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23 August
NATIONAL SPACE DAY
Touching lives while touching the Moon: India's Space Saga

NATIONAL SPACE DAY
PRE EVENT

REPORT

WORKSHOP ON

SPACE TECHNOLOGY IN DISASTER MANAGEMENT

FRIDAY, 09 AUGUST 2024
NIDM CAMPUS, DELHI

ORGANIZED BY

NATIONAL INSTITUTE OF DISASTER MANAGEMENT
MINISTRY OF HOME AFFAIRS, GOVERNMENT OF INDIA

IN COLLABORATION WITH

NATIONAL DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF INDIA

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Pre-Event National Workshop on Space Technology in Disaster Management

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2. Prof Surya Parkash, Head GMR Division and CBRN-Industrial-Cyber DRR Division
3. Shri Surendra Thakur, Joint Director, NIDM
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    a. Dr. Ravinder Singh
    b. Shri Shubham Badola, YP
    c. Shri Sandeep Singh, YP
    d. Shri Vimal Tiwari, YP
    e. Ms. Krishma, YP
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August 2024

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Background

In recent years, space technology has become an integral part of the country's disaster risk management and response efforts. Satellites can provide critical data for early warning systems, real-time monitoring, and assessment of damage caused by disasters such as floods, cyclones, landslides, earthquakes, forest fires, agricultural droughts, etc. Remote sensing technology, including synthetic aperture radar and LiDAR, provides high-resolution imagery of disaster-prone areas, identifying regions at risk of flooding or landslides. Space technology has also enabled the development of innovative solutions such as unmanned aerial vehicles (UAVs), which can be deployed rapidly to gather data and provide situational awareness in disaster zones. These technologies are particularly useful in inaccessible areas.

India had successfully landed its Chandrayaan-3 Vikram lander on the lunar South Polar Region on August 23, 2023. To commemorate this feat, every year August 23rd has been declared as “National Space Day” by the Government of India. On this occasion of National Space Day, an extensive celebration will be organized across the county.

Objectives

Following are the main objectives of the workshop as given below:

- Understanding the role of space technology in disaster risk management.
- To highlight the Honorable Prime Minister’s 10-point agenda on DRR.
- To create awareness and to bring synergy between all the decision-makers, researchers, scientists, academicians, and other stakeholders.
- To focus on Decision Support System tools to assist disaster managers in decision-making during emergency situations.

Summary of the Workshop

On the occasion of **National Space Day**, a pre-event one-day national workshop was organized by the National Institute of Disaster Management (NIDM) in collaboration with National Disaster Management Authority (NDMA), Ministry of Home Affairs (MHA) on 09 August 2024. This event marked a significant milestone in integrating space technology with disaster management strategies. The workshop, themed **"Space Technology for Disaster Management,"** was graced by senior decision-makers, scientists, industry experts, and academics/ researchers.

The workshop was inaugurated by Shri Vivek Shrivastava, IPS, (DG FS, CD & HG); Shri Rajendra Ratnoo, IAS, Executive Director, NIDM; Prof. Surya Parkash (Head, GMR & CRBN Division, NIDM), Dr. K H V Durga Rao, Group Director, DMS (NRSC) and Shri Chandrashekhar S., IAS (Deputy Director, LBSNAA).

In his inaugural address Shri Vivek Shrivastava highlighted the critical role of risk reduction in disaster management, citing the success of efforts such as achieving zero casualties during Cyclone Biparjoy. Shri Rajendra Ratnoo emphasized the importance of learning from past disasters and conducting post-disaster studies to guide future preparedness.

The inaugural session ended with vote of thanks to the chair, delegates and participants by Shri Surendra Thakur, Joint Director, NIDM.

In addition to that, technical session chaired by Shri Vivek Shrivastava and co-chaired by Shri Rajendra Ratnoo in which presentations included insights from Ms Jivisha Joshi Gangopadhyay, Deputy Secretary, DPIIT; Dr. KHV Durga Rao, Group Director, DMS (NRSC); Ms Srilaxami, ED-DSD NRSC-ISRO; Rajesh Kumar, DC, IT & Comm., NDRF. The panels underscored the importance of collaboration between government and private sectors to advance technological innovations in disaster resilience.

Another technical session on Space Technology in Geo Hydro-Meteorological Disasters was chaired by Prof. Surya Parkash and featured insights from experts like Dr. Saji Mohandas, Scientist NCMRWF, Akshay K. Mishra, Director GSI, Ananda K. Das,Sci-F IMD, Dr. Karan Choudhary, Mahalanobis National Crop Forecast Centre, Shri Manoj Kumar, Director CWC, and Dr. Patanjali Kumar, Sci-F INCOIS . Technical sessions covered various aspects of disaster management, focusing on the use of GIS, AI, and machine learning in risk assessment and crop insurance.

In the panel discussions on **"Innovation in Space Technology & Disaster Response,"** chaired by Deepak Awari, Vice President of AGI, the latest advancements in SAR technology were explored, along with the need for

enhanced collaboration between the public and private sectors. Another panel discussion, chaired by Shri Safi Ahsan Rizvi, IPS (Advisor, NDMA) emphasized the need for better data collection and the integration of AI/ML tools to improve crop yield predictions and insurance assessments.

The event concluded with a valedictory session in which welcome address was given by Shri Surendra Thakur, Joint Director NIDM. The keynote address was given by Dr. Prakash Chauhan, Director, NRSC-ISRO and insightful valedictory address by Lt. Gen. Syed Ata Hasnain, Member, NDMA who urged the disciplined use of space technology in disaster management. The session was concluded by Prof. Surya Parkash NIDM with a vote of thanks in the gracious presence of, marking the end of an insightful and educational workshop.

