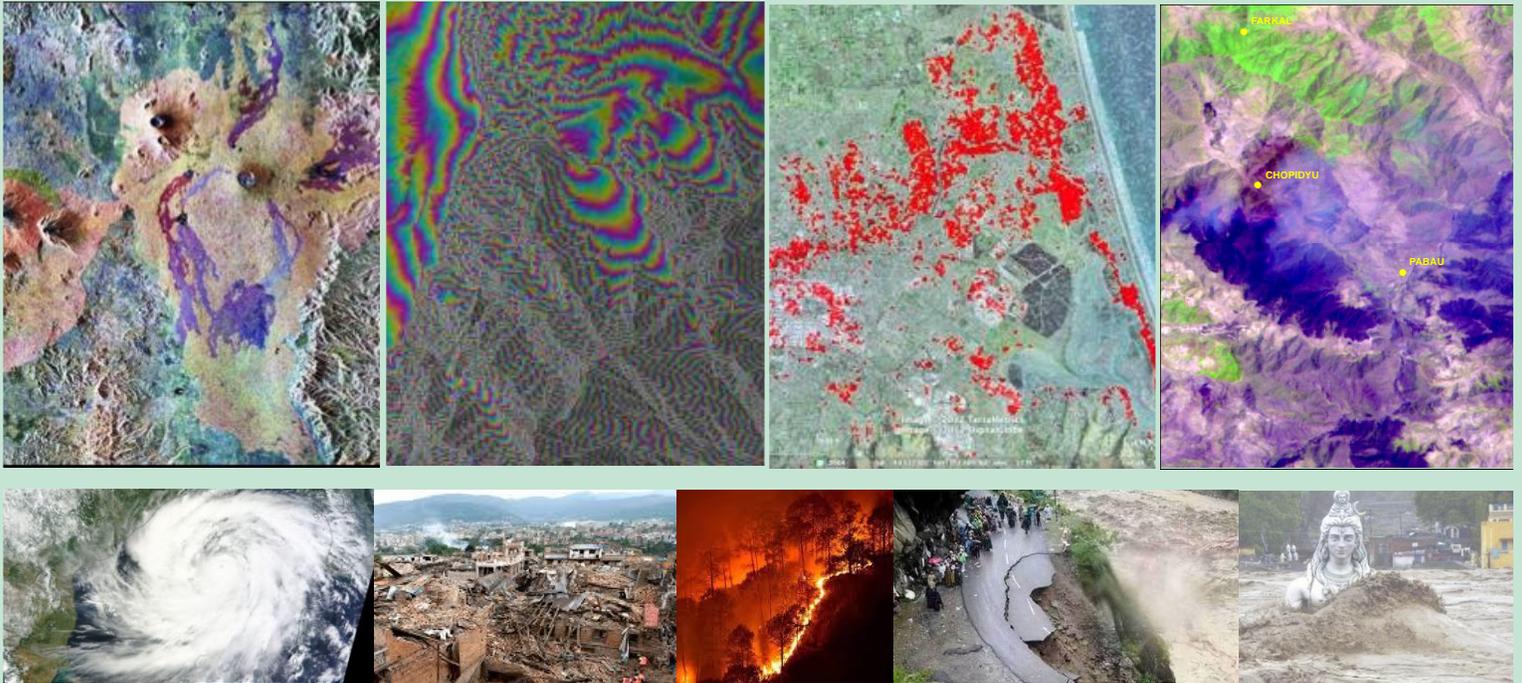


# Announcement of Opportunity (AO) for Advanced Studies in Space Based Disaster Management Support



## CALL FOR PROPOSALS 2021-22

Indian Institute of Remote Sensing  
ISRO, Department of Space, Government of India  
Dehradun



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## Introduction

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Disaster Management is one of the areas of national importance as every year millions of rupees are spent in mitigating the effects of disaster in terms of rescue, relief and rehabilitation. India being one of the disaster prone countries needs to be ever vigilant and prepared to minimize the risks due to disasters. Space technology, which enables rapid and continuous monitoring of the earth, provides critical data to understand the cause as well as timely information for disaster risk reduction, rescue and relief operations.

