Announcement of Opportunity
AKARI (ASTRO-F)

CALL FOR OBSERVING PROPOSALS
for the AKARI
Post-Helium (phase 3) mission
2nd year of Operations
(October 2009 – October 2010)
Policies and procedures

27 May 2009

CHANGE LOG

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TABLE OF CONTENTS

1. Overview

This is an announcement soliciting proposals for participation in the ESA AKARI (ASTRO-F) Open Time programme in the post-helium phase (Phase 3) of the mission, for the 2nd year of operations (October 2009 – October 2010). AKARI is an infrared space mission of the Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA). A portion of the observing time is reserved for scientists belonging to institutions within the ESA member states.

This document presents an overview of the AKARI mission, an introduction of the observing opportunities with AKARI in the post-helium phase, the policies adopted and the procedures to be followed for proposal submission.

Detailed documentation about the mission and tools for proposal submissions are available at the ESA site:

http://akari.esac.esa.int/

Japanese and Korean scientists should consult the parallel announcement at:

http://www.ir.isas.jaxa.jp/AKARI/Observation/

2. The AKARI Mission

AKARI is the first Japanese space mission dedicated to infrared astronomy. A major goal of the mission was to perform an All-Sky Survey in six infrared bands between 6 and 180 micron. AKARI also performed pointed observations over the wavelength range 2-180 microns in 13 bands, providing comprehensive multi-wavelength photometric and spectroscopic coverage of a wide variety of astronomical sources.

AKARI was launched on February 21 (UT), 2006 and brought into a sun-synchronous orbit at an altitude of 700 km with a period of approximately 100 min by a JAXA M-V rocket. The telescope system and the scientific instruments on board were cooled down by super-fluid liquid helium with mechanical coolers. AKARI cryogen boiled off on 26 August 2007, 550 days after launch as predicted. The telescope system is currently kept at about 45K by means of the mechanical cooler and observations at near infrared

wavelengths can continue. AKARI is equipped with a 68.5 cm cooled telescope and two scientific instruments, the Far-Infrared Surveyor (FIS) and the Infrared Camera (IRC). The FIS has two 2-dimensional detector arrays and observes in four far-infrared bands between 50 and 180 μm. The IRC consists of three cameras covering 1.8 - 26 μm with a field-of-view of approximately 10 × 10 arcminutes^2. Both instruments have low to moderate resolution spectroscopic capabilities. **Only the IRC near infrared channel (1.8 μm – 5.5 μm) is available for Phase 3 observations**. **The AKARI near-infrared spectroscopic capability is unique at present, enabling to quickly obtain complete spectra of faint sources (down to about 1 mJy) without terrestrial atmosphere disturbances.** The spacecraft spins about the sun-pointed axis once per orbit, pointing the telescope at the zenith. In this scanning mode, an all-sky survey was executed in the cold phase simultaneously both with the FIS and IRC. Up to three times per orbit, the attitude of the spacecraft was fixed in the inertial space for up to approximately 600s to make a pointed observation with the FIS or IRC. In the pointed observation mode, the absolute pointing accuracy is better than 30 arcsec and the attitude stability is 1 arcsec per minute. In the post-helium phase, the All-sky survey is not carried out (being defined at mid and far infrared wavelengths). The pointing configurations remain unchanged however as for the cold phase.

The AKARI project is run by JAXA's Institute of Space and Astronautical Science (ISAS) in Japan in collaboration with other Japanese institutions, Seoul National University in Korea, Imperial College London, the Open University, University of Sussex in the United Kingdom, the Netherlands Institute for Space Research (SRON) with the Kapteyn Astronomical Institute in the Netherlands, and the European Space Agency (ESA).

3. Mission phases and time allocation

The observing programme is conceived along three phases:

- Phase 1 comprised the first 6 months after the Performance Verification phase, in which the All-Sky Survey was the primary program. Pointed observations were also preformed in this phase for the AKARI project team.
- Phase 2 encompassed the period after Phase 1 until liquid helium exhaustion. It lasted 291 days, until the liquid helium boiled-off on August 26, 2007. During Phase 2, the area that could not be observed for the survey in Phase 1 was observed in the scanning mode to complete the All-Sky Survey. In the rest

of observing time, 4000 pointed observations were executed.

- In **Phase 3** the telescope and scientific instruments are kept around 45K by the mechanical cooler and only near-infrared observations in the pointed observation mode are carried out.

