



Centre National d'Etudes Spatiales



Indian Space Research Organization

December 15, 2009

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*CNES - DSP/OT09-27509*  
*ISRO - ISRO/SAC/SARAL/A009*

**SARAL/ALTIKA**

**JOINT ANNOUNCEMENT OF  
OPPORTUNITY**

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Proposals due February 15<sup>th</sup>, 2010

# SARAL/AltiKa: Announcement of Opportunity

## 1.0 DESCRIPTION OF THE OPPORTUNITY

### 1.1 OVERVIEW OF THE OBJECTIVES

The Indian Space Research Organization (ISRO), Department of Space (DOS), Government of India and Centre National d'Etudes Spatiales (CNES), France, jointly announces an opportunity to carry out scientific research towards the utilization of SARAL/AltiKa data. The objectives of ISRO-CNES SARAL/AltiKa mission are to realize precise, repetitive global measurements of sea surface height, significant wave height and wind speed for developing operational oceanography, understanding of climate variability and developing forecasting capabilities. The aim of AltiKa mission is to provide altimetric measurements complementary to Jason-2, as a follow-on to the successful couples TOPEX/Poseidon, Jason-1/2+ENVISAT series of satellite altimetry missions. The added advantages of AltiKa mission is that it is based on a wideband Ka-band altimeter (35.75 GHz, 500 MHz), which will be the first oceanography altimeter to operate at such a high frequency. This unique technical characteristic of the instrument will offer higher performance both in terms of spatial and vertical resolution which will also be useful for coastal applications. SARAL/AltiKa is scheduled to be launched during third quarter of 2010 onboard Polar Satellite Launch Vehicle (PSLV) from Sriharikota, India. The satellite will be placed on a Sun-synchronous orbit (6am-6pm) with a cycle and ground track identical to ENVISAT's historical ones.

The AltiKa payload consists of a Ka-band (35.75 GHz) radar altimeter along with a dual frequency microwave radiometer (23.8 and 37 GHz), required to correct tropospheric effects on the altimeter measurement. The Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) on board package and its antenna, along with a Laser Retroreflector Array (LRA), are dedicated to precise determination of the orbit. Complementary information on the SARAL/AltiKa mission, system and payload can be found on <http://smc.cnes.fr/SARAL/>.

Data from these payloads are meant for addressing various research areas, primarily in oceanographic and atmospheric science. The data from the satellite is likely to be made available to the global scientific community (Principal Investigators) after necessary post-launch sensor characterization, which is expected to be completed within 2 months from the launch, as part of the assessment phase.

This Announcement of Opportunity (AO) is open to global scientific community for submitting research proposals towards utilization of AltiKa payload data in the following broad categories:

- Cal/Val activities: development and assessment of dedicated techniques. Specific investigations in the fields of coastal and inland water, ice surfaces and rainy/cloudy conditions, are solicited.
- Reprocessing activities: development and assessment of new retrieval algorithms and/or models likely to improve the quality of the data over open ocean and in particular zones: coastal oceans, inland waters, ice surfaces and rain/clouds are of special interest.
- Scientific applications studies: mesoscale variability, coastal altimetry, continental water monitoring, polar oceans observations, continental and sea ice studies, low rain and clouds climatology, global mean sea level variations, marine biogeochemistry, marine geoid, etc.
- Operational applications studies: with a requirement for near real-time delivery of data products. These include development of techniques for use in operational applications, seasonal-to-interannual climate prediction, local weather forecasting, sea-state forecasting, oil exploration/operations, oil spill mitigation, coastal currents, shipping, fisheries, marine meteorology and marine recreation.

- Assimilation of AltiKa data in numerical models : use of AltiKa data for assimilation into numerical models dedicated to description and forecasting of ocean, e.g. global or coastal circulation models.
- Synergistic studies using multi-sensor approaches e.g. Ocean Colour, winds from scatterometer: use of AltiKa in conjunction with data from other, non-altimetric, sensors such as ocean-color imagers, scatterometers, at global, regional, or coastal scale.

