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Date: June 24, 2023

Ref No: 2023/FL/AS/09

Dear Sir,

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

Please refer to our earlier mail dated 23-Jun-2023 regarding mapping and monitoring of flood inundation in Near Real Time in Assam State using Sentinel-1A SAR satellite data. Heavy incessant rains in many regions of Assam during the third week of June, 2023 has led to floods in Assam State. We have analyzed Sentinel-1A SAR satellite dataset of 23rd June 2023 (1800 Hrs) and an inundation flood inundation map for part of Assam 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 NDEM portal (<https://ndem.nrsc.gov.in>) and Bhuvan portal (<https://bhuvan-app1.nrsc.gov.in/disaster/disaster.php?id=flood>) for better visualization of flood extent in Assam State.

In addition, the flood layer in GIS ready format and inundation statistics are transmitted to Assam State Remote Sensing Application Centre and North Eastern State 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.

Mapping and Monitoring of Flood situation in Assam State during 2023

1.0 Background

Floods were reported in Assam due to heavy rains followed by rise in water levels of Brahmaputra & its tributaries during the third week of June, 2023. River Brahmaputra at Dhubri and Jorhat, River Manas at Bongaigaon, River Puthimari at Kamrup, River Pagladiya at Nalbari and River Buridehing at Tinsukia were reported to be flowing above danger level. (Source: CWC, News media, ASDMA-Assam)

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 Sentinel-1A SAR satellite dataset of 23rd June 2023 (1800 Hrs) is acquired & analyzed. (Refer Table-1).

Table-1 Satellite Data acquired over Flood Affected Area

S No	Date	Satellite / Sensor	Districts affected
1	16.06.2023 (1800 Hrs)	Sentinel-1A SAR	Goalpara,Dhubri,Bongaigaon,Barpeta*, Kokrajhar,Kamrup Rural*, Chirang, Baksa,South Salmara Mancachar
2	17.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- MRS	Dhemaji, Tinsukia, Sibsagar, Charaideo, Dibrugarh
3	18.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- CRS	Golaghat, Cachar, Biswanath*, Lakhimpur, Karimganj, Sonitpur, Jorhat*, Nagaon
4	16.06.2023 to 18.06.2023	Multi Satellite/ Sensor Data	Golaghat, Cachar, Goalpara, Biswanath, Dibrugarh*, Dhubri, Lakhimpur, Bongaigaon, Kokrajhar, Barpeta*, Karimganj, Sonitpur, Jorhat*, Nagaon
5	19.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- CRS	Dibrugarh, Sibsagar, Tinsukia
6	20.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- CRS	Barpeta, Kamrup Rural, Baksa, Cachar*, Karimganj, Nalbari, Bongaigaon, Goalpara*, Darrang, Marigaon
7	21.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- CRS	Cachar, Kamrup Rural*, Darrang, Karimganj, Nagaon, Baksa*

8	22.06.2023 (1800 Hrs)	RISAT-1A (EOS-4)- CRS	Sibsagar, Lakhimpur*, Jorhat
9	23.06.2023 (1800 Hrs)	Sentinel-1A SAR	Barpeta*, Kamrup Rural, Darrang, Cachar, Nalbari, Nagaon, Karimganj, Baksa*, Marigaon*, Sonitpur*, Udalguri*, Hojai, Goalpara*, Hailakhandi and Bongaigaon*

3.0 Satellite Data Analysis

Satellite data is rectified and flood inundation layer is extracted. Further, flood inundation map was composed for part of Assam state based on the analysis of Sentinel-1A SAR satellite dataset of 23rd June 2023 (1800 Hrs). The cumulative 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 from Satellite Images

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

- Satellite data covers part of Assam State
- Major inundation was observed in Barpeta*, Kamrup Rural, Darrang, Cachar, Nalbari, Nagaon, Karimganj, Baksa*, Marigaon*, Sonitpur*, Udalguri*, Hojai, Goalpara*, Hailakhandi and Bongaigaon* 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	BARPETA*	48797
2	KAMRUP RURAL	34297
3	DARRANG	21983
4	CACHAR	21570
5	NALBARI	20241
6	NAGAON	16484
7	KARIMGANJ	15559
8	BAKSA*	15451
9	MARIGAON*	13804
10	SONITPUR*	13340
11	UDALGURI*	11807
12	HOJAI	11360
13	GOALPARA*	8011

14	HAILAKANDI	7263
15	BONGAIGAON*	6679
16	KARBI ANGLONG	4986
17	KAMRUP METRO	3061
18	BISWANATH*	2177
19	CHIRANG*	1931
20	WEST KARBI ANGLONG	1125
TOTAL		279926

Note:

