



# **Floods & Cyclones – Space Based Information**

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**ISRO DMS Programme**

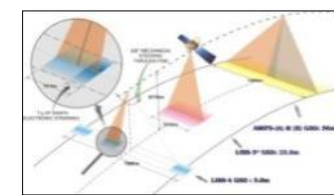
National Remote Sensing Centre (NRSC)  
Indian Space Research Organisation (ISRO)  
Dept. of Space, Govt. of India  
Hyderabad



# ISRO - Disaster Management Support Programme

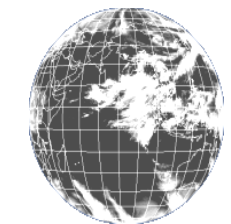


RESOURCESAT-2/2A



Mx 56 / 23 / 5.8 m.

INSAT- 3DR, 3DS



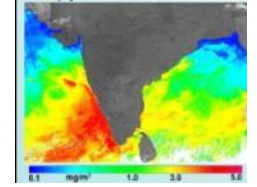
6 Ch. Imager 1/4 km, 19 Ch. Sounder, 48 Images/day

CARTOSAT-2S & 3



0.45 PAN Sharpened

OCEANSAT-3 (EOS-06)



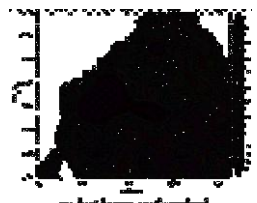
Ocean Color Mon. 360 m / 2 days, SCAT

RISAT-1A (EOS-04)



C-Band SAR

SARAL



Ka Band Altimeter



Flood



Cyclone



Landslide



Earthquake



Forest fire



Drought

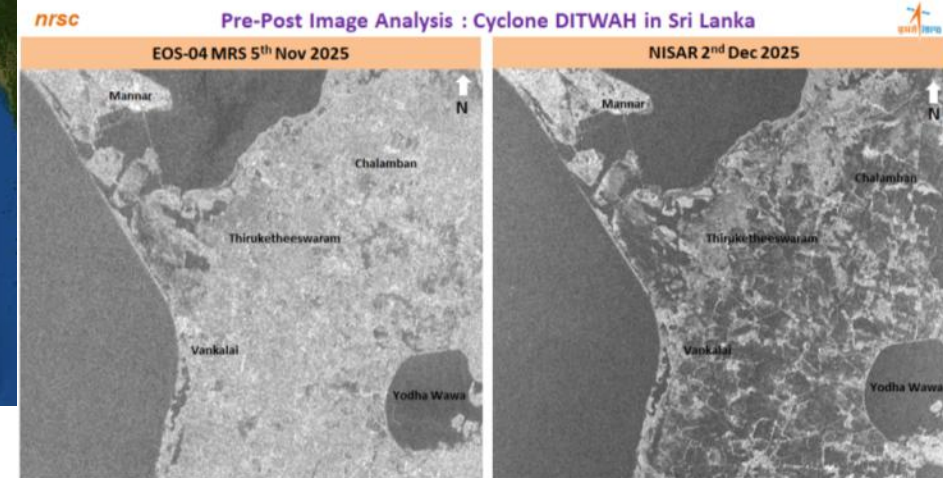
# Flood/Cyclone Monitoring & Mapping & Hazard Assessment

S. No.	State	MAPs/VAPs
1	Andhra Pradesh	29
2	Assam	45
3	Bihar	82
5	Delhi	1
4	Gujarat	2
6	Haryana	2
7	Himachal Pradesh	19
8	Jharkhand	1
9	Jammu & Kashmir	3
10	Karnataka	4
11	Kerala	3
12	Madhya Pradesh	3
13	Maharashtra	7
14	Manipur	1
15	Meghalaya	1
16	Odisha	5
17	Punjab	13
21	Tamil Nadu	8
19	Telangana	3
20	Tripura	4
22	Uttar Pradesh	64
23	Uttarakhand	10
24	West Bengal	6
<b>Total</b>		<b>319</b>



## Cumulative Floods 2025

- Providing information to all Central and State DMS organisations within 3 to 4 hours Turn Around Time
- Flood depth (major floods), crop/infrastructure damage assessment is done on need basis.
- Need for more satellites for DM in the country
- Extensive support to Sri Lanka during Ditwah Cyclone



319 products in 2025, 319 products in 2024 and 205 products in 2023 were provided

Turn Around Time of the products dissemination is 3 to 4 hours after obtaining satellite data