ISRO's Disaster Management Support Programme (DMSP) has been actively supporting the Central and State governments by providing operational services during pre-disaster, during-disaster and post-disaster time-frames, including experimental forecasts, using space systems. However, there is a need for advanced research in the area of Disaster Management for fulfilling the priorities of action of Sendai Framework towards reducing disaster risks.

Proposals on advanced research studies in different areas of **space based disaster management support, particularly on developing methodologies for early warning**, are invited from scientists, engineers and faculty members from ISRO/ Department of Space (DOS) Centres & Units, R&D institutions and recognised Academic institutions in India, for financial support by ISRO under the DMSP.

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## Research Areas

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Broad areas in which research proposals for developing advanced techniques and early warning systems can be submitted (but not limiting to the list), are indicated below:

**Common to All Disasters:** Hazard, Vulnerability, and Risk analysis (inclusive of social risk assessment); Climate change and its effect on natural hazards (at regional to local scale); Risk visualization (static/dynamic) and communication/ dissemination (web-based); Development of sensor network/web-based solutions to augment satellite based observation for information collection and validation; UAV based data acquisition, processing and products generation for disaster preparedness, search & rescue and rapid damage assessment; Crowdsourcing for data collection using Apps; Decision Support System (DSS) for near real-time data analysis and decision making; Use of EO based AI/ML techniques for early warning and detection for major disasters.

**Landslides:** Automated mapping of active and old landslides and preparation of inventory at large to medium scales; Landslide hazard microzonation, factor of safety (FoS) and debris flow/rock fall modelling for run-out estimation; Slope stability monitoring and deformation analysis using DInSAR/GNSS/terrestrial laser scanner/UAV and sensor networks; Slip-surface determination and sub-surface probing by geophysical techniques; Landslide Lake Outburst Flood (LLOF) modelling and analysis; Landslide Early Warning System (LEWS).

**Earthquake & Tsunami Hazards:** Active fault and deformation monitoring using high spatial resolution images and SAR Interferometry based pre-, co- and post-seismic deformation monitoring and modelling; Earthquake precursor (seismic, Thermal, Total Electron Content (TEC), sub-ionospheric VLF signals, geophysical and environmental) monitoring; Earthquake Early Detection and Communication System; Earthquake triggered

landslide modelling; Ground motion and liquefaction modelling, building damage prediction based on building capacity and demand spectra analysis; Rapid damage assessment using high-resolution (HR) satellite and UAV images; Reconstruction site suitability and monitoring; Tsunami and storm surge modelling; Automated Land use/Land cover (LULC) mapping for damage assessment.

**Snow and Glacier Hazards:** Snow avalanche modelling; Glacial Lake Outburst Flood (GLOF) modelling; Modelling debris flow due to permafrost melting.

**Mining and Subsidence:** Surface and subsurface coal mine fire monitoring and assessment; Subsidence and slope failure assessment of open cast mines; Ground subsidence monitoring using DInSAR and GNSS.

**Hydrological Hazards:** Flood hazard zoning and risk assessment; Large riverine and coastal flood hazard modelling and inundation mapping (Indo-Gangetic plains, Brahmaputra basin, east and west coast of India); Flash flood hydrological modelling and simulation in mountainous or hilly terrain and inundation mapping; Dam break analysis; Urban flood hazard modelling and simulation; Assessment of design parameters for storm water management; Near real-time flood data acquisition based on crowd sourcing; Flood Early Warning System (FEWS); River erosion modelling and river bank protection design; Flood damage assessment and automated LULC change detection.

**Meteorological Hazards:** Extreme precipitation modelling in mountainous terrain; Drought vulnerability modelling; Early detection of drought; Damage assessment due to drought; Cyclone forecast, monitoring and damage assessment; Storm surge modelling; Coastal erosion modeling vis-à-vis climate change; Automated LULC based damage assessment after major storm events; Extreme heat and cold wave modelling; Fog and aerosol modelling; Dust storm modelling; Crop damage due to hailstorm.