The workshop saw the participation of 190 registered participants from across the country including central and state government officials from various departments and Ministries, NDMA, SDMA, private entities, academic and scientific institutions. The event also features poster presentations by emerging space start-ups and data providers, showcasing the latest developments in space technology.

Overall, this pre-event of National Space Day 2024 celebrations in the National Institute of Disaster Management (NIDM), Ministry of Home Affairs (MHA) in collaboration with National Disaster Management Authority (NDMA) were a resounding success. The deliberations not only enhanced the utilization of space technology in disaster management purposes but also fostered a deeper understanding of the potential of space technology among a broader audience. The insights gained and the discussions held during these events will undoubtedly contribute to more effective disaster risk reduction and response strategies in future in collaboration with government and private agencies.

Programme Schedule

Pre-Event National Workshop

Space Technology in Disaster Management

Date: 09 August, 2024 **(Friday)**
Time: 1000 – 1700 Hrs
Venue: Dronacharya Hall, Ground Floor, NIDM, Sector-29, Rohini, New Delhi

(Friday): 9th August, 2024				
10:00–10.30	**Registration**			
10:30–11:30	**Inaugural Session**			
10:30–10:31	**National Anthem**			
10:31–10:35	Lamp Lightening	Dignitaries		
10:35–10:40	Welcome Address	**Prof Surya Parkash**, NIDM		
10:40–10:45	Context Setting	**Shri Rajendra Ratnoo,** IAS, ED, NIDM		
	Gracious Presence	**Shri Chadrashekar S., IAS** Deputy Director, LBSNAA		
10:45–10:55	Keynote Address	**Dr. KHV Durga Rao** Group Director, DMS, NRSC- ISRO		
10:55–11:10	Inaugural Address	**Shri Vivek Srivastava, IPS** DG, Fire Services, Civil Defence & Home Guard		
11:10–11:15	Vote of Thanks	**Shri Surendra Thakur,** JD, NIDM		
11:15–11:30	**Group Photograph**			
11:30–11:45	**High Tea**			
11:45–13:15	**(Technical Session 1) Chanakya Hall, Ground Floor**		**(Panel discussion 1) Dronacharya Hall, Ground Floor**	
	Disaster Management & Space Technology **Chair:** Shri Vivek Srivastava, IPS DG, Fire Services, Civil Defence & Home Guard **Co-Chair:** Shri Rajendra Ratnoo, IAS, ED NIDM	**Resource Person**	**Innovation in Space Technology & Disaster Response** **Chair:** Shri Deepak Awari, Vice President, AGI **Co-Chair:** Shri Chadrashekar S., IAS Deputy Director, LBSNAA	**Panelist**
	1. Role of Space Technology in DM - ISRO DMS Programme **2.** National Database for	Dr. KHV Durga Rao, Group Director, DMS, NRSC- ISRO Ms. Srilaxami, Head, ED-DSD,		**1.** Col. Rakesh Verma India Head, Maxar Technologies **2.** Dr. Kapil Malik

	Emergency Management& ICR-ER **3.** National Emergency Communication Plan (NECP) **4.** PM GatiShakti Framework for DRR	NRSC-ISRO Shri Rajesh Kumar (DC, IT & Comn.), NDRF Ms. Jivisha Joshi Gangopadhyay, Deputy Secretary, DPIIT		Radar Systems & Services **3.** Shri Partha Ghosh Presales Leader Planet Labs **4.** Shri Vinay Babu Adimulam, Vice President Solutions & head Business, Hexagon
	Question Answers & Discussions			
13:15–14:15	**Lunch Break**			
14:15–15:45	**(Technical Session 2)** **Chanakya Hall, Ground Floor**		**(Panel Discussion 2)** **Dronacharya Hall, Ground Floor**	
	Space Technology in Geo-Hydro-Meteorological Disaster **Chair:** Prof Surya Parkash, NIDM	**Resource Person**	**Chair:** Shri Safi Ahsan Rizvi, IPS, Advisor, NDMA **Moderator:** Prof. A. K. Gupta, NIDM	**Panelist**
	1. Modelling and Prediction of Cloudburst **2.** Landslides Mapping & Forecasting **3.** Cyclone & Lightning Risk Assessment **4.** Drought Risk Management	Dr. Saji Mohandas, Scientist-G, NCMRWF Shri Akshay K. Mishra, Director, GSI Shri Ananda K. Das, Sci-F, IMD Dr. Karan Choudhary, Mahalanobis National Crop Forecast Centre Shri Manoj Kumar, Director, CWC	**Panel 2.1** **USE OF SPACE TECH IN CROP INSURANCE**	**1.** Shri Siddesh Balasubramanian InRisk Labs (Ex Agriculture Insurance Corp.) **2.** Shri Alok Shukla, Head of UW, Munich Re **3.** Shri Shubham Bhatnagar, ICICI Lombard **4.** Shri Harish Naidu

	5. Flood Hazard Risk Assessment **6.** Earthquake induced Tsunami Prediction & EWS	Dr. Patanjali Kumar, Sci-F, INCOIS		GIS Expert, Andhra Pradesh SDMA
			Panel 2.2 **SPACE TECH - EASING THE COMPLEXITY OF PARAMETRIC INSURANCE**	**1.** Ms. Mandakini Balodhi, Director, DoFS **2.** Shri Manish Mohandas, UNDP **3.** Shri Shishir Agarwal, NDMA **4.** Shri Ankur Gupta, Munich Re
	Question Answers & Discussions			
15:45–16:00	**Tea Break**			
16:00–1:00	**Valedictory Session**			
16:30–16:35	Summary of the Workshop		**Dr. Ravinder Singh**, NIDM	
16:35–16:37	Welcome Address		**Shri Surendra Thakur,** Joint Director, NIDM	
16:37–16:40	Special Address		**Shri Rajendra Ratnoo**, IAS, ED, NIDM	
16:40–16:45	Keynote Address		**Dr. Prakash Chauhan** Director, NRSC-ISRO	
16:45–16:50	Special Address		**Shri Safi Ahsan Rizvi,** IPS, Advisor, NDMA	
16:50–17:00	Valedictory Address by Chief Guest		**Lt. Gen (Retd) Syed Ata Hasnain,** Member, NDMA	
17:00–17:02	Vote of Thanks		**Prof Surya Parkash**, NIDM	