Applications studies that use AltiKa mission data along with the combined long TP/Jason-1/Jason-2 and ENVISAT data sets, and/or jointly with other satellite and *in situ* data and/or models, are highly encouraged.

Studies proposal that focus on the Indian Ocean processes are particularly solicited.

It should be noted that this AO does not fund the 'projects', but only ensures that the selected Principal Investigators (PIs) are provided with relevant, limited data sets at no cost. For funding issues, refer to **paragraph 4.0**.

## 1.2 WHO CAN SUBMIT A PROPOSAL?

Proposals could be submitted by individuals or a group of scientists, academicians and research scholars belonging to recognized institutions, universities, government and non-government organizations. Proposals may be submitted by a Principal Investigator (PI) with one or more Co-Investigators (CoIs). Selection will depend on the experiences and qualifications of the PIs and the CoIs along with the quality and pertinence of the proposal.

The proposals must be forwarded through the Head of the Institution, with appropriate assurance for providing necessary facilities for carrying out the AO projects.

## 2.0 DATA AVAILABILITY

The term data refers to the data products produced at data processing facility of ISRO and CNES for offline products, at ISRO and EUMETSAT for near-real-time products, and distributed as listed in **Annexure 4**. OGDR and IGDR data will be made available to the Principal Investigators (PIs) after the commissioning phase, which is expected to be around 2 months after launch. GDR data will be produced later on, as soon as a quality precise orbit ephemeris will be available, and then distributed to PIs (expected about 8 to 10 months after launch). The data sets required for executing the AO projects will be provided at no cost.

IGDR and GDR data products will be hosted on CNES (AVISO website: [www.aviso.oceanobs.com](http://www.aviso.oceanobs.com)) and ISRO (MOSDAC) websites for the use of the global users after the offline verification phase, which is expected to be about one year from the launch. OGDR data products will be distributed by EUMETSAT and ISRO to global user after the near-real time verification phase, i.e. about 6 months after launch. Level-3 altimetry multi-missions merged gridded products (including AltiKa data as soon as possible) are produced by CNES (SSALTO-DUACS) and distributed by CNES (AVISO website) in a routine mode.

## 3.0 EVALUATION OF PROPOSALS

With the overall SARAL/AltiKa mission objectives briefly summarized in Section 1.0, this Announcement of Opportunity (AO) for potential Principal Investigators is aimed towards stimulating newer research in oceanography and atmospheric research; identifying necessary support for calibration and validation of AltiKa payloads; and for encouraging development of specific techniques for operational use of the data on a regional/ global basis. Towards this, the proposals received in response to

this AO will be evaluated considering primarily the scientific/technical merits. The principal elements, listed in descending order of importance, considered in selecting the proposals, will be:

- The relevance of the proposed investigation to the AO and to the established experiment objectives quoted in section 1.1 of the core text of this Announcement,
- The overall, scientific or technical merit of the proposal, uniqueness and innovative methods, approaches or concepts planned to be demonstrated, and the probability of achieving positive results,
- The need for and planned contribution of the Principal Investigator and any collaborators to pre-launch and post-launch mission planning activities,
- The competence and relevant experience of the Principal Investigator and any collaborators as an indication of their ability to carry the investigation to a successful conclusion,
- The reputation and interest of the investigator's institution, as measured by the willingness of the institution to provide the necessary support to ensure that the investigation can be completed satisfactorily.

## **4.0 FUNDING**

### **4.1 INDIAN INVESTIGATOR FUNDING**

The funding support will be made available to Indian researchers carrying out studies using SARAL/AltiKa data through SARAL/Altika Science and Application Programme of ISRO. Since this Announcement ensures free data sufficient to carry out the studies, ISRO can also provide letters of support when needed to help selected investigators in their funding requests from any other sources.

### **4.2 FRENCH INVESTIGATOR FUNDING**

The funding available for French investigators may come from CNES national program budget appropriations, in accordance with TOSCA rules and procedures, for scientific and CalVal investigations related to the SARAL/AltiKa and Jason-2 programs and from the CNES SARAL/AltiKa and Jason-2 projects for activities directly related to instruments or system performance. Another source of budget may be the so-called 'National Programs' such as LEFE, etc. Yearly progress reviews of the selected studies will be conducted by CNES in relation with TOSCA and related National Programs to determine if satisfactory progress has been towards achieving the goals of these programs.