# Flood Hazard Assessment



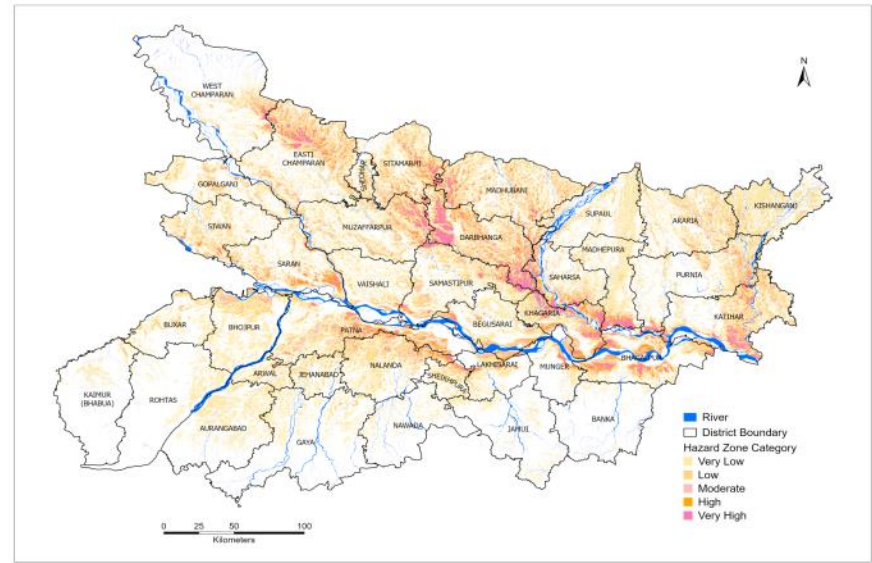
- Flood Hazard Zonation has been carried out using satellite data of 1998 to 2022 and Atlases were released for 6 States (Assam, Bihar, UP, WB, AP, Odisha)
- Flood affected area (1998-2022) Atlas is released in March 2023
- Assam Flood Hazard Atlas has been updated and released in 2025
- Flood Hazard Atlas of Bihar State being updated and ready for release

- Useful in controlling the developmental activities in flood hazard areas
- Vital input in flood insurance
- Inputs provided to NHA in preparing DPRs of 4 routs in India