Inaugural Session

India had successfully landed its **Chandrayaan-3** Vikram lander on the **lunar South Polar Region** on August 23, 2023. To commemorate this feat, every year **August 23rd** has been declared as **"National Space Day"** by the Government of India.

On this **occasion of National Space Day**, a pre-event one-day national workshop was organized by the National Institute of Disaster Management (NIDM) in collaboration with National Disaster Management Authority (NDMA), Ministry of Home Affairs (MHA). The Inaugural session was marked by presence of following dignitaries:

- **Shri Vivek Srivastava,** IPS, Director General, FS, CD & HG
- **Shri Rajendra Ratnoo,** IAS, Executive Director, NIDM
- **Prof. Surya Prakash,** Head GMR Division and CBRN-Industrial-Cyber DRR Division NIDM
- **Shri Chandrashekar S,** IAS, Deputy Director, LBSNAA
- **Dr. KHV Durga Rao,** Group Director, DMS, NRSC-ISRO
- **Shri Surendra Thakur,** Joint Director, NIDM

Moderator: Ms. Shalini Mittal, AIR

As dignitaries light the lamp at the start of the workshop, A spark of hope and progress illuminates the room. This flame marks the union of space technology and disaster

management, Guiding efforts to shield communities from nature's unpredictable force.

Welcome Address by Prof. Surya Prakash, NIDM

Prof. Surya Prakash opened the event by extending a warm welcome to all distinguished guests, emphasizing the significance of the occasion marked by the successful landing of Chandrayaan-3. He commended the remarkable achievements of Indian scientists and leaders, expressing gratitude to the Department of Space, ISRO, and NRSC for their invaluable support in organizing the workshop. Prof. Prakash highlighted the recent landslide in Wayanad, Kerala, and Chamoli of previous year's, and emphasized the globally recognized efforts of the National Institute of Disaster Management (NIDM) in landslide management under its Centre of Excellence. He shared his vision for a resilient India, stressing the importance of inclusivity and ensuring that no one is left behind. He concluded by underscoring the necessity of knowledge sharing, emphasizing that information should be accessible to every individual. His speech ended with the pledge "No one is safe until all is safe"

Context Setting by Shri Rajendra Ratnoo, IAS, Executive Director, NIDM

Shri Rajendra Ratnoo IAS, addressed the audience, highlighting the Prime Minister's vision and commitment to advancing space technology, citing initiatives like National Space Day as evidence of visionary leadership. He emphasized the need to understand the alignment of space technologies with the Prime Minister's 10-point agenda, which focuses on leveraging technology and fostering collaboration among stakeholders. Shri Ratnoo discussed the critical role of space technologies in risk assessment and monitoring, particularly their potential in enhancing early warning systems and disaster response preparedness. He emphasized the need to bring awareness about disaster and the need to bring synergy amongst scientists, academicians, researchers, engineers and other stakeholders in harnessing space based technologies for disaster management. He euphorically mentioned the NISAR project a collaboration between ISRO and NASA. He recalled the Bhuj earthquake in Gujarat, inviting the chief guest to elaborate on their experience managing the crisis using space technology. Shri Ratnoo also highlighted the significance of the planned panel discussions and provided a brief overview of their agendas.

Keynote Address by Dr. KHV Durga Rao, Group Director, DMS, NRSC-ISRO

In his keynote address, Dr. KHV Durga Rao spoke about the nation's vulnerability to potential disasters, emphasizing that floods and cyclones pose major threats, leading to significant economic losses. He noted the increase in flood occurrences from affecting 8-9 states to 14-15 states due to climate change. Dr. Rao highlighted the potential of space technologies in mitigating disaster damage through efficient early warning systems. He shared real-world examples, noting ISRO's crucial role in identifying the causes of disasters like the glacier outbreak. Dr. Rao congratulated NIDM on successfully conducting the program and announced ISRO's proposal for a comprehensive disaster management program addressing all major disasters throughout the disaster cycle.

Inaugural Address by Shri Vivek Srivastava, IPS, Director General, FS, CD & HG

Shri Vivek Srivastava shared his experience about managing the Bhuj earthquake when he was Superintendent of Police of Kachh district. He vividly portrayed the disaster situation and highlighted the technological resources lacking at that time. He also stressed on harnessing of space based technologies which are currently available. He emphasized the vital role of high-resolution imagery in disaster monitoring and decision-making. Mr. Srivastava also discussed the study being carried out by NDMA on GLOF, which aims to identify approximately 30 lakes in India with potential disaster risks. He highlighted the importance of space technology as it provides high resolution imagery which can be leveraged for optimum resource allocation during disaster management to ensure efficient management and better decision-making, noting that satellite technologies operate independently of local systems. Additionally he stressed that no two disasters are same because of the geography and human elements involved. He stressed the failure of critical infrastructure and communication networks during disaster, and the crucial role played by Spaced based Technology like satellite phones and GPS in communication and allocation of resources. Furthermore he spoke on evolving disasters and flash disasters and consequently the use of space technology. He advocated for the comprehensive use of space technology across all four phases of disaster management such as preparedness, mitigation, response and long term reconstruction & rehabilitation.