### **4.3 OTHER INVESTIGATOR FUNDING**

For non-French and non-Indian proposals, the proponents will have to seek and secure appropriate sources of funding from relevant national, European or international authorities. ISRO and CNES, will provide letters of support when needed to help selected investigators in their funding requests.

## **5.0 GUIDELINES FOR PROPOSAL PREPARATION**

The potential PI should submit the proposal in a format described in the following sections. The format for the cover page is given in **Annexure 1**. The format for the detailed proposal is given in **Annexure 2**. **The format for proposal includes a Declaration to be signed by the Principal Investigator and Head of the Institution (Annexure 5).**

## 5.1 INSTRUCTIONS FOR SUBMISSION OF PROPOSAL

Proposals should be limited to around 10 pages in length on standard A4 size paper, typed double-spaced and in the prescribed format. The proposal prepared in the formats given in **Annexure 1** and **Annexure 2** should be mailed to:

Dr. Rakesh Mohan Gairola  
Associate Project Director, SARAL/AltiKa Utilisation Project  
& ISRO-SARAL-PI  
Meteorology and Oceanography Group (Bopal Campus)  
Space Applications Centre, Ambawadi Vistar P.O.  
Ahmedabad-380 015, India.  
Telephone: +91 -79 -2691 6051;  
Fax : +91 -79 -2691 6075;  
E-mail: rmgairola@yahoo.com

OR

Dr. Eric Thouvenot,  
Centre National d'Etudes Spatiales  
18, avenue Edouard Belin  
F-31401 Toulouse Cedex 9  
FRANCE  
Telephone : +33 561 28 25 68  
Fax : +33 561 28 34 21  
E-mail : eric.thouvenot@cnes.fr

Electronic version of the proposal (preferred) should be sent to :

[saralao@sac.isro.gov.in](mailto:saralao@sac.isro.gov.in)

AND

[oceano@cnes.fr](mailto:oceano@cnes.fr)

## 5.2 DESCRIPTION OF THE PROPOSAL

The proposals shall be written in English. The main part of the proposal should contain a summary (briefing the objectives, methodology, deliverables of the project and the time schedule), followed by a detailed description of the objectives and the scientific rationale being addressed. The data requirement and the analysis methods should be highlighted. The methodology or approach to be followed and the expected results of the project must be presented. Targeted schedule for various stages of the project must be indicated including the completion date. Criteria for assessing the success of the project should be projected. The data requirements, particularly that call for large quantum of data, should be justified.

### 5.2.1 PROJECT DURATION

It is expected that the project will be completed within 3 years. Projects will be evaluated and short listed by April 15<sup>th</sup>, 2010. PIs are expected to present the preliminary results in a workshop to be conducted around mid-2011.

### **5.2.2 DATA REQUIREMENTS**

Only AltiKa data sets fulfilling the project requirement will be supplied. The project should clearly indicate the type of data product (refer to **Annexure 4**), geographical area and period of coverage, and quantum of data. All approved PIs are encouraged to download the data products which are hosted on the website and the additional data products required will be supplied directly to the PIs within 30 days of its reception.

### **5.2.3 PERSONNEL**

The project may involve joint efforts involving many individuals from the concerned institution(s). However, only one PI will be recognized. Other participants could be designated as "Co-Investigators". PI/CoIs shall provide Curriculum Vitae referring to educational qualifications, the work carried out in the related areas and list of recent publications. The PI is responsible for ensuring timely completion of the project. The assurance of necessary administrative and financial support to PI and CoIs from Head of the Institution(s) is a must.

### **5.2.4 FACILITIES AND EQUIPMENT**

Describe available computer facilities, analysis software and other equipment in the home institution or in sister facilities and their availability for the project.

### **5.2.5 PROJECT EVALUATION**

It is proposed that a workshop will be conducted once a year for the purpose of reviewing the progress of the AO projects and sharing the results with international scientific community. PIs of each project are expected to attend these workshops.

