
Astronomy & Astrophysics
61 avenue de l'Observatoire
75014 Paris, France
Email: aanda.paris (at) obspm.fr
Phone: +33 1 43 29 05 41