Vote of Thanks by Shri Surendra Thakur, Joint Director, NIDM

Shri Surendra Thakur, delivered the vote of thanks, expressing gratitude to all dignitaries, invitees, participants, faculty members, staff, and contributors for their participation and support in making the event a success.

The event was graced by the presence of Shri Chandrashekar S, IAS, Deputy Director, LBSNAA, whose participation added significance to the proceedings.

Key Takeaways:

1. Space technology is essential in disaster management, exemplified by initiatives like NISAR and ISRO's disaster management program, and India's achievements in space, such as Chandrayaan-3's successful landing, highlight the nation's growing expertise and dedication to advancing this field.
2. High-resolution imagery from space technology is vital for disaster monitoring and decision-making, enabling efficient resource allocation and response efforts.
3. Comprehensive use of space technology across all four phases of disaster management (preparedness, mitigation, response, and rehabilitation) is essential for effective disaster management and minimizing the impact of disasters.

Technical Session 1: Disaster Management & Space Technology (Chanakya Hall, Ground Floor)

CHAIR: Shri Vivek Srivastava, IPS, DG FS, CD and HG
Co-CHAIR: **Shri Rajendra Ratnoo**, IAS, ED, NIDM

Session Speakers:

1. **Dr KHV** *Durga Rao, Group Director, DMS, NRSC-ISRO,*
2. **Ms Jivisha Joshi Gangopadhyay**, *Deputy Secretary, DPIIT*,
3. **Dr Srilakshmi P**, *Head, ED-DSD, NRSC-ISRO* and
4. **Shri Rajesh Kumar**, *Deputy Commandant, NDRF*

Moderator: Shri Dilip Kumar Jha & Shri Sandeep Kumar Singh

Welcome address by the Chair: The chair initiated the session by highlighting the role of Space Technology, Infrastructure Development, Geographic Information Systems and Effective Communication in Disaster Risk Reduction.

Speaker 1: Dr KHV *Durga Rao***,** Group Director, DMS, NRSC-ISRO

Dr. Durga Rao discussed ISRO's Disaster Management Support Program, which comprises an Early Warning System, Monitoring and Damage Assessment, a Database and Decision Support System, and Capacity Building and Technical Guidance. The presentation emphasised the crucial role of space technology in disaster risk reduction. He discussed the utilization of various satellites, including those with optical and microwave capabilities and meteorological satellites. These satellites serve in all phases of disaster management. He discussed the application of satellite technology for near real-time monitoring of floods and cyclones at the National Remote Sensing Centre (NRSC), providing recent instances such as the floods in Delhi (2023), Assam (2024), and Kerala (2024), as well as the REMAL cyclone (2024). In addition, he provided information regarding the recently added flood depth map feature and the availability of damage assessment for crops and urban infrastructure. He mentioned the expedited process of acquiring and analysing data during disasters, namely floods, and emphasized the significance of worldwide data exchange. He highlighted the flood hazard atlas created utilizing extensive Multi-sensor satellite data and Central Water Commission (CWC) data on water, which is accessible on the NDEM Portal. He also talked about the application in other areas of disaster management, such as monitoring atmospheric lightning, assessing landslide risk and providing early warnings (illustrated by the Wayanad and Ramban landslides in J&K in 2024), Seismic hazard assessment, detecting forest fires and stubble burning using Machine Learning techniques on Thermal sensor data, and assessing the risk of Glacier Lake Outburst Floods for specific lakes (for instance, South Lhonak lake in 2023) using advanced satellite technology. He concluded by emphasizing the importance of capacity building through national conferences, workshops, and training programs to spread awareness about the effective utilization of space technology in disaster management.

Speaker 2: Ms Jivisha Joshi Gangopadhyay, Deputy Secretary, DPIIT

Ms Jivisha Joshi Gangopadhyay discussed the PM GatiShakti National Master Plan, emphasizing the crucial role of infrastructure in disaster situations. She stated that PM Gatishakti is currently being

utilized at the national, state, and district levels to plan various infrastructure projects. She underlined the importance of ensuring the design of future infrastructure projects is well-equipped to effectively manage and mitigate any risks associated with disasters. She discussed the Prime Minister's initiation of this program, which aims to adopt a comprehensive approach to planning. The goal is to bring all stakeholders together on a unified platform to ensure the successful delivery of a product, rather than just completing a project, whenever planning is undertaken in the country. The concept involves implementing a comprehensive strategy for multi-modal infrastructure, establishing last-mile connectivity to reduce the logistic costs and ensure the safest movement of people across the country. The system consists of two components: The first component is a GIS-based portal with 1500 plus layers, from central and state layers covering transport and underground utility networks. The second component is the establishment of an institutional framework, led by the cabinet secretary, to ensure the operational functioning of this GIS portal. The most important part of the network planning group is of appraisal of the infrastructure projects that exceed 500 Crore rupees, in compliance with the guidelines set by the Ministry of Finance. When a project is received, the Technical Support Group, consisting of 14 experts from various fields, analyses the project using a GIS portal. They identify all potential intersections, clearances, and any oversights that may have occurred due to the project being developed by a single ministry and the corresponding inputs are provided. The network planning group convenes every 15th day to discuss and deliberate on various infrastructure projects using GIS-based technology. This forms an integral part of the cabinet note of any project in the country when it is taken for approval, based on the suggestions. The utilization of the PM GatiShakti portal has expanded beyond greenfield projects to include brown field projects going for extensions. She urged the integration of the PM GatiShakti portal and the NDEM portal, as it will be an important component in considering disaster management when designing infrastructure in the country. The integrated approach to infrastructure development emphasizes six key aspects: prioritizing, optimization, synchronization, analytical components, dynamic components, and an emphasis on people-centric development. Furthermore, she provided examples of PM GatiShakti in disaster management, such as the implementation of evacuation measures during the Goa floods and the provision of disaster management services during floods in the Banaskantha District and cyclones in Gujarat.