## **6.0 TERMS AND CONDITIONS**

- ISRO and CNES together reserves the right to revoke in part or in whole its support for a project at anytime without assigning any reason.
- The data sets provided must be used only for the purpose specified in the proposal. The project personnel do not have the rights to copy, lease or loan the satellite data without the prior permission of ISRO and CNES. Ownership and copyright of the data lies with ISRO and CNES. Also, this data is supplied free of cost purely for scientific research and it should not be used for any commercial and operational applications. Commercial use is defined as that involving the sale or resale of data, as well as data derived therefrom, for more than the cost of reproduction. Operational use is defined as routine real-time or near-real-time use of the data as well as the data derived therefrom.
- The user will make available to the scientific community the salient results of the AO projects through publication in appropriate journals or other established channels. Acknowledgement of ISRO and CNES support must be made in all reports and publications arising out of the AO projects. Copies of all publications resulting from these research projects must be submitted to ISRO and CNES to the addresses mentioned under paragraph 5.1. If the reports or publications are copyrighted, ISRO and CNES will have a royalty-free right under the copyright to reproduce, distribute, and use the copyrighted works for their purposes.
- The PI is required to submit six-monthly progress reports during the duration of the project. A detailed report is to be submitted during the mid-term and final reviews in soft copy form.

- The PI must maintain an inventory of data products received/obtained under the AO project(s) and the data products must be deposited with the home institution after the end of the project.

The declaration contained in the proposal format must be signed by the PI and Head of the Institution (**Annexure 3**). Otherwise the proposal will not be considered valid and is liable to be rejected.

## 7.0 SCHEDULE

Deadline for submission of proposals: **15 February, 2010**  
Notification of evaluation results to Principal Investigators: 15 April, 2010

Your interest and cooperation in participating in this opportunity are greatly appreciated.

For ISRO & CNES, the co-chairmen of the SARAL/AltiKa Joint Science Working Group,



Dr. RR Navalgund  
Director, SAC, ISRO



Dr. Pascale Ultré-Guérard  
Head of Earth Observation, CNES

**Annexure – 1 : Cover Page of the Proposal**

**Title of the Proposal**

**Name and Designation of PI**

**Telephone, Fax and E-mail Address**

**Name of Institution with full Address**

**Signature of PI with Date**

**Signature of Head of Institution**

**SARAL/AltiKa Announcement of Opportunity (AO) proposal  
submitted to Indian Space Research Organization (ISRO)/  
Centre National d'Etudes Spatiales (CNES) on**

## **Annexure – 2 : Format of the Proposal**

1. Title of the Proposal:
  
2. Name of the Principal Investigator:  
Institution:  
Telephone:  
Fax:  
E-mail:  
Mailing Address:
  
3. Summary of the proposed work
  
4. Details on the preliminary work done/background experience, if any
  
5. List of Publications in the related field
  
6. Description of the project
  - Theme
  - Objectives
  - Study area (latitude/ longitude)
  - Type of data products required (season(s), periodicity and number)
  - Methodology
  - Schedule
  - Expected results and its possible uses
  
7. Name of Co-investigator(s) in the AO project (please include bio-data of all Investigators)
  
- 8 Available facilities and equipment at your institution

**Annexure – 3 : Format for Declaration**

Declaration

We have carefully read the terms and conditions of SARAL/AltiKa AO program and agree to abide by them.

It is certified that if the AO proposal is accepted and supported by the Indian Space Research Organization (ISRO) & Centre National d'Etudes Spatiales (CNES), the facilities as identified in the proposal and administrative support available at our institution and needed to execute the project will be extended to the Principal Investigator and other Co-investigators.

We certify that the data products provided would be used only for the intended AO project.

It is agreed that data products will be returned to ISRO, CNES in case the AO project does not progress/ complete as scheduled.

