Request for Proposal for FS9A International Science Payload

Taiwan Space Agency

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1.0 Introduction to the Cooperation

In order to foster international cooperation, bolster partnerships, and contribute positively to sustainability and advancements in scientific, technological, and engineering fields, the Taiwan Space Agency (TASA) is extending an invitation to host an International Science Payload (SP/L) weighing up to 5 kg on the FORMOSAT-9A satellite. The SP/L flight model is needed by July of 2026. Selected international partner(s) shall be responsible to provide the SP/L, and TASA will be responsible for satellite-level testing, integrating and launching the satellite into space. Selected international partner(s) shall identify and partner with registered organization(s), as the engaged beneficiary(ies) of the data/imagery/value-added applications/published papers/extended joint research/commercialized services and solutions derived from the chosen SP/L, in the public and/or private sector of Taiwan. Selected international partners should share SP/L data with Taiwanese partners and collaborate to explore its applications.

For entity(ies) feels interested in this international cooperation, please contact with leiwang@tasa.org.tw to request for "FORMOSAT-9A International Science Payload Statement of Work (SOW)" and "FORMOSAT-9A Spacecraft Bus to Science Payload Interface Requirement Document (IRD)." The entity(ies) mentioned here refer to governments, agencies, academia, and research institutions.

You can find more detailed for roles and responsibilities defined in SOW and the technical interfaces defined in IRD. To participate into the international program, please prepare a proposal in according with Section 3 Cooperation Survey and Section 4 Payload Survey. Please provide a proposal to leiwang@tasa.org.tw by June 28, 2024. TASA will evaluate the proposal in one month and make contact to the selected partner.

2.0 Introduction to FORMOSAT-9

FORMOSAT-9 is a micro-wave remote sensing satellite program, one of the programs in the third long term national space technology development program. The objective of this program is to develop a constellation of two X-band Synthetic Aperture Radar (SAR) satellites having multi-functions, resolution better than 1 meter, and swath more than 50km. There are three main operation modes including strip-map, spotlight and ScanSAR. The satellite will be operated in dawn-dusk sun-synchronous orbit with an altitude of 514km, and with a mission life of 5 years. SAR satellites can collect images in all-day and all-weather conditions. They are suitable for Taiwan's cloudy weather. The application domains of SAR data include environmental monitoring, disaster monitoring, maritime and oceanography, agriculture and forestry, reconnaissance and security, etc.

FORMOSAT-9 constellation can revisit Taiwan within two days and provide global coverage SAR images. Two FORMOSAT-9 satellites, FORMOSAT-9A (FS9A) and FORMOSAST-9B (FS9B), carrying an active phased array antenna SAR payload on board are scheduled to be launched in 2027 and 2029 respectively. In addition to the SAR mission payload, there will be secondary payloads on board including a Global Navigation Satellite System- Radio Occultation / Reflectometry (GNSS-RO/R) instrument and two SP/Ls. Two SP/Ls will be one from domestic university and one from international partner.

3.0 Cooperation Survey

The chosen application for this rideshare opportunity will be examined and considered according to the following aspects. Applicants are encouraged to provide supplementary qualitative and/or quantitative materials associated with those aspects in question.

(1). Management:
such as organizational structure, workforce qualifications and composition, work interface handling, schedule management, capability of timely contract performance, site management, project management capability, subcontracting plan, etc.

(2). Technology:
such as functionality of technical specifications, professional or technical manpower, professional expertise, technical feasibility, development approaches, standardization conformity, requirements on operational environment, etc.

(3). Product Assurance:
such as provided Product Assurance Program Plan (PAPP).

(4). Sustainability:
such as generated data and imagery to deal with the viability of the society, greenhouse gases on the climate, protection of wildlife and natural habitats, environmental pollution, weather forecast, disaster management, etc.

(5). Collaboration
such as reciprocal bilateral relationships, shared resources, in-kind contributions, extended joint projects, extended joint research, international relations, co-branding, collaborative writing in research and papers, etc.

(6). Track record:
such as record of contract/cooperation performance, experience, compliance with regulatory requirements, efficiency in timely contract performance, etc.

(7). Any other matters related to the benefit of the proposed mission (payload) in question.

4.0 Payload Survey

Please provide information of the payload you would like to fly with FS9A below. Feel free to provide any supporting diagrams/pictures and files to help us understand your payload better.