Speaker 3: Dr Srilakshmi P, Head, ED-DSD, NRSC-ISRO

Dr.Srilaxmi, who leads the National Database for Emergency Management (NDEM) at NRSC, introduced the NDEM integration platform. This platform is a distinctive geo-portal for Disaster Management Services, which was sponsored by the Ministry of Home Affairs (MHA) and implemented by ISRO. The portal aims to consolidate geographic information system (GIS) data nationwide, offering Decision Support System (DSS) tools, and developing infrastructure to streamline information dissemination on a single platform for decision-makers to make informed decisions. She showcased the most recent iteration of NDEM Version 5, illustrating its ability to present near-real-time disaster scenarios across the entire country. This advanced portal provides many services such as response, early warning, and mitigation. She provided detailed explanations of stakeholders and the collaborative efforts across several agencies. The stakeholders responsible for monitoring include agencies such as MHA (Ministry of Home Affairs), NDMA (National Disaster Management Authority), PMO (Prime Minister's Office), NIDM (National Institute of Disaster Management), and IDS (Integrated Defence Staff). Forecasting agencies such as IMD, CWC, INCOIS, MOSDAC, GSI, DGRE, and NCS participate in the forecasting process. The other stakeholders in disaster response include all the forces and officials from the state and districts. The NRSC's services for response, early warning, and mitigation phases were emphasized. These services include monitoring lightning frequency and intensity, providing timely alerts for forest fires and floods, and mapping flood-prone areas in near real time. Additionally, the NRSC maintains a database on landslide hazards, glacial lakes, forest fires, and a flood hazard atlas. In addition, she highlighted the assistance provided by other authorities to address various threats. The Indian Meteorological Department (IMD) provides real-time information on nowcast warnings, current meteorological conditions, cyclone tracks, and other related data. The Central Water Commission (CWC) offers a 7-day flood prediction and monitors water levels at gauge stations. The Indian National Centre for Ocean Information Services (INCOIS) provides information on storm surge levels. The Meteorological and Oceanographic Satellite Data Archival Centre (MOSDAC) collects and archives satellite data. The Geological Survey of India (GSI) offers seismology services. The Directorate General of Resettlement (DGRE) provides avalanche alerts. The National Centre for Seismology (NCS) monitors and reports earthquake activity. In addition, she provided a comprehensive overview of the decision support tools accessible on the NDEM portal. These tools encompass Proximity Analysis, route analysis for use during disasters, evacuation plans, and the

display of the top 10 relief shelters. In addition, she addressed incident reports about response forces, data from the India Disaster Resource Network (IDRN) regarding nearby resources, tools for interaction, Post-Disaster Needs Assessment (PDNA) tools for 14 sectors, the Integrated Control Room - Emergency Response (ICR-ER), and SMS alerts that can be accessed through the NDEM portal.

Speaker 4: Mr Rajesh Kumar, Deputy Commandant, NDRF

Mr Rajesh Kumar, Deputy Commandant of NDRF, discussed the National Emergency Communication Plan (NECP) and the role of communication techniques in disaster response. He highlighted the components and objectives of NECP which involves enhancing governance, planning, technical, training, exercises and disaster communication capabilities. He provided insights into how the NDRF utilizes the NECP to address various challenges during disaster situations. He talked about challenges in early warning systems, emergency services coordination, community engagement, backup power and resilience, and interoperability and standardization. He briefed about how the NECP has equipped NDRF over the years initially from 4 communication equipment in the year 2006 to presently it has 48 types of communication equipment essential for emergency operations. Rajesh Kumar detailed the NDRF's communication setup during disasters, which ensures effective coordination from NDRF Headquarters to Battalion HQ, Base Teams, and finally to rescuers on the field.

Key Takeaways/ Recommendations:

- Continue to focus on national conferences, workshops, and trainings to enhance awareness and utilization of space technology in disaster management.
- Strengthen international data-sharing agreements to improve disaster response and management.
- Integrate the PMGatiShakti portal with the NDEM portal to enhance infrastructure design and planning by incorporating disaster management principles.
- Improve the integration of data from various agencies to provide more comprehensive and timely information on the NDEM portal.
- Ensure that decision support tools are updated regularly to incorporate the latest data and technological advancements.

- Continue to invest in and upgrade communication equipment to ensure effectiveness during disasters.
- Enhance training programs for communication techniques and interoperability among different response teams.

Technical Session 2: Space Technology in Geo-Hydro-Meteorological Disaster (Chanakya Hall, Ground Floor)

CHAIR: Prof Surya Parkash, NIDM

Session Speakers:

1. **Dr Saji Mohandas,** Scientist-G, NCMRWF
2. **Shri Akshay Kumar Mishra**, Director GSI
3. **Shri Ananda Kumar Das,** Scientist F, IMD
4. **Dr Karan Choudhary,** MNCFC
5. **Shri Manoj Kumar,** Director, CWC
6. **Dr Patanjali KumarChodavarapu,** Scientist-F INCOIS

Moderator: Shri Sandeep Kumar Singh

Welcome address by the Chair: The chair initiated the session by highlighting the role of Space Technology in Geo-Hydro-Meteorological Disaster, research development and technological advancement.

