

AKARI's view on birth and death of stars

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This view provides a comparison between a visible image (left) of the reflection nebula IC 1396 – an intense star forming region - and a mid-infrared view of the same area as seen by AKARI's satellite (right). In the visible light (left image) it is possible to see the emission from ionized (charged) hydrogen gas as well as light emitted from the massive stars in the centre and scattered by the interstellar dust. High density gas clumps are seen as dark stains. New stars born in these dark regions do however appear bright if observed in infrared light (right image). Massive young stars, recently born in the centre of the imaged area (right image), blow out interstellar gas and dust and create the giant hollow seen in the central region. The gas that has been swept out creates the bright filament-like structures seen in the infrared in the surrounding regions. The dust in the gas is heated by the intense light coming from both the massive star at the centre of the nebula and the newly born stars in the dense gas itself, and emits infrared light. The bright clump seen on the slightly off-centre right-hand side is known as the 'Elephant Trunk Nebula', a star forming region too. It appears as a dark nebula in the visible light (left image), but it is very bright in the infrared. It is a clump of dense gas that was not originally blown away because of its very high density. Credits: D.De Martin, ESA/ESO/NASA FITS Liberator & Digitized Sky Survey (left), JAXA (right)

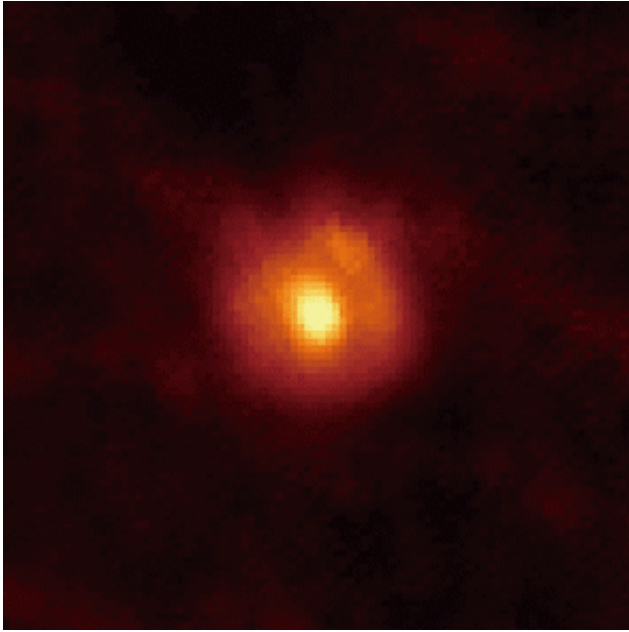
AKARI, the Japan Aerospace Exploration Agency (JAXA) infrared astronomical satellite with ESA participation, is continuing its survey of the sky and its mapping of our cosmos in infrared light. New exciting images recently taken by AKARI depict scenes from the birth and death of stars.

AKARI's Infrared Camera (IRC) imaged the reflection nebula IC 1396 in the constellation Cepheus (a reflection nebula is a cloud of dust which reflects the light of nearby stars). IC 1396 is a bright star-forming region located about 3000 light years from our Solar System, in a region where very massive stars – several tens of times as massive as our Sun - are presently being born. Massive young stars in the central region of the image have swept out the gas and dust to the periphery of the nebula, creating a hollow shell-like structure.

A new generation of stars is now taking place within the compressed gas in these outer shell structures. With this high-resolution and high-quality image of IC 1396, AKARI has revealed for the first time the detailed distribution of the gas and dust swept out over the entire nebula.

A comparison between a visible image of IC 1396 and AKARI's view of the same area shows that stars being born in regions that appear dark in visible light (left), do however appear bright if observed in infrared light (right).

The gas that has been swept out creates the bright filament-like structures seen in infrared in the surrounding regions. The dust in the gas is heated by the intense light coming from both the massive star at the centre of the nebula and the newly born stars in the dense gas itself, and emits infrared light.



This far-infrared image (90 micrometers wavelength) shows the red giant star 'U Hydrae' as viewed by AKARI's Far-Infrared Surveyor (FIS) instrument. This star is located at about 500 light years from our Sun. AKARI's observations have revealed very extended clouds of dust surrounding this star. Stars with masses close to that of our Sun will expand during the later stages of their life becoming so-called 'red-giant' stars. During the final phase of their life such stars often eject gas from their surface into interstellar space - dust is formed in the ejected gas, and this mixture of gas and dust expands and escapes from the star. AKARI's superior quality and high-resolution imaging allowed the clear detection of a shell-like dust cloud surrounding U Hydrae at a distance of about 0.3 light years from the central star. This implies that a short and violent ejection of mass took place in the star about 10 000 years ago. Credits: JAXA

The bright clump seen on the slightly off-centre right-hand side is known as the 'Elephant Trunk Nebula', a star forming region too. It appears as a dark nebula in the visible light (left image), but it is very bright in the infrared. It is a clump of dense gas that was not originally blown away because of its very high density.

Many recently born stars that were previously unknown are now expected to be detected thanks to AKARI's new image, while the detailed analysis of these data will reveal the story of the star formation in this area.

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Source: ESA

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