



# ISRO Support to Sentinel Asia

*nrsc*

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By

Shri S V Shiva Prasad Sharma

Scientist/ Engineer "SE"

Disaster Management Support Division(DMSD)

Remote Sensing Applications Area (RSAA)

National Remote Sensing Centre (NRSC),

Indian Space Research Organisation (ISRO),

Govt. of India, Balanagar

Hyderabad, India

500037

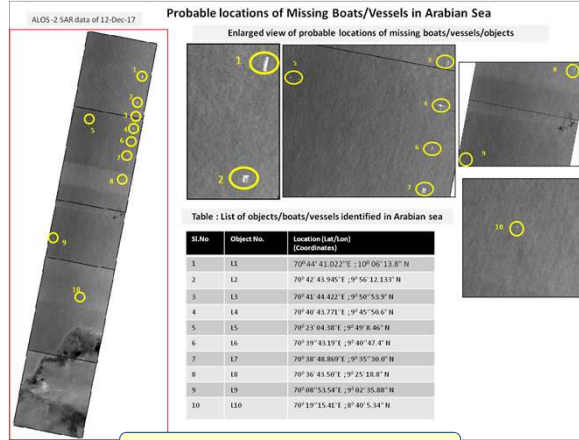


## Emergency requests responded during 2018

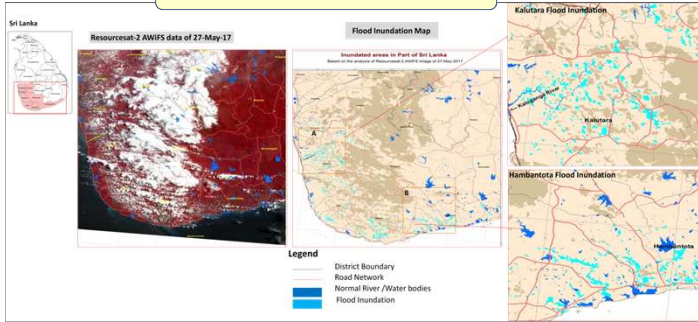


- During 2017-2018, ISRO has activated Sentinel Asia for Cyclone OCKHI and recent Kerala floods. Based on the Satellite datasets provided by SA VAP's were generated and were of great help in relief and rescue measures.
- In addition, ISRO has also generated few value added products towards support to Sri Lanka floods of 2017

## Cyclone 'OCKHI' - 2017



## Sri Lanka Floods- 2017



- During 2018, ISRO has responded to 22 disaster events in 12 countries with 56 Indian Remote Sensing Satellites comprising of Resourcesat-2/2A AWiFS, LISS IVFMX, LISS III and Cartosat-series data.

## Emergency requests responded during 2017

Country/Event	Month-Year	Pre-Event data	Post Event data	No. Of Datasets
INDONESIA_FLOODS	FEB-2017	-	Resourcesat-2 AWiFS	1
Nepal Flash floods	Apr-2017	-	Resourcesat-2 AWiFS	1
Sri Lanka Floods	May-2017	-	Resourcesat-2 AWiFS	1
Sri Lanka Floods	May-2017	-	Resourcesat-2 A AWiFS	1
Sri Lanka Floods	May-2017	-	Resourcesat-2 A LISS IV FMX	1
Taiwan flashfloods	Jun-2017	-	Resourcesat-2 A AWiFS	1
Bangladesh Landslides	Jun-2017	-	Resourcesat-2 AWiFS	1
China Landslides	Jun-2017	-	Cartosat-2 PAN	3
Vietnam typhoon	Jul-2017	-	Resourcesat-2 AWiFS	1
Vietnam FLOODS	Jul-2017	-	Resourcesat-2 AWiFS	1
Vietnam FLOODS	Aug-2017	-	Resourcesat-2 A AWiFS	1
NEPAL-FLOODS	AUG-2017	-	Resourcesat-2 AWiFS	1
CHINA_EQ	AUG-2017	-	Resourcesat-2 A AWiFS	1
NEPAL-FLOODS	AUG-2017	-	Resourcesat-2 AWiFS	1
BANGLADESH-FLOODS	AUG-2017	-	Resourcesat-2 AWiFS	1
VIETNAM-FLOODS	AUG-2017	-	Resourcesat-2 AWiFS	1
VIETNAM-FLOODS	SEP-2017	-	Resourcesat-2 AWiFS	1
TAIWAN-FLOODS	OCT-2017	-	Resourcesat-2 AWiFS	1
PHILIPPINES-FLOODS	OCT-2017	-	Resourcesat-2 AWiFS	1
VIETNAM-FLOODS	OCT-2017	-	Resourcesat-2 AWiFS	1
KOREA-EARTHQUAKE	NOV-2017	-	Resourcesat-2 A LISS IV FMX	1
Indonesia-Volcanic Eruption	Nov-2017	-	Resourcesat-2 A LISS IV FMX	2
VIETNAM-FLOODS	DEC-2017	-	Resourcesat-2A AWiFS	1