Dr. Saji Mohandas

Dr. Saji Mohandas discussed the current state of cloudburst prediction and modelling, with a specific focus on the Wayanad region. He highlighted the capabilities of the NCUM (National Centre for Medium-Range Weather Forecasting Unified Model) in predicting extreme weather events. The global NCUM model can predict extreme weather over North Kerala up to five days in advance, while the regional NCUM model can provide more accurate forecasts two days ahead. However, he also emphasized the limitations of existing technologies, particularly in delivering location-specific forecasts, underscoring the need for further advancements in predictive capabilities.

Sh. Akshay Mishra

Sh. Akshay Mishra provided an in-depth analysis of landslide occurrences, their classification, and the role of the Geological Survey of India (GSI) in landslide forecasting and documentation. He stressed the limitations of current technologies and databases, cautioning against over-reliance on numerical models for decision-making. He introduced the prototype landslide EWS being developed by the Landslip consortium, and the Bhooskalan mobile app, a resource for landslide management, and discussed the various resources available in public domain for landslide awareness and management.

Sh. Ananda K. Das

Dr. Ananda Kumar Das discussed the role of satellite data in forecasting cyclones and lightning, focusing on the use of INSAT 3D, INSAT 3DR, METEOSAT 8, and other international satellites. He emphasized the importance of NWP model assimilation for improved forecasting accuracy and the reliance on satellite data due to limited ground-based systems. Dr. Das highlighted the success of the Lightning EWRF model in providing daily forecasts and stressed the need for new weather satellites to enhance early warning capabilities.

Dr. Karan Choudhary

Dr. Karan explained the use of satellite imagery in drought management, focusing on monitoring vegetation health and crop conditions through indices like greenness and crop lodging. He discussed the classification of droughts based on triggers such as rainfall deficits and highlighted the importance of cloud-free, cost-free satellite data for agricultural planning. Dr. Karan emphasized the need for data-driven solutions, including village-level data, a composite drought indicator, and the development of a geospatial platform, along with enhanced training for stakeholders.

Sh. Manoj Kumar Chodavarapu

Shri Manoj Kumar provided an overview of flood hazard risk assessment, including the causes and types of floods. He outlined the CWC's activities, such as flood forecasting at 340 locations, and introduced key initiatives like the seven-day advisory flood forecasting web portal and the Floodwatch India mobile application. Shri Kumar emphasized the need for better reporting of ground conditions during floods and the importance of integrated reservoir operation and near real-time inundation forecasting.

Dr.Patanjali Kumar

Dr.Patanjali Kumar discussed the development of the tsunami early warning system (EWS) in India, initiated after the 2004 tsunami event. He detailed the real-time data collection through seismic and GNSS networks, the operational tsunami forecasting system, and the tsunami warning chain. He also highlighted the role of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) in

providing tsunami services.

Key Takeaways/ Recommendations:

1. There is a need for continuous improvement in predictive models, especially for cloudbursts and landslides, to provide more location-specific and accurate forecasts.
2. The integration of various technologies, such as satellite data, ground-based sensors, and mobile applications, is crucial for effective disaster management.
3. Training and capacity building for stakeholders at all levels, from local communities to national agencies, are essential to ensure the effective use of space technology in disaster management.
4. A shift towards data-driven risk management solutions, supported by comprehensive and accessible geospatial platforms, is necessary to improve disaster preparedness and response.
5. The development of new weather satellites and the expansion of existing forecasting centers like NLFC are vital for enhancing disaster monitoring and early warning capabilities.

Panel Discussion (1): Innovation in Space Technology & Disaster Response (Dronacharya Hall, Ground Floor)

CHAIR:Shri Deepak Awari, Vice President, AGI
Co-CHAIR:**Shri** Chandrasekar S, Deputy Director, LBSNAA

Session Speakers:

1. **Col. Rakesh Verma**, India Head, Maxar Technologies
2. **Dr Kapil Malik**, Radar Systems & Services
3. **Shri Partha Ghosh**, Presale Leader, Planet Labs
4. **Shri Vinay BabuAdimulam**, Vice President, Solution & head Business, Hexagon

Moderator: Ms. Shalini Mittal, AIR

The panel discussion on "Innovation in Space Technology & Disaster Response" brought together experts from different sectors to explore the evolving role of space-based technologies in disaster management. The session highlighted how innovations in space technology are transforming disaster response strategies by providing more accurate, timely, and accessible data. Each panelist presented their organization's contributions, focusing on the practical applications of these technologies in managing various disaster scenarios, including urban flooding, landslides, and glacial movements. The discussion also addressed the challenges of sustaining technological

advancements and the importance of collaboration between academia, private companies, and government bodies to enhance disaster response and management.

Key-takeaways / Recommendations:

- Space technologies, such as terrestrial radars and structural sensors, are vital for tracking and managing various disaster types, including urban flooding, riverine flooding, land subsidence, and slope instability.
- Sensor-based solutions are crucial for monitoring glacier movements, rockfalls, avalanches, and potential dam breaks, enhancing public safety and disaster preparedness.
- Daily earth coverage with varying resolutions (3-meter and 50-centimeter) is essential for effective disaster monitoring and response.
- SAR technology is reliable and versatile, offering significant advantages in disaster response scenarios.
- Maxar Technologies' extensive data resources and new satellite constellation provide high-resolution imaging capabilities, essential for disaster response.
- There is a need to address the sustainability of current technologies amidst rapid technological advancements.
- Collaboration among academia, private Earth Observation (EO) companies, and the government is crucial to streamline data procurement processes, ensuring faster and more effective disaster response.
- A coalition between these entities would maximize the impact of space-based technologies in disaster management and ensure their sustainable integration into disaster response frameworks.