**Environmental Hazards:** Automated forest fire detection and monitoring; Fire risk mapping and modelling; Fire spread modelling; Automated forest fire burnt area mapping and regeneration assessment; Oil spill detection and monitoring; Forest damage assessment due to locust/pest/epidemic; Agricultural crop damage due to pest, disease and weed infestation; Industrial/pipeline fire hazards.

**Trans-Boundary Hazards:** Earthquake in the neighboring region and its impact in India in terms of ground motion, wave propagation and damage assessment; GLOF and LLOF mapping, monitoring and modelling; Flood modelling and simulation.

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## Evaluation of the Research Proposal

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The research proposal will be thoroughly evaluated by domain experts (internal and/or external) as per the mechanism and set of criteria as decided by ISRO. Principal Investigator (PI) may be asked to make the presentation(s) of his/her proposal before the review committee. The proposal may call for changes based on review and the PI will have to re-submit the proposal incorporating the recommended changes. Financial support will be provided, if the proposal is approved by ISRO. The decision of ISRO in selection of the research proposal for financial support shall be final. PI will be informed about the outcome of the evaluation of his/her proposal.

The pre-requisites and some of the criteria (but not limited to) to be used for selection of research proposal are as under:

- Scientists/ Engineers/ Faculty members holding permanent position in ISRO/DOS Centres & Units, R&D institutions and recognised Academic institutions in India can only submit the proposal and be the PI or Co-Investigators. All the PI and Co-Investigators should have at least 05 years of service remaining before the superannuation. Co-Investigators (maximum 03) may be from the same/ different institutions; however, satisfactory completion of the project (if approved) will be the responsibility of the PI and her/his institution/ organisation. The proposal must be forwarded/ endorsed by the Head of the Institution/ Organisation of the PI.
- The PI should be a domain expert in the area in which the proposal is submitted, evident from publications, patents/ copyrights, projects carried out. The Co-Investigators should also have expertise and experience in the related field of proposed study.
- The proposal submitted should have linkage with ISRO-DMSP and other national/ international initiatives and frameworks for disaster management.
- Selection of the research proposal will mainly depend on the novelty of the proposal, usefulness of outputs to ISRO-DMSP and Indian Space Programme, and other scientific/ technical merits. **Development of new methodologies for early warning of disasters (e.g., floods, drought, cyclones, landslides, earthquake, and forest fires) shall be one of the elements of focus.** Proposals aiming at scalable automated systems/ solutions for analyzing satellite and ancillary datasets from other sources including social media platforms for preparing the information products (including rapid damage assessment for various elements of risk like buildings/ built-up, infrastructure, land use/ land cover) ready for dissemination to stakeholders and public; non-dependability of the solutions/ deliverable on COTS software, will be preferred.
- Availability of adequate infrastructure, computing resources and equipment in the parent institutions/ organisations of the PI and Co-Investigators.

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### Financial Support

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The financial support will be provided by ISRO for the approved research proposals. Maximum project duration should be three (03) years from the release of funds. The budgetary estimate of the proposal should be within INR 30-40 Lakhs. It is envisaged that the existing equipment and computing resources (hardware, software) in the parent organisation of the PI and Co-Investigators will be used and the proposed budget estimate covers the direct costs, such as manpower cost (JRF/ SRF/ Project Associate-I/II), data cost, field visit, etc. Equipment and computing resources should be proposed only if these are not available in the parent institute/ organisation of the PI and Co-Investigators and are essential to complete the objective(s) of the research proposal. Recruitment of purely temporary positions of JRF/ Project Associate-I should be as per RESPOND norms (<https://www.isro.gov.in/capacity-building/research->

**fellowships**). JRF(s) should be encouraged to take up Ph.D. It is expected that the proposed study should result in a few deliverables that are useful to ISRO-DMSP and can be replicated with standard datasets and equipment in other areas. As mentioned earlier, satisfactory completion of the project will be the responsibility of the Principal Investigator and his/her parent institution/ organisation.