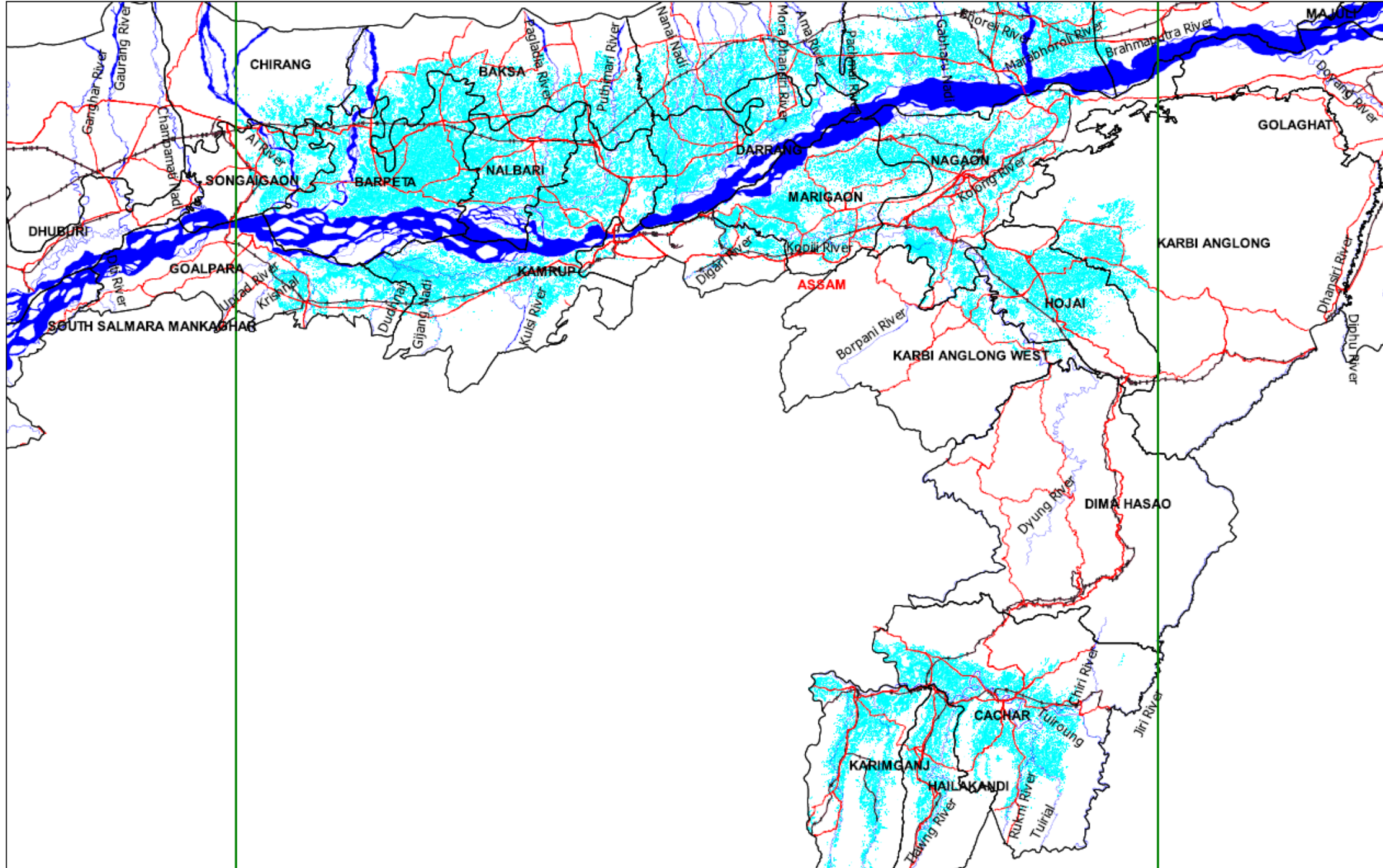
- Flood inundation may include rain water accumulation / flood water in low lying areas/ swampy areas.
- Districts with inundation less than 100 ha are not included in the statistics
- * Partially covered in satellite data.

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-110066 2. Deputy Director General, Hydrology, India Meteorological Department, Mausam Bhavan, New Delhi -110003
3	STATE	<ol style="list-style-type: none"> 1. Additional Chief Secretary & Relief Commissioner, Govt. of Assam, Janatha Bhavan, Assam Secretariat, Dispur, GUWAHATI-781005. 2. Scientific Officer, Assam State Remote Sensing Application Centre (ARSAC) Govt of Assam, Guwahati, Assam.
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,NRSC 2. Deputy Director (RSA) & Project Director, RRES 3. Director, NRSC

Flood Inundation Areas in Part of ASSAM State

Based on the analysis of Sentinel-1A - SAR Satellite Image of 23-06-2023 (1800 Hrs IST)



Map ID:2022/FL/ASSAM/09/23062023
Date Of Issue:24.06.2023

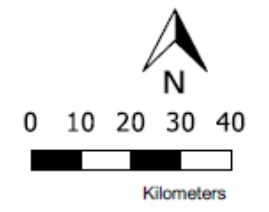
About the Event
Floods were reported in Assam during the third week of June, 2023 due to heavy rains. River Brahmaputra at Tezpur and Neamatighat and River Puthimari at DRF were reported to be flowing above danger level. (Source: ASDMA, CWC, News Media)

Satellite Observations:
This map highlights the inundation in 20 districts of Assam as on 23-Jun-2023 (1800 Hrs).

Satellite Data Used
Pre Flood Data
Satellite: Resourcesat-2A AWiFS
Date of Pass: 15-03-2023

Post Flood Data
Satellite: Sentinel-1A - SAR
Date of Pass: 23-06-2023

Other data used
NRSC Landuse/Landcover Data of 2018-19, Bhuvan Geospatial Legacy Data



- District Boundary
- Major Roads
- Railway Line
- River
- Flood Inundation
- Satellite Data Coverage



Disclaimer : This product is prepared on rapid mapping mode for immediate use and sharing amongst official agencies. This provides preliminary results. Flood inundation may include rain water accumulation / flood water in low lying areas. All geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. No ground verification is done

Citation ' NRSC (2023) - Flood Inundated areas in Part of assam State (as on 23-06-2023)' dated 2023 Map no : 2022/FL/ASSAM/09/23062023, NRSC/ISRO,Hyderabad

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