

भारत सरकार
अन्तरिक्ष विभाग
राष्ट्रीय सुदूर संवेदन केन्द्र
बालानगर, हैदराबाद-500 037, तेलंगाणा, भारत
टेलिफोन : +040-23879572-76
+040-23879261-65
फैक्स : +040-23878648



Government of India
Department of Space
National Remote Sensing Centre
Balanagar, Hyderabad - 500 037, Telangana, India
Telephone : +040-23879572-76
+040-23879261-65
Fax : +040-23878648

Dr. A V Suresh Babu
Head, Flood Mapping & Hazard Assessment Division
Disaster Management Support Group

Phone: 040-23884544,
e-mail: flood@nrsc.gov.in

Ref No: 2023/FL/BR/09

Date: August 22, 2023

Dear Sir,

Sub: Bihar Heavy Rains 2023- Near Real Time Flood Mapping using satellite data

Please refer to our earlier mail dated 21-Aug-2023 regarding Near Real Time flood mapping and monitoring in Bihar using multi-sensor satellite data. Heavy incessant rains in many regions of Bihar during the fourth week of August, 2023 has led to floods in Bihar State. We have analyzed RISAT-1A (EOS04) MRS SAR satellite data of 22nd August 2023 (0600 Hrs IST) and a flood inundation map for part of Bihar State is prepared. The map along with a brief report is enclosed herewith for your kind information. Since the image was acquired during/immediate to the rainfall event, large extents of wet areas were also observed.

Further, we request you to visit flood page in Bhuvan portal (<https://bhuvan-app1.nrsc.gov.in/disaster/disaster.php?Id=flood>) NDEM portal (<https://ndem.nrsc.gov.in>) for better visualization of flood extent in Bihar State.

In addition, the flood layer in GIS ready format and inundation statistics are transmitted to Bihar State Remote Sensing Application Centre by e-mail for further value addition and dissemination to user departments.

We will continue to keep a watch on the flood situation and update the information as and when required. Your support and active interaction is highly appreciated. Please provide feedback on the information being provided.

With kind regards

Yours sincerely,

(A V SURESH BABU)

As per the distribution list enclosed in the report.

Bihar Heavy Rains – 2023

1.0 Background

Floods were reported in Bihar due to heavy rains followed by rise in water levels of Ganga river during the fourth week of August , 2023. (Source: CWC, news media)

2.0 Satellite Data

Flood Disaster Team is keeping a constant watch on the flood situation and checked the satellite data coverage over the affected areas. RISAT-1A (EOS04) MRS SAR satellite data of 22nd August 2023 (0600 Hrs IST) is acquired & analyzed. (Refer Table-1).

Table-1 Satellite Data acquired over Flood Affected Area

S No	Date	Satellite / Sensor	Districts affected
1	10.07.2023 (1800 Hrs)	RISAT-1A (EOS04) CRS SAR	Madhubani, Lakhisarai*, Darbhanga and Patna
2	08.08.2023 (1800 Hrs)	RISAT-1A (EOS04) MRS SAR	Munger*, Begusarai, Supaul*, Madhubani*
3	11.08.2023 (1800 Hrs)	Sentinel-1A SAR	Bhagalpur*, Katihar*, Purnia*, Madhepura*
4	13.08.2023 (1800 Hrs)	Sentinel-1A SAR RISAT-1A (EOS04) MRS SAR	Bhagalpur, Darbhanga, Munger, Madhubani, Khagaria, Muzaffarpur.
5	16.08.2023 (0600 Hrs)	Sentinel-1A SAR	Bhagalpur, Darbhanga , Munger, Khagaria, Muzaffarpur and Begusarai
6	20.08.2023 (1800 Hrs)	Sentinel-1A SAR	Bhagalpur, Katihar , Madhepura * , Khagaria*, Purnia*,
7	22.08.2023 (0600 Hrs)	RISAT-1A (EOS04) MRS SAR	Bhagalpur, Munger, Khagaria, Katihar*, Madhepura*, Begusarai*, Lakhisarai* , Purnia*

3.0 Data Analysis

Satellite data is rectified and flood inundation layer is extracted. Further, flood inundation map was composed for part of Bihar state based on the analysis RISAT-1A (EOS04) MRS SAR satellite data of 22nd August 2023 (0600 Hrs IST). The flood inundation layer is integrated with

district boundary layer, for extracting district-wise flood inundation statistics which are shown in the Table-2.

4.0 Observations

Based on the analysis of satellite data, the following points were observed.

- Satellite data covers part of Bihar State
- Major inundation was observed Bhagalpur, Munger, Khagaria and Katihar* districts.
- The Inundation may include water accumulation in low lying areas due to heavy incessant rainfall

Table-2:

S. No.	DISTRICT	Inundated Area (Ha)
1	BHAGALPUR	16908
2	MUNGER	10932
3	KHAGARIA	5919
4	KATI HAR*	4930
5	MADHEPURA*	2760
6	BEGUSARAI*	2443
7	LAKHISARAI*	2333
8	PURNIA*	1327
	TOTAL	47552

Note: Districts with inundation less than 100 ha are not included in the statistics ; * Partially covered in satellite data.

Disclaimer : Flood inundation may include rain water accumulation / flood water in low lying areas. Estimated flood extent depends on availability of satellite data, it's date of overpass and coverage over flooded areas. Some of the Flash flood events could not be mapped due to non availability of satellite data in short duration. Flood affected area estimated in the study excludes river portion, permanent water bodies. Hence, actual flooded area may be more than the area estimated by satellite images.

Distribution List:

1	MHA	<ol style="list-style-type: none">1. Additional Secretary,(DM & FFR), Ministry of Home Affairs, Govt. of India, Room No.171-B, North Block, New Delhi-110001.2. Joint Secretary, NDM, Ministry of Home Affairs, North Block, New Delhi - 110 001.3. NDM control Room, Ministry of Home Affairs, North Block, New Delhi - 110 001.4. DG, NDRF, New Delhi
2	NODAL MINISTRIES	<ol style="list-style-type: none">1. Director, FCA, Central Water Commission, Sewa Bhavan, R K PURAM, New Delhi-1100662. Deputy Director General, Hydrology, India Meteorological Department, Mausam Bhavan, New Delhi -110003
3	STATE	<ol style="list-style-type: none">1. Commissioner & Secretary, Disaster Management Department, Govt of Bihar, Old Secretariat, PATNA-800015 (Email & hard copy of the map through FMISC/BIRSAC also)2. In-charge, Flood Management Information System Cell (FMISC), Patna (With a request to disseminate the information to the concerned departments)3. Project Director, Bihar Remote Sensing Centre (BIRSAC), Planetarium Complex, Bailey Road, Patna 800001. (With a request to disseminate the information to the concerned user depts.)
4	ISRO/DOS	<ol style="list-style-type: none">1. Director, EDPO, ISRO Head Quarters, Antariksh Bhavan, New BEL Road, Bangalore-560094.2. Programme Director, EDPO, ISRO Head Quarters, Antariksh Bhavan, New BEL Road, Bangalore-560094.3. Associate Director, EDPO, ISRO Head Quarters, Antariksh Bhavan, New BEL Road, Bangalore-560094.
5	NRSC	<ol style="list-style-type: none">1. Group Director, DMSG,NRSC2. Deputy Director (RSA) & Project Director, RRES3. Associate Director, NRSC4. Director, NRSC