Signature of PI with Name and Designation

Signature of Head of Institution with Name and Designation

Date:

Seal of Head of Institution

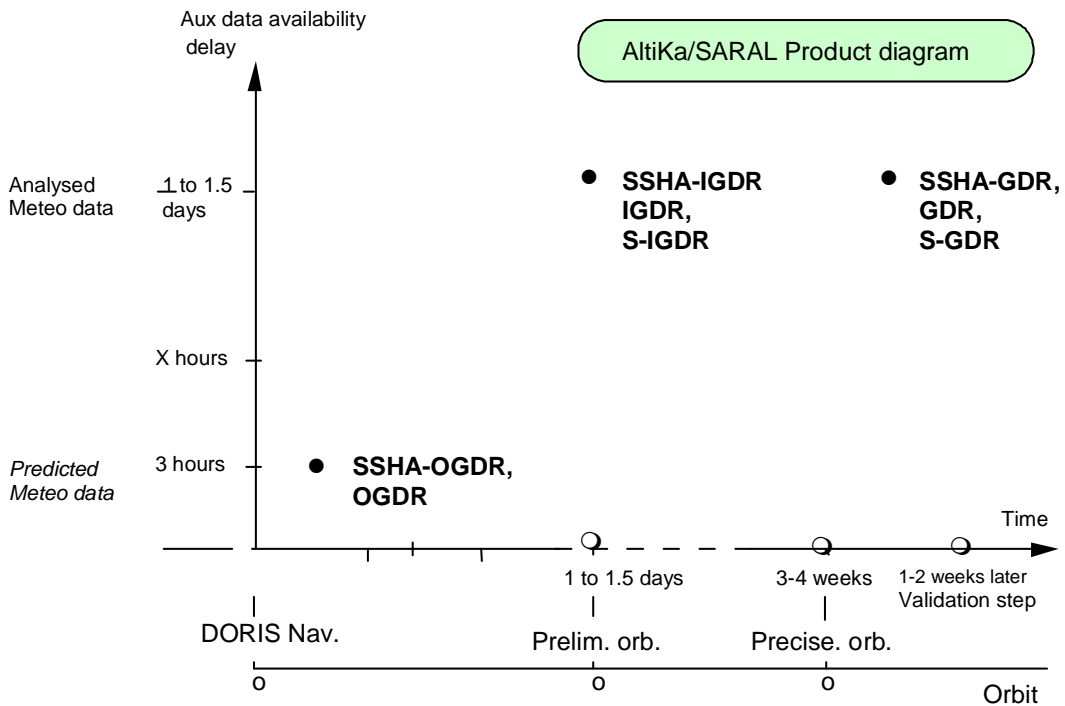
**Annexure – 4 : AltiKa data products**

Product	OGDR	IGDR	GDR
Content	geophysical level 2 product Fast QC&C	geophysical level 2 product QC&C	fully validated geophysical level 2 product
Latency	3-5 hours	< 3 days	~ 40 days
1-Hz	OGDR-SSHA	IGDR-SSHA	GDR-SSHA
1-Hz 40-Hz	OGDR	IGDR	GDR
Waveforms		S-IGDR	S-GDR
Structure	acquisition segment	pass	pass
Packaging	segment	day	7-day arc

Size & complexity



Latency   
 Accuracy



### **Annexure – 5 : List of Abbreviations**

AO	-	Announcement of Opportunity
AVISO	-	<a href="http://www.aviso.oceanobs.com">www.aviso.oceanobs.com</a>
CNES	-	Centre National d'Etudes Spatiales (French Space Center)
CoIs	-	Co-Investigators
DORIS	-	Doppler Orbitography and Radiopositioning Integrated by Satellite
DOS	-	Department of Space
EUMETSAT	-	European Organisation for the Exploitation of Meteorological Satellites
GDR	-	Geophysical Data Record
IGDR	-	Interim Geophysical Data Record
ISRO	-	Indian Space Research Organization
LRA	-	Laser Retroreflector Array
OGDR	-	Operational Geophysical Data Record
PI	-	Principal Investigators
PSLV	-	Polar Satellite Launch Vehicle
S-GDR	-	Sensor- Geophysical Data Record
SSHA	-	Sea Surface Height Anomaly
SSALTO/DUACS-		CNES Multimission altimeter data processing system