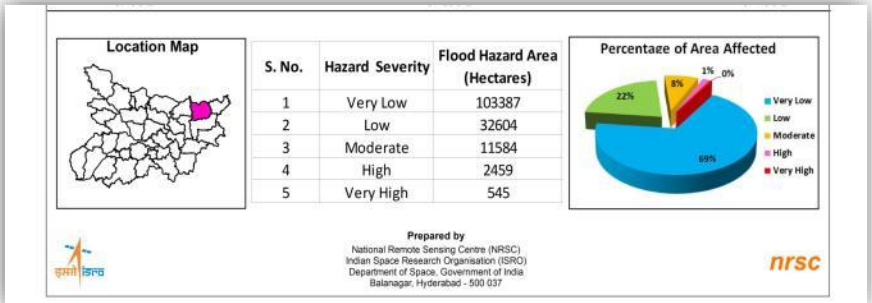


Release of Assam FHZA by Union Home Minister 16 June 2025

## Flood Hazard Zonation Map (1998-2024) Bihar



## Flood Hazard Pattern in Araria District, Bihar

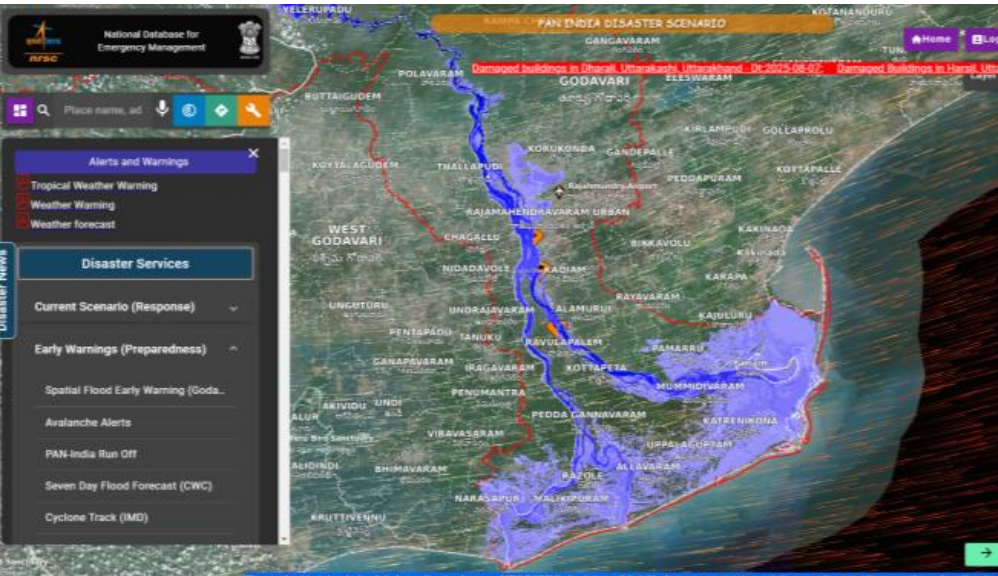




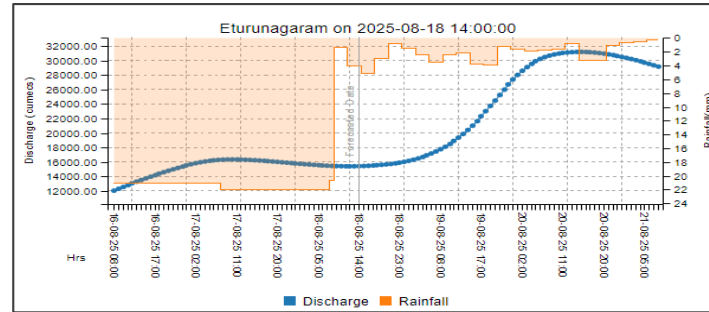
# Spatial Flood Early Warning



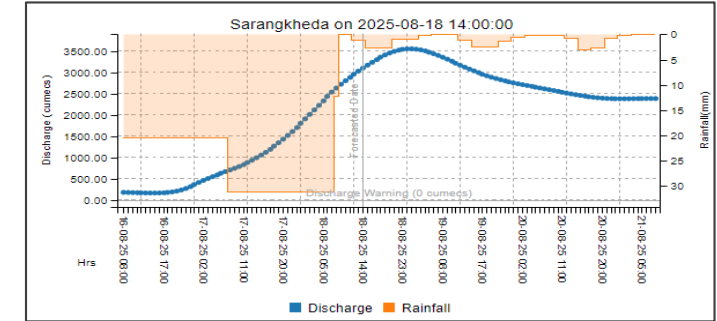
## Godavari flood forecast in 2025



Spatial flood inundation simulation – 2025 floods in Godavari



Godavari Flood Forecast 2025



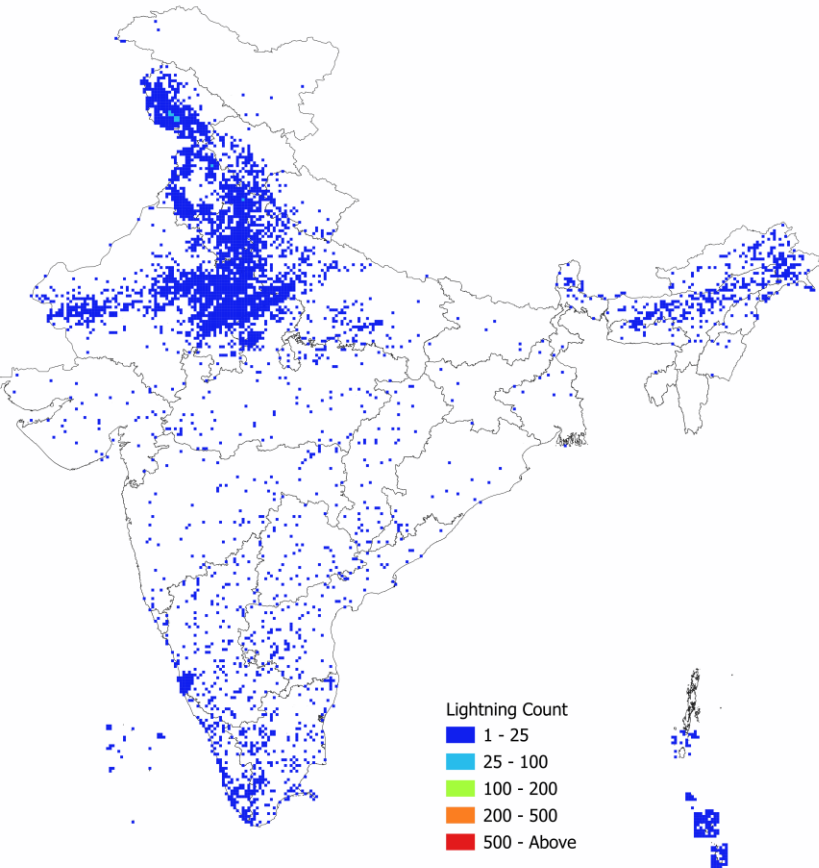
Tapi Flood Forecast 2025

- Flood early warning systems are migrated to CWC, NRSC will act as DR node. Early warning systems were run at NRSC also in 2025
- The Hon'ble Minister of Jal Shakti, Shri C.R. Patil, inaugurated the Unified Flood Inundation Model (FIM) Dissemination Portal on 2nd July 2025 at Shram Shakti Bhawan, New Delhi