Panel Discussion (2.1): Use of Space Technology in Crop Insurance(Dronacharya Hall, Ground Floor)

CHAIR:Shri Safi Ahsan Rizvi, IPS, Advisor, NDMA

Session Speakers:

1. **Shri Siddesh Balasubramanian**, InRisk Labs
2. **Shri Alok Shukla**, Head of UW, Munich Re
3. **Shri Shubham Bhatnagar**, ICICI Lombard
4. **Shri Harish Naidu**, GIS Expert, APSDMA

Moderator: Shri Shubham Badola

The panel discussion on "Use of Space Technology in Crop Insurance" focused on the integration of satellite data into agricultural insurance, exploring its current usage, challenges, and future potential. The discussion highlighted the varying levels of reliance on space technology in crop insurance, with significant dependence on traditional methods due to the limitations of current satellite data, particularly in the context of India's diverse and small-scale farming practices. The panellists provided insights into how advancements like AI and ML could enhance the accuracy of crop yield predictions and improve the reliability of insurance models. They also addressed systemic issues within the sector, such as rising premium rates and delays in claims processing,

emphasizing the need for more reliable data and a collaborative approach to overcome existing challenges.

Key-takeaways / Recommendations:

- Crop insurance in India still heavily relies on conventional methods (70%), with only 30% reliance on satellite-based techniques. A more balanced integration of these methods is needed to improve the accuracy and reliability of insurance assessments.
- The current satellite data, though utilized, is not fully reliable for crop insurance in India due to challenges posed by small landholdings and mixed cropping systems.
- The inadequacy of ground-based crop yield data further complicates the effective use of space technology in insurance models.
- Advanced technologies like AI and ML have the potential to enhance crop yield predictions and improve the reliability of crop insurance models.
- Rising premium rates and delays in claims processing (up to 2 to 2.5 years) are significant challenges that need to be addressed to build confidence in satellite-based crop insurance.
- The adoption of weather data-based proxies and index-based assessments has shown progress, but these methods remain complex and require further refinement.
- Greater collaboration between government agencies, private companies, and research institutions is essential to develop more sophisticated data collection methods and refine existing models to better suit India’s diverse agricultural landscape.

Panel Discussion (2.2): Space Tech - Easing the Complexity of Parametric Insurance (Dronacharya Hall, Ground Floor)

CHAIR: Shri Safi Ahsan Rizvi, IPS, Advisor, NDMA

Session Speakers:

1. **Ms. MandakiniBalodhi,** Director, DoFS
2. **Shri Manish Mohandas**, UNDP
3. **Shri Shishir Agarwal**, NDMA
4. **Shri Ankur Gupta**, Munich Re

Moderator: Shri Shubham Badola

The panel discussion on "Space Tech - Easing the Complexity of Parametric Insurance" focused on the role of space technology in simplifying and enhancing parametric insurance, particularly in disaster risk management. Experts from government, international organizations, and the private sector discussed the current challenges in data accuracy, reliability, and information asymmetry that complicate parametric insurance models. They also explored potential solutions, such as public-private partnerships, improved data infrastructure, and increased financial literacy. The discussion highlighted the Nagaland model as a promising example of parametric insurance in action and emphasized the need for greater collaboration and innovation to improve the effectiveness and adoption of these insurance models across India.

Key-takeaways / Recommendations for each panel discussion:

- There is a critical need for enhanced data sharing between government agencies and private sector players to improve the accuracy, reliability, and consistency of data used in parametric insurance models.
- Educating and empowering farmers and other stakeholders with technology and knowledge on risk mitigation is essential for the

successful implementation of parametric insurance. Financial literacy should be encouraged to build trust and understanding.

- Establishing a national disaster information system is strongly recommended to centralize and standardize data collection and dissemination.
- Building resilience in communities and fostering a culture of risk acceptance and management are key factors for the successful adoption of parametric insurance. Efforts should be made to strengthen community resilience.
- A national scheme for parametric insurance should be developed to standardize practices and provide a framework for states to adopt and implement these models more effectively.
- Public-private partnerships are crucial for advancing parametric insurance in India. The Nagaland model could serve as a role model for other states, with initial government subsidies to encourage adoption and gradual phasing out as familiarity with parametric insurance grows.

Valedictory Session

Dr. Ravinder Singh from the National Institute of Disaster Management (NIDM) concluded the workshop by summarizing the major discussions held throughout the day. His presentation captured the essence of the various explored themes, including the integration of space technologies in disaster risk management (DRM), which resonated as a core focus of the workshop.

Shri Surendra Thakur, Joint Director of NIDM, initiated the session with a warm welcome to all distinguished dignitaries, guests and participants, fostering an atmosphere of collaboration and positivity for the session's proceedings.

Special Address by Shri RajendraRatnoo, IAS, ED, NIDM

In his Special Address, Shri RajendraRatnoo, IAS, Executive Director, NIDM elaborated on the integral relationship between NIDM and the National Disaster Management Authority (NDMA). He emphasized significance of their partnership in guiding and collaborating on disaster management efforts across the nation. While NDMA provides strategic oversight and policy direction, NIDM acts as a centre of excellence for capacity building, training, and research, ensuring that disaster management efforts are comprehensive and effective.

Shri Ratnoo highlighted the importance of risk financing as a crucial component of disaster management. He explained how integrating space technology into risk financing could provide significant benefits by enhancing accuracy in risk assessment and enabling more informed decision-making. He concluded by emphasising that the integration of space technology in DRM will not only enhance our response capabilities but also contributes to long-term resilience and sustainable development. By leveraging these advanced technologies, India can strengthen its position as a global leader in disaster management and ensure the safety and well-being of its citizens.