## Emergency requests responded during 2018

Country/Event	Month-Year	Pre-Event data	Post Event data	No. Of Datasets
Philippines Volcanic Eruption	Jan-2018	-	Resourcesat-2 LISS IV FMX	1
Papua New Guinea Volcanic Eruption	Jan-2018	-	Resourcesat-2 LISS IV FMX	1
Taiwan earthquake	Feb-2018	-	Resourcesat-2 A LISS IV FMX	1
Korea earthquake	Feb-2018	-	Resourcesat-2 LISS IV FMX	1
Tonga tropical Cyclone	Feb-2018	-	Resourcesat-2 LISS IV FMX	1
Sri Lanka Floods	May-2018	Resourcesat-2A AWiFS (1)	Resourcesat-2 AWiFS (1) CARTOSAT-2 (3)	5
Vietnam floods	June-2018	-	Resourcesat-2A AWiFS	1
Japan Floods	July-2018	-	Resourcesat-2A AWiFS	2
Japan Floods	July-2018	-	Resourcesat-2 AWiFS	1
Thailand Oil Spill	July-2018	-	Resourcesat-2 AWiFS	1
Vietnam floods	July-2018	-	Resourcesat-2A AWiFS	1
LAOS floods	July-2018	-	Resourcesat-2/2A AWiFS	2
Myanmar Floods	July-2018	-	Resourcesat-2 AWiFS	1
Indonesia Earthquake	Jul-2018	-	Resourcesat-2A L4FMX	1
Indonesia Earthquake	Jul-2018	-	Resourcesat-2A L4FMX	2
Indonesia Earthquake	Jul-2018	-	Cartosat-2	3
Indonesia Earthquake	Aug-2018	-	Resourcesat-2 A LISS IV FMX	2
Thailand Floods	AUG-2018	-	Resourcesat-2A AWiFS	1
Taiwan floods	Aug-2018	-	Resourcesat-2 AWiFS	1

Country/Event	Month-Year	Pre-Event data	Post Event data	No. Of Datasets
Vietnam floods	Aug-2018	-	Resourcesat-2A AWiFS	1
Myanmar Floods	Sep - 2018	-	Resourcesat-2A AWiFS	1
Japan Earthquake	Sep-2018	-	Cartosat-2 Resourcesat-2A LISS IV FMX (2)	10+2
Vietnam Typhoon	Sep-2018	-	Resourcesat-2A AWiFS	1
Philippines Typhoon	Sep-2018	-	Resourcesat-2 AWiFS	1
INDONESIA EARTHQUAKE	Sep-2018	-	Resourcesat-2 LISSIVFMX(7) Resourcesat-2 LISS III (5)	12

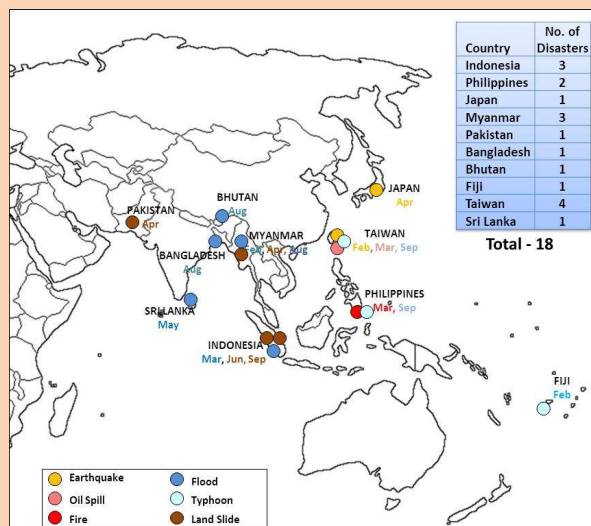
- During 2017, about 22 disasters were monitored using 26 satellite datasets.
- During 2018 (till date) about 21 disasters were Monitored using 56 satellite datasets.

# ISRO Support to Asia Pacific Countries (Sentinel Asia)

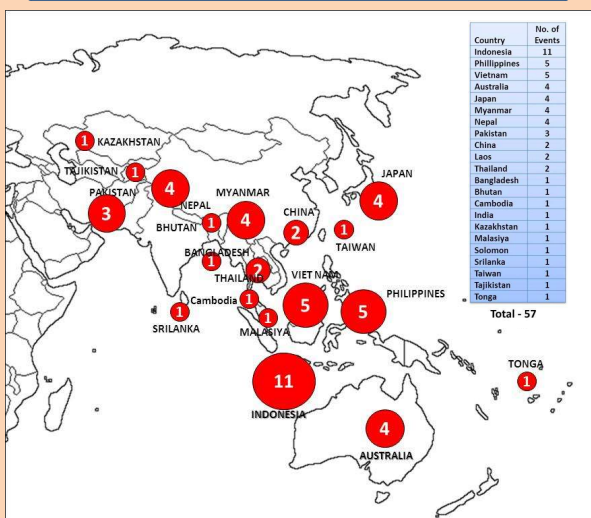
## Background

- Sentinel Asia is a voluntary basis initiative led by the APRSAF (Asia-Pacific Regional Space Agency Forum) to support disaster management activity in the Asia-Pacific region.
- NRSC /ISRO is actively involved in Sentinel Asia (SA) program and supports the Emergency Observation Requests (EOR's) with IRS series of satellite datasets comprising of Resourcesat-1/2 (AWiFS , LISS III and LISS IV), Cartosat-1/2, RISAT-1 etc. on voluntary basis.
- About 67 Emergency observation requests were supported with more than 144 satellite datasets during 2011- 2016.
- Some of the major disasters which ISRO has supported are Nepal Landslides,2015 Taiwan Typhoon,2015, Philippines Typhoon “BOPHA” 2012, Japan Tsunami,2011.
- Appreciation was received from Japan Government for the support extended during JapanTsunami-2011.