- Proposals are given to MoJS for the development of early warning systems for 3 more river basins (Brahmaputra & Barak, Brahmani & Baitarani, and Subarnarekha)
- Pan India Runoff being disseminated (current day & two day forecast)
- Urban flood modelling for Hyderabad City
- Flood Risk Assessment in Association with TISS for Bihar State

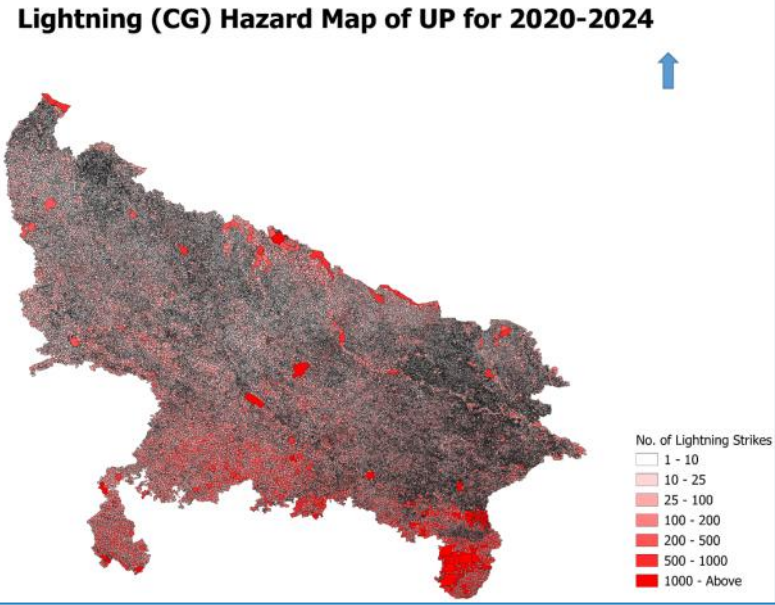
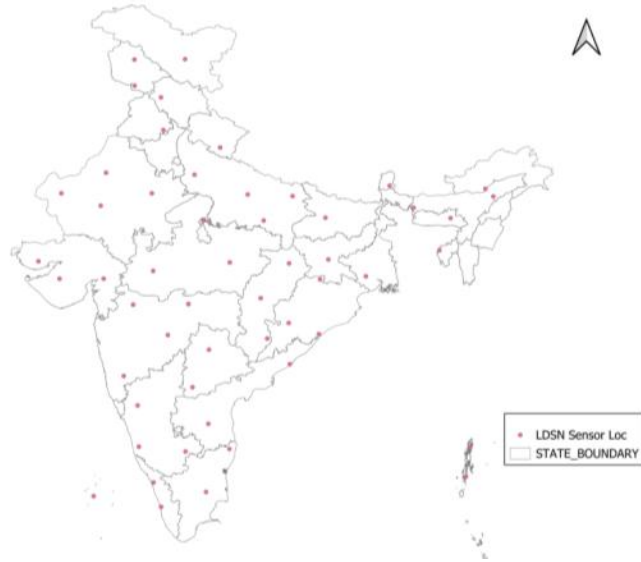


Inauguration of Unified Flood Inundation Dissemination Portal by MoJS

## CG\_Lightning ECV: Jan 2025



## Lightning Detection Sensor Network



- Network of lighting detection sensor has been established with 49 sensors across India
- A day ahead outlook lightning map generation is being assessed for its efficacy