Keynote Address by Dr. Prakash Chauhan, Director NRSC, ISRO

In his keynote address, Dr. Prakash Chauhan, Director, National Remote Sensing Centre (NRSC), ISRO, highlighted that ISRO's mission extends beyond space exploration, aligning with the vision of its founding father, Dr.Vikram Sarabhai, to solve the problems of common people. Chauhan emphasized the importance of satellite technology in disaster management, noting NRSC's efforts in creating detailed flood and landslide archive data with a high resolution across the country.

He also spoke about the rapid growth of space technology-based startups in India, which he sees as a positive development for the field. However, he stressed the need for more satellites to improve the accuracy and timeliness of weather predictions and disaster-related updates. Chauhan discussed ongoing plans for building satellites through a public-private partnership model, where

the government contributes a major share of the investment. He also talked about space technology and stated that India's share was 2% in 2010 and now it is an increasing phase and will reach up to 10% by 2040. He predicted that space technology will play a crucial role in future disaster early warning systems, monitoring, and response and illustrated the two remote sensing products namely Pan India flood hazard map and the Pan India Landslide Atlas. Despite India's limited budget, the country is a leader in space technology.

Mr. Chauhan acknowledged the application of remote sensing in disaster management and financing helpful for the insurance companies and the challenges of data requirements and satellite demands for further observation, pointing out issues like landslide data disturbances and the acceleration of phenomena such as rewilding, which requires coherent data management strategies.

Special Address by Shri Safi Ahsan Rizvi, IPS, Advisor (Mitigation), NDMA

Shri Safi Ahsan Rizvi, IPS, Advisor (Mitigation) at NDMA, during his special address highlighted the importance of workshops as platforms for brainstorming and interaction among stakeholders in the field. He applauded the National Remote Sensing Centre (NRSC) for completing its recent studies on 30-year data archive on floods and landslides, describing it as a significant achievement and a valuable asset for both the government and researchers working in mitigation and risk assessment. Shri Rizvi also shared his vision for the National Institute of Disaster Management (NIDM) to evolve into a prestigious institution akin to IITs and IIMs. He expressed the need for NIDM to expand with multiple campuses across the country and to offer extensive courses ranging from six months to a year.

Valedictory Address by Chief Guest: Lt. Gen (Retd) Syed Ata Hasnain, Member, NDMA

In his valedictory address, Lt. Gen (Retd) Syed Ata Hasnain, Member, NDMA, praised the efforts of the National Institute of Disaster Management (NIDM) in highlighting the critical role of the private sector in disaster management. He emphasized how the NRSC is working on a Public-Private Partnership (PPP) model in research and development for space technology.

He also touched on the historical significance of the Strategic Defence Initiative, often referred to as "Star Wars" technology, developed by the USA, which was a significant factor in the downfall of the Soviet Union. Furthermore, Lt. Gen Hasnain elaborated on the extensive use of satellites in DRM and other sectors, including their potential scope in air traffic control. He underscored the importance of adopting these innovative methods to overcome challenges and become global players. He highlighted India's leadership in space technology for societal reforms and benefits, noting that space will play a major role in disaster risk management and various other enclosures.

Vote of Thanks

Professor Surya Prakash presented the Vote of Thanks, expressing gratitude to all speakers, participants, and organizers for their contributions to the workshop's success. He emphasized the importance of continued collaboration and collective effort toward building a disaster-resilient nation, reflecting the workshop's spirit of unity and forward-thinking.

Key Takeaways:

- **India's Space Technology Growth and Disaster Management:** India's space technology capabilities will grow from 2% (2010) to 10% (2040), driven by public-private partnerships and new satellite development. It will play a crucial role in disaster management by enhancing early warning systems, risk assessment, monitoring, and response through remote sensing applications.

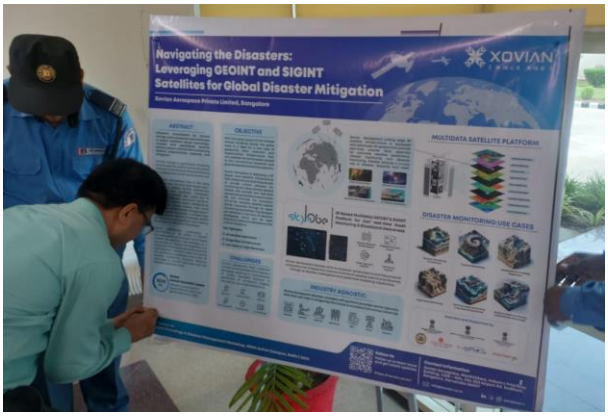
- **Risk Financing:** Integrating space technology into risk financing improves risk assessment accuracy and enables informed decision-making, benefiting insurance companies and disaster response efforts. NRSC's 30-year data archive on floods and landslides is a valuable resource to initiate a step ahead in this direction.

- **Global Leadership:** By embracing innovative technologies and partnerships, India can establish itself as a global leader in disaster

management, ensuring citizens' safety and well-being, and driving sustainable development.

- **NIDM's Future:** NIDM should strive to become a prestigious institution with multiple campuses and extensive courses, enhancing disaster management capabilities.

Photo Gallery


Navigating the Disasters:
Leveraging GEOINT and SIGINT
Satellites for Global Disaster Mitigation
XOVIAN
MULTIDATA SATELLITE PLATFORM
DISASTER MONITORING USE CASES
INDUSTRY AGNOSTIC


NATIONAL WORKSHOP ON
SPACE TECHNOLOGY IN
DISASTER MANAGEMENT
(A PRE-EVENT OF NATIONAL SPACE DAY)
FRIDAY, 09 AUGUST 2024, NIDM CAMPUS, DELHI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