There is no provision for any kind of payment to the PI, Co-Investigators, or other staff belonging to the institutions/ organisations of PI and Co-Investigators. The allocated funds cannot be used for travel abroad for any reason.

Approved funds must be utilized solely for the purpose for which they have been granted unless ISRO agrees otherwise. The PI will have to submit two copies of the Fund Utilization Certificate (FUC), as per ISRO/DOS format, and (not applicable for ISRO/DOS Centres & Units) Audited Accounts Statement (AAS) on completion of the first year of the project to enable renewal of the project for second year, and so on. On completion of the project, final FUC and AAS for the total expenditure incurred in the project has to be submitted by the PI. The unutilized funds, if any, at the end of the project will have to be refunded to ISRO.

On approval of the proposed study, a Memorandum of Understanding (MoU) may have to be signed (not applicable for ISRO/DOS Centres & Units) between the parent institute/ organisation of the PI and Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun as per the prevailing modalities of ISRO/DOS.

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## Progress Review of the Project

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Two-level review mechanism is envisaged for monitoring and evaluation of the approved projects. First level of review has to be carried out once in 6 months by an internal team of the parent institution/ organisation of the PI and report has to be sent to IIRS, Dehradun. Second level of review will be carried out once a year by a review committee of ISRO. The PI is expected to attend the review and brief about the progress of the respective project to the ISRO review committee.

Besides above, annual progress reports will have to be submitted by the PI during the project period once the project is approved. Continuation of the project and funding in next year(s) will be subject to the progress of the work as per the milestones indicated in the approved project proposal. The PI is responsible for ensuring timely completion of the project.

On completion of the project, PI will have to submit a comprehensive report (soft copy & three hard copies) covering total project activities. For the format of final report, refer the following link: <https://www.isro.gov.in/sponsored-research-respond/proposal-format-0>

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## How to Apply and Last Date for Submission of Research Proposal

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Soft copy (as a singly pdf document) and one hard copy of the research proposal along with cover letter duly signed by PI and Head of the Institute/ Organisation of PI, and CV of the PI and Co-Investigators should be sent in the requisite format (refer Annexures–1, 2 and 3) by email and post (Speed/ Registered post) on or before the last date. The email should be sent to [dmsp\[dot\]ascb\[at\]@iirs\[dot\]gov\[dot\]in](mailto:dmsp[dot]ascb[at]@iirs[dot]gov[dot]in) with the subject **Attention: DMSP – Advanced Studies AO Proposal**. It is important to note that the PI and Co-Investigators must hold permanent position in ISRO/DOS Centres & Units, R&D institutions and recognised Academic institutions in India and should have minimum 05 years remaining in service before superannuation. Further, the Cover Letter (Annexure–1) and Declaration (refer Annexure–2) must be signed by the PI and as well as by the Head of the Institute/ Organisation of PI.

**Last date for submission of soft copy of proposal:** [November 15, 2021 \[17:00 hrs\]](#)

The research proposal along with other documents should be sent to:

**Director,**  
**Indian Institute of Remote Sensing (IIRS)**  
**ISRO, Department of Space, Government of India**  
**4-Kalidas Road, Dehradun, Uttarakhand - 248001**  
**Email:** [dmsp\[dot\]ascb\[at\]iirs\[dot\]gov\[dot\]in](mailto:dmsp[dot]ascb[at]iirs[dot]gov[dot]in)

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## Terms and Conditions

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- ISRO reserves the right to scrutinize or reject any or all the proposals received in response to this AO, or suggest a modification to the proposal.
- ISRO reserves the right to choose any project proposal received in response to this AO, depending upon need, novelty of intended applications, innovative science, suitability, deliverables and merits. The decision of ISRO shall be treated as final.
- ISRO reserves the right to revoke in part or in whole its support for a project at any time without assigning any reason.
- It shall be declared and ensured by the PI of the selected project proposal under this AO, that any/all analysis conducted as part of this project shall not use any pirated/un-licensed copy of the analysis software used.