ID	Information Type	Information	Guidance
1	Name		Point of Contact
2	Email address of Point of Contact		
3	Name of affiliation		Leading organization.
4	Affiliation type	☐ Agency/Government ☐ Academia ☐ Research institute	

5	Mission purpose	☐ Experimental data collection ☐ Operational data collection	
6	Mission objectives	☐ Science research ☐ Environmental monitoring ☐ Other	Please select all that apply. If "Other", please provide details in the additional notes box at the end of the form.
7	Name of Payload		
8	Payload Type	☐ Optical ☐ Radio-Frequency ☐ Other	Please select all that apply. If "Other", please provide details in the additional notes box at the end of the form.
9	Payload Development Stage	☐ Built ☐ Tested ☐ Flown	
Payload Accommodation Parameters			
10	Mass (kg)		
11	Position/Dimensions	Please refer to IRD for the description of position ☐ Position 1 _____ ☐ Position 2 _____ ☐ Position 3 _____	Please provide dimension of SP/L envelop (in mm) for preferred position.
12	How long will the payload operate for per orbit or per day?		Please provide a brief description of the duty cycle of your payload per orbit or per day, for example 10 minutes per orbit; 7 orbits per day.
13	Peak Power (W)		Please provide an estimate of the peak power of your payload
14	Orbit Average Power (W)		Based on the information provide in 12, please provide an estimate of the nominal orbit average power consumption of your payload.

Supplementary Information (anything you would like to add to help us process your payload hosting request)			
15	Additional Notes		Please provide any additional information that we may find useful to explain the information requested above.

A. Please provide the description to help us understand the current status of your payload
   - Current Technology Readiness Levels (TRLs)
   - What has been done and what remains to be done prior to delivery of Flight Model.
   - Is there any existing Interface Simulator Device (ISD), payload simulator, Engineering Model (EM), or Engineering Qualification Model (EQM) currently available or scheduled for development in the near future?

B. Please list all domestic and international partners, even it is still in plan. Which organization takes the leading role? What are roles and responsibilities of the supporting agency/institute/company?

C. Please identify your SP/L data product partner(s) in Taiwan. Please describe the areas in which you plan to collaborate, such as data/images/value-added applications, published papers/joint research, commercial services (if any), or provision of solutions.

D. Do you use any China product/elements would be shipped to TASA? Please identify them if there is any.

E. Please provide operation scenarios including field of view, direction, attitude requirement, duty cycle, and operation modes. Please provide description for the part of orbit/location is preferred for operations e.g. specific country/area, ocean/land, latitude bands, and orbit sunlight/eclipse.

F. How will your payload be operated? Are you expecting commands to be sent every time upon power up to initialize, set, and operate the payload or will it do it automatically? Do you have pre-programmed sequence of actions on your payload that only need to be called on by the bus platform to perform certain tasks? Is the payload be operated via time-schedule commands from the bus platform or are there event-based actions that need to be considered?

G. Does your payload have any autonomous or automatic switching between modes? Please define the different modes of operations, associated power draws, data rates, etc.

H. Will the payload also capture and store its own housekeeping data? How much housekeeping telemetry is required to be transferred to the spacecraft for download to the ground station per payload operation? Will you require the bus to also capture some housekeeping data that will have to be consolidated and distributed to you post downlink? Is there a rate that the data needs to be collected at and for what duration?

I. If you have an active payload, please identify the frequency and bandwidth, including optical, RF, etc.

J. Please also identify the nature of the transmissions, such as continuous or burst etc., and identify any other features that may influence the power supply or may generate out of band spurious emissions that could cause interference.

K. You will need to support any regulatory activities as part of the satellite licensing. Please indicate if you have given this any consideration and have made any enquiries or applications.

L. Please provide as much information as you can about your expected power profile or current draws on the different switches during operation:
   - Transients such as switch on and data processing (including durations)
   - Steady state

M. Please provide the following mechanical properties where possible:
- Mass
- Volume & mounting footprint, drawing or STEP file
- Centre of Gravity and Moment of Inertias

N. Please provide top level details of the sort of tests/calibration/measurement that will be required following delivery of the payload.

O. Please review the SOW to identify and list tasks you may not be able to complete or items you may not be able to deliver in a timely or complete manner.

Task/Item	Difficulty encountered	Potential solution if any

P. Please check IRD to identify and list the requirements which cannot be compliant with.

IRD requirement	Payload capability	Potential solution if any

Q. Please provide any additional information that we may find useful to explain the information requested above.

5.0 Acronyms

TASA	Taiwan Space Agency
SP/L	Science Payload
SOW	Statement of Work
IRD	Interface Requirement Document
SAR	Synthetic Aperture Radar
FS9A	FORMOSAT-9A
FS9B	FORMOSAT-9B
GNSS-RO/R	Global Navigation Satellite System- Radio Occultation / Reflectometry
PAPP	Product Assurance Program Plan
TRL	Technology Readiness Levels
ISD	Interface Simulator Device
EM	Engineering Model
EQM	Engineering Qualification Model