High spatio-temporal resolution data for vulnerability assessment



Crucial for mitigation planning and disaster management



Point-data is invaluable for the lightning risk assessment

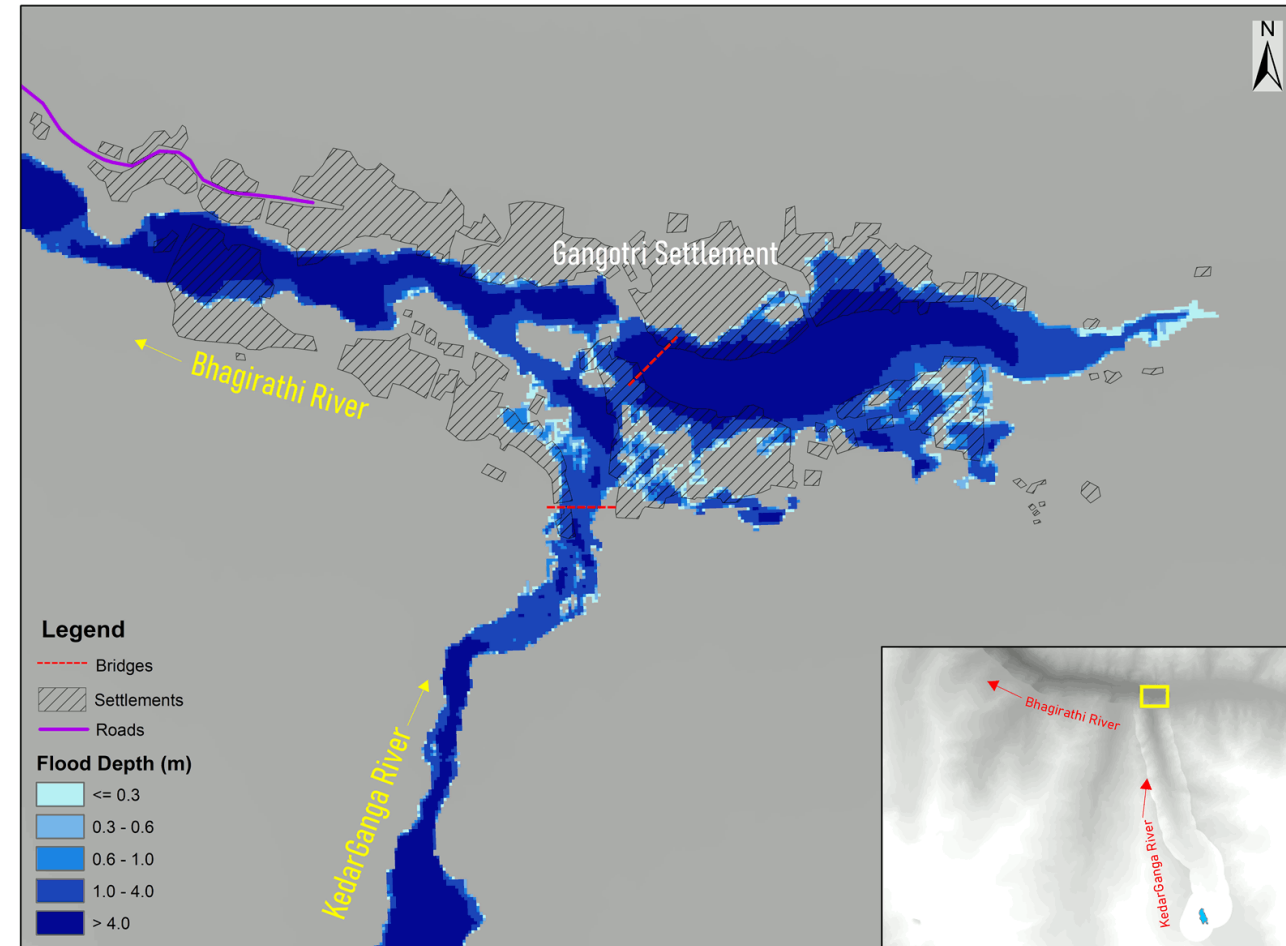
# Risk – Glacial Lake Outburst Floods



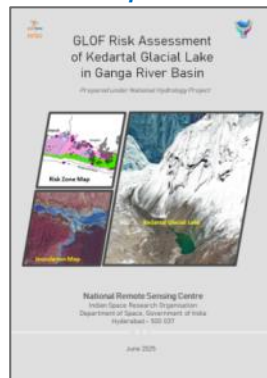
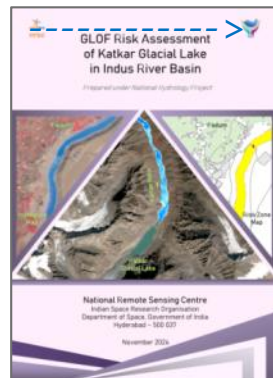
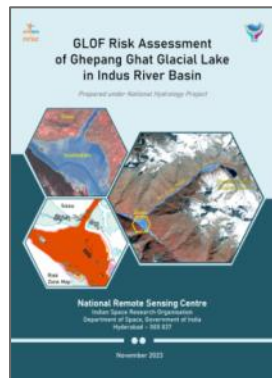
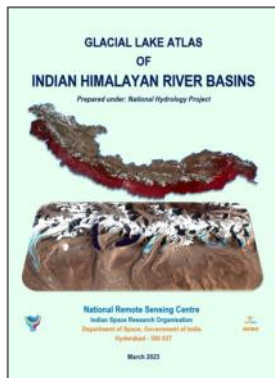
- NRSC prepared inventory of Glacial Lakes ( $\geq 10$  ha) and build capacity in Central Water Commission (CWC) for monthly monitoring of glacial lakes using satellite data since 2016.
- Under National Hydrology Project (NHP), NRSC prepared updated inventory of Glacial Lakes ( $\geq 0.25$  ha) utilizing Resourcesat – 2 LISS IV satellite images of majorly 2016 – 17.
- Basin-wise ranking of glacial lakes carried out for Indus, Ganga, and Brahmaputra River Basins.
- The glacial lake database was shared with NDMA, CWC, DGRE, etc.
- For selected glacial lakes (15), Glacial Lake Outburst Flood (GLOF) Risk Assessment was carried out.

## GLOF Risk Assessment of Kedartal Glacial lake, Uttarakhand

### FLOOD DEPTH (m)



Glacial lake Atlas <----- GLOF Risk Assessment Reports --





# NDEM & ICR-ER



**National Database for Emergency Management (NDEM)** is an unique Geo-portal to disseminate space based inputs along with services of forecasting organizations addressing all disasters in all phases at Pan India level.



## Salient Features:

- Pan India Disaster Scenario
- Multi-scale geospatial database
- Decision support system tools
- Incident Report Mechanism
- PDNA & IDRN Tools
- Resource Management
- Mobile Apps



ICR-ER Inauguration



NDEM Mobile App Inauguration

## Integrated Control Room for Emergency Response (ICR-ER)

- NDEM will act as DR Site and continuous data provider node