- All proposals will be reviewed by the review committee(s) constituted by ISRO. The PI and Co-Investigators shall cooperate with the members of the review committee(s) for the review of their research proposal.
- Scientific results obtained as part of the project proposal by PI and Co-Investigators, shall not be allowed to be used for marketing/ business purposes without prior permission from ISRO. ISRO reserves the right to accord permission on such cases, considering the overall national interests.
- Any/ all Intellectual Property Rights (IPR) such as patents, copyrights, design rights, etc. acquired by the grantee institute/ organisation of the PI through this AO proposal, shall be jointly owned by the grantee institution and ISRO. Both the parties shall inform each other before filing for any protection of IPR resulting from the proposal under this AO. The expenses for filling the Patent protection in India and abroad shall be borne equally between grantee institution and ISRO. Both the parties will ensure appropriate protection of IPR generated from cooperation, consistent with laws, rules and regulations of India.
- Any commercialization of such IP rights shall be done by the parent institute/ organisation of the PI, only with the consent/ permission of ISRO, on specific terms and conditions, which shall be determined on a case by case basis mutually as per its standard practices for such activities. Any/all financial accruals due to any commercial exploitation of the patent resulting from this AO proposal shall be shared equally between the grantee institution and ISRO, on 50:50 basis. However, any of the parties is free to utilize the IPR for their own use on non-commercial basis.
- Proposal shall give a declaration that if the proposal is selected for funding by ISRO, PI shall not submit the same proposal for funding support from other agencies.
- Acknowledgement of ISRO support/ funding 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 IIRS, Dehradun.
- The PI is required to submit annual progress report, FUC and AAS during the duration of the project to Director, IIRS, Dehradun ([dmsp\[dot\]ascb\[at\]@iirs\[dot\]gov\[dot\]in](mailto:dmsp[dot]ascb[at]@iirs[dot]gov[dot]in)), as stated in 'Financial Support' section. Detailed report is to be submitted during the reviews. Final report at the end of the project is to be submitted as per the format provided at (<https://www.isro.gov.in/sponsored-research-respond/proposal-format-0>).
- Satisfactory completion of the project will be the responsibility of the PI and his/ her parent institution/ organisation forwarding the proposal. On approval of the project proposal, a Memorandum of Understanding (MoU) may have to be signed between the parent institute/ organisation of the PI and Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun as per the prevailing modalities of ISRO/DOS (not applicable for ISRO/DOS Centres & Units).

- Approved funds must be utilized solely for the purpose for which they have been granted unless ISRO agrees otherwise. A certificate that the funds have been so used must be produced by the grantee Institution at the end of each year of support.
- ISRO may depute scientists/ experts to visit the grantee institution periodically, for reviewing the progress of work.
- General rules and guidelines of ISRO's RESPOND programme, which are subject to change with time, will be followed. For this, refer the following links:  
**<https://www.isro.gov.in/capacity-building/respond-projects>;**  
**<https://www.isro.gov.in/capacity-building/research-grants>;**  
**<https://www.isro.gov.in/capacity-building/terms-and-conditions>;**  
**[https://www.isro.gov.in/sites/default/files/article-files/sponsored-research-respond/proposal-format-0/form\\_c-1.pdf](https://www.isro.gov.in/sites/default/files/article-files/sponsored-research-respond/proposal-format-0/form_c-1.pdf)).**
- Cover Page (Annexure-1) and Declaration (Annexure-2) must be signed by the PI and Head of the Institution/ Organisation of the PI. Otherwise, the proposal shall not be considered valid and will be rejected.