This Call offers observing opportunities in Phase 3 for the 2nd year of operations. Of the total observing time, 10% is reserved for calibration and director's time. AKARI will carry out scientific observations in the remaining 90%. The AKARI team has its own observing programs, called "Mission Program (MP)". MP is a coherent set of guaranteed time programs dedicated to specific scientific goals. It comprises 15 programs. In Phase 3, 60% of the total pointed observations are allocated to MPs. The remaining 30% are open to General Observers (hereafter Open Time observations; OT). One third of the OT will be allocated to the European astronomers through ESA as part of an internal collaboration (hereafter ESA OT). The remaining two thirds will be assigned to observation opportunities for the Japanese and Korean communities (hereafter ISAS OT). About 1400 pointed observation opportunities are anticipated to be available for the ISAS OT observations and 700 for the ESA OT.

In Phase 1 and 2, the observing opportunities were distributed in a similar manner. In addition to the MPs, the AKARI team had developed and executed pointed observation surveys on specific areas of the sky, namely the North Ecliptic Pole and the Large Magellanic Cloud.

A Call for observations in Phase 2 was issued in September 2005. 50 proposals were received at ESA and 49 in ISAS. Seventeen proposals were granted observing time by the European TAC (26 by the Japanese and Korean TAC). Four hundred European observations were executed in the cold phase, i.e. 10% of the available pointing opportunities.

A Call for observations in Phase 3 for the 1st year of operations was issued on 12 May 2008. 12 proposals were received at ESA and 28 at ISAS. 11 proposals were granted observing time by the ESA appointed TAC and 22 by the Japanese and Korean TAC. At the time of writing, over 460 European observations and 900 Japanese and Korean observations have been successfully executed, in line with the overall scheduling simulation. By the end of the 1st year of operation, ~700 European observations and 1300 Japanese and Korean observations are expected to have been executed as planned.

4. Observing constraints

Because the AKARI telescope has to avoid the Sun- and Earthshine in its low Earth orbit, the sky visibility is highly restricted. Particularly, objects near the ecliptic plane have a small chance of being observed. Except for the ecliptic polar regions, several pointed observations of a given target are thus quite difficult. The attitude control system has a capability to locate the telescope axis ±1 degree off the canonical position of the solar elongation of 90 degree, which increases the observable area on a given orbit. AKARI is operated in a pre-planned manner without any significant routine real-time interaction. Thus, all observations must be specified in full detail by the observers with pre-packaged templates or AOTs (Astronomical Observations Templates). Open time proposers may apply to use any of the instrument modes or AOTs described in the Observer's manual.

In general, OT investigators should not propose observations that are deemed to duplicate those targets scheduled in MPs. Since both instruments have array detectors, a guideline of the definition of a duplication observation is to overlap with half of the field-of-view of existing MP targets with the same AOT. Those with a requested number of pointings a factor of 4 higher are not regarded as duplications. However as described above, such observations may only be possible in very small regions of the entire sky.

It is not recommended (although not prohibited) to repeat observations already executed in the cold phase, or in the first year of warm phase with the same AOT. Observers should justify the repetition of those observations in the proposal. All IRC observations executed in Phase 1 and 2 are in the public domain.

A tool is provided, returning observations deemed to duplicate Phase 3 MP or observations in the cold phase or the first year of warm phase, performed with the same AOT. In addition, observers are invited to consult the observing log for possible overlap with executed observations in the Phase 3 PV phase. The latter set may be duplicated, although users are aware that these are by definition in the public domain already.
In making MP observing programs, 6 orbits in two days are reserved for OT observation opportunities. Taking account of the ±1 degree pointing capability off the canonical attitude, any part of the sky should be observable in OT observations in the reserved orbits, except for the areas disturbed by the presence of the Moon, and the South

Atlantic Anomaly (SAA) where a high hit rate of ionizing particles are anticipated. Note, however, that targets near the ecliptic plane generally have a small number of observation opportunities. **Observers should understand that opportunities to observe particular objects or fields with AKARI are severely limited. Observations of generic targets distributed over the entire sky are preferred to those of specific targets**. Time critical observations are not recommended for the same reasons. Target-of-opportunity (TOO) proposals will not be accepted as OT proposals. They can instead be requested as director's time. An Open Time proposal should have a sufficient number of backup targets (priority C) in addition to those with A and B priorities. The targets should be distributed across priorities A:B:C in the ratio of 1:1:1.