- ISRO will continue to provide hand-holding to ICR-ER
- ICR ER Being Monitored by NRSC

**Hon'ble Union Home Minister, Shri Amit Shah, inaugurated ICR-ER and NDEM Mobile App on 16 June 2025, New Delhi**

# Capacity Building and International Cooperation in



## International Charter: Space and Major Disasters

- ❖ ISRO is the Lead for Charter from April to Oct 2025
- ❖ Organised 53<sup>rd</sup> Charter Meeting at Hyderabad from 14-17 Apr 2025.
- ❖ ISRO has supported 153 disasters Globally since 2021



## APRSAF initiative - Sentinel Asia

- ❑ ISRO supported 44 disasters in 15 countries with 107 IRS data products in Asia during 2025,
- ❑ Received satellite data from Sentinel Asia and charter for three major disasters in India in 2025



## Capacity Building

- Annual DMS training programmes (5days)
- NDEM training programmes for NDRF and DMS officials
- Workshops in association with NDMA and NIDM
- Regional workshops on DMS applications



# Preparedness for 2025 Monsoon

## Satellite Data Readiness



Pre-monsoon RISAT 1A, and RS 2/2A (ISRO) satellite data is acquired and spatial database is prepared for entire country



## Flood Mapping & Monitoring

Flood mapping activity and disaster watch are automated to reduce Turn Around Time (< 3 hour).



Floods being monitored now

## Flood Modeling Readiness

PAN India Runoff forecast being operationalised at NRSC, ISRO.

Spatial flood early warning models of Godavari & Tapi Rivers are automated and will be run at CWC



## Flood Hazard & Risk

All India Flood Affected Area Atlas, Flood Hazard Zonation Atlases for 6 States are released.

Bihar Atlas being updated and ready for release



## Disaster Dashboard

NDEM disaster dashboard is being updated time to time (NDEM 5.0) NDEM will act as a DR site for ICR-ER.

Services from all forecasting organisations are operational

Thank you very much...