Annexure-1**Cover Page Format for Submitting Announcement of Opportunity (AO) Proposal  
for Advanced Studies in Space Based Disaster Management Support**

**Title of the Research                    :**  
**Proposal:**

**Name and Designation of            :**  
**PI with Telephone, Fax**  
**and Email-ID**

**Name of Institution/                    :**  
**Organisation of PI with**  
**full Address including its**  
**website URL**

**Signature of PI with Date            :**

**Signature & Seal of                    :**  
**Head of Institution/**  
**Organisation with Date,**  
**Telephone, Fax and**  
**Email-ID**

**Annexure-2****Format for Submitting Announcement of Opportunity (AO) Proposal for  
Advanced Studies in Space Based Disaster Management Support**

1.	<b>Title of Proposal &amp; Broad Research Area:</b>	Title
		Broad Research Area (As mentioned in the Call for Proposals of this AO)
2.	<b>Name &amp; Designation of PI with Telephone, Fax and Email-ID:</b>	Scientists/ Engineers/ Faculty members holding permanent position in ISRO/DOS Centres & Units, R&D institutions and recognised academic institutions can only be the PI. The PI should have at least 05 years of service remaining before superannuation.
3.	<b>Name &amp; Full Address of the Institution/ Organisation of PI:</b>	
4.	<b>Name, Designation &amp; Full Address of the Institution/ Organisation of Co-Investigators (Max 3) with Telephone, Fax and Email-ID:</b>	Scientists/ Engineers/ Faculty members holding permanent position in ISRO/DOS Centres & Units, R&D institutions and recognised academic institutions can only be the Co-Investigators. The Co-Investigators should have at least 05 years of service remaining before superannuation.
5.	<b>Executive Summary of the Proposed work (500 words approx.):</b>	
6.	<b>Objectives, Research Questions and Scope of the Proposed Research Study:</b>	Objective(s):  Research Question(s):  Scope:
7.	<b>Scientific Rationale/ Relevance of the Study including Linkage with ISRO-DMSP and other</b>	Provide here the detailed scientific justification and value addition of the proposed research study, along with details on existing knowledge (nationally and internationally), gap and relevance to Disaster Management, Linkages (as applicable) with ISRO-Disaster Management Support

	<b>Policy/ Regulatory Frameworks for Disaster Management:</b>	Programme (ISRO-DMSP), Sendai Framework for Disaster Risk Reduction (SFDRR), United Nations Sustainable Development Goals (UN-SDGs) and other policy/ regulatory frameworks for disaster management.
8.	<b>Novelty/ Innovation &amp; Automation (if any):</b>	
9.	<b>Study Area:</b>	
10.	<b>Methodology:</b>	Provide Text and Flow Diagram
11.	<b>Data and Software to be used</b>	
	<b>Expected Results and Deliverables:</b>	1. Expected Results:  2. Deliverables:
12.	<b>Duration of Proposed Study:</b>	Maximum duration should be 03 years
13.	<b>Total Cost (INR):</b>	
14.	<b>Details on the Preliminary Work done/ Background Experience of PI, if any, in the Proposed Field of Study:</b>	
15.	<b>Previous and Ongoing Project Details Executed/ Being Executed by PI and Highlight (with bold font) the ones related to the Proposed Field of Study:</b>	Provide here the list in chronological order (latest on top) the Title, Funding agency, Period/Duration, Budget, and Current Status (i.e. Completed/ Ongoing) of projects carried out/ being carried out by PI.  Highlight (with bold font) those projects which are related to the proposed field of study.
16.	<b>Existing Facility (Computing Resource, Software, Equipment, etc.) to carry out the Proposed Study:</b>	Provide the list of Software, Hardware, relevant equipment, etc. which will be available while executing the proposed research.

17.	<b>List of Publications (only best 05), Patents, Copyrights of PI in the Related Field:</b>	
18.	<b>CV of PI and Co-Investigators:</b>	Enclose CV of PI and all Co-Investigators, each in separate sheet, as per the format provided in Annexure-3.