Because of the increased number of hot pixels, observers should take account of this fact seriously and are strongly recommended to have sufficient redundancy in their observation plan. Particularly deep imaging (IRCZ0) and spectroscopy (IRCZ4) should have at least 3 pointing observations for the same target. Refer to the Observer's manual for phase 3 (version 1.2) for details of the instrument performance.

5. Review process and schedule

Proposals may be submitted until 6 July 2009. All proposals will first be technically assessed by the User Support Team at ESAC, who will also prepare summary statistics on the response. The proposals will then be sent to an ESA established European Time Allocation Committee for peer review. ESA and ISAS will make the review independently. The following items will be taken into account during the review process:

- Scientific case and justification
- Scientific merit and relevance of the proposed observation(s)
- Exploitation of the AKARI instrument
- Duplication with MP observations and with observations already executed in the cold phase
- Technical feasibility and adequate performance estimation
- Visibility and requested number of pointings

The final selection of the proposals will be made based on the results of both reviews. In case of conflict, the proposal with the higher ranking in the individual lists will be selected. If there are similar proposals with similar evaluation in both sides,

corresponding investigators may be asked to make collaborative observations. The visibility of the proposed observations will be examined before the selection to ensure that they can be allocated the requested observing time. The result of this process is expected to be announced to the proposers in September 2009. Successful proposers will be given the number of pointed observations of each priority and asked to revise the target list, if necessary, to meet the given observation opportunities.

The observation scheduling will be performed as follows: priority A observations will be scheduled first, followed by B and C observations. In general, observations with priority C will not be executed even if observing time is allocated. Investigators of successful proposals will be informed which A and B observations are allocated the observing time and asked to report which C observations should replace unallocated A and B observations. Investigators should understand that the execution of the allocated observations cannot be guaranteed.

6. Data products and data rights

The data will be delivered to the successful proposer after standard processing has been performed. The data package will comprise both raw and pipeline-processed data together with the associated calibration files. Open Time data have a proprietary period of one year since their availability in the Data Archive.

7. Proposal submission

a) **Who may propose**. Only PIs affiliated with institutions located in ESA member states are eligible to propose for AKARI Open Time programme through ESA. This requirement does not extend to Co-Investigators.

b) **Due date of proposals**. Proposals are due on **6 July, 2009, 09:00 hrs UT**.
In view of possible network congestion close to the deadline, proposers are urged to submit their proposals well in advance of the due date.

c) **Proposal format**. Proposals must be submitted electronically using the Proposal Submission Tool available at the AKARI website http://akari.esac.esa.int/. Details of the mission, instruments and observing modes (AOTs) are provided in the Observers Manual documentation. Observers are required to check the visibility and the technical feasibility of the observations, and the duplication with blocked observations, via usage

of the specific tools provided. Proposals should include a scientific justification for the program and a demonstration of the feasibility of the proposed observations and the need of the unique capabilities of AKARI for carrying out the investigation. The scientific justification is limited to 6 pages at most (4 for text and 2 for figures and tables). A latex template is provided. The proposal will include the complete target list and associated observation details.

8. Documentation and Tools

The following documentation and tools are available at http://akari.esac.esa.int/

- **Letter from ESA Director of Science**
  The formal invitation letter from the Director of the ESA Scientific Programme
- **The ESA AKARI Announcement of Opportunity**
  This document, providing the necessary information about the policies adopted and the procedures to be followed.
- **AKARI Observers' Factsheet**
  A synoptic 2-pages overview of the mission and instrument capabilities, sensitivities and observing modes (AOTs).
- **AKARI Observer's manual for the post-Helium (Phase 3) mission.**
  A document which describes the mission scientific instrument and AOTs, including its performance, and the guidelines for the observation planning.
- **Mission Program (MP) abstracts for Phase 3**

The following items will be available in mid June:

- **Blocked target list**
- **Target list format validity check tool**
  A web tool to check the validity of a target list (this module is also integrated in the other tools).
- **Duplication check tool**
  A web tool to search for nearby targets in the blocked target list.
- **Visibility tool**
  A web tool to provide the target visibility.
- **Proposal Submission Tool**
  A web tool for the submission of the proposal and the target list.

For any question regarding Open Time observations, please consult with the ESA AKARI helpdesk at http://akari.esac.esa.int/esupport/