### 19. Time Schedule (Quarterly Targets)

Activity	1 <sup>st</sup> year				#2 <sup>nd</sup> year				#3 <sup>rd</sup> year			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

#If applicable

### 20. Budget (Break-up of Expected Expenditure):

(INR in Lakhs)

Heads of Expenditure	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	Total
Satellite and Ancillary Data				
Manpower: JRF/ SRF/ Project Associate-I/ II (including HRA)				
Equipment/ Computing Device/ Software (if any)				
Internal Travel for Fieldwork (TA/ DA, Vehicle hiring, etc.)				
Internal Travel for Meetings/ Workshops, etc.				
Consumables & Supplies				
Contingency (for Brain storming meetings/ Equipment accessories/ Books/ Reports/ Hospitality during meeting/ workshop, etc.)				

Overhead charges (20% of total project or INR 3.00 lakhs, whichever is less)				
<b>Total Amount</b>				

**Note:** Existing infrastructure, equipment, computing devices, software, etc. in the parent institute/ organisation of the PI and Co-Investigators will have to be used. The proposed budget estimate should mainly cover the direct costs, such as manpower cost (JRFs/ SRFs/ Project Associates), data cost, field visit, internal travel (no foreign visit is allowed), etc. Computing device, equipment, software, etc. should be projected only if these are not available in the home institution of the PI/ Co-Investigators and are essential to complete the objectives of the proposal. Recruitment of JRF/ Project Associate-I should be as per prevailing norms Recruitment of purely temporary positions of JRF/ Project Associate-I should be as per RESPOND norms (<https://www.isro.gov.in/capacity-building/research-fellowships>). Overhead charges should not be projected by ISRO/DOS Centres & Units.

### 21. Justification for Manpower:

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### 22. Justification for Equipment/ Computing Device/ Software:

S. No.	Name of the Equipment	Justification
1.		
2.		
3.		

### DECLARATION

We have carefully read the terms and conditions of the Announcement of Opportunity (AO) programme of ISRO for Advanced Studies in Space Based Disaster Management Support.

It is certified that if the AO proposal is accepted and supported by ISRO, 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 (PI) and other Co-Investigators.

It is certified that, if the AO proposal is accepted and supported by ISRO, the same proposal shall not be submitted for funding support from other agencies.

**Signature of Principal Investigator**

**Signature of Head of Department / Area with Name and Designation**

**Signature of Head of Institution/ Organisation with Name and Designation**

Date:

**Seal of Head of Institution/ Organisation**

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Soft copy (as a single pdf document) and one Hard copy of the duly signed proposal with cover letter and CV of all the Investigators in the requisite format (refer Annexure-1, 2 and 3) should be sent by email ([dmsp\[dot\]ascb\[at\]iirs\[dot\]gov\[dot\]in](mailto:dmsp[dot]ascb[at]iirs[dot]gov[dot]in)) and Speed/ Registered post to: **Director, Indian Institute of Remote Sensing (IIRS), ISRO, Department of Space, Government of India, 4-Kalidas Road, Dehradun, Uttarakhand – 248001**. Soft copy by email with the Subject **Attention: DMSP – Advanced Studies AO Proposal** must reach on or before the deadline. The cover letter (Annexure-1) and Declaration (Annexure-2) must be signed by the Head of the Institution/ Organisation of the PI; otherwise, the proposal shall be considered as invalid and shall be rejected.

**Annexure-3****Format for CV of PI and Co-Investigators**

(CV of all the investigators should be given, each on a separate sheet)

1.	Name:			
2.	Date of Birth (dd/mm/yyyy):			
3.	Designation:			
4.	Name of Institution/ Organisation with Full Address, Phone, Fax and Email-ID			
5.	Degrees Conferred (begin with Bachelor's degree)			
	<b>Degree</b>	<b>Institution conferring the Degree</b>	<b>Branch/ Discipline</b>	<b>Year of Passing</b>
6.	Research/ Training Experience (in chronological order):			
	<b>Duration</b>	<b>Institution</b>	<b>Name of work done</b>	
7.	Major Scientific Fields of Interest:			
8.	List of Publications (Only the journal papers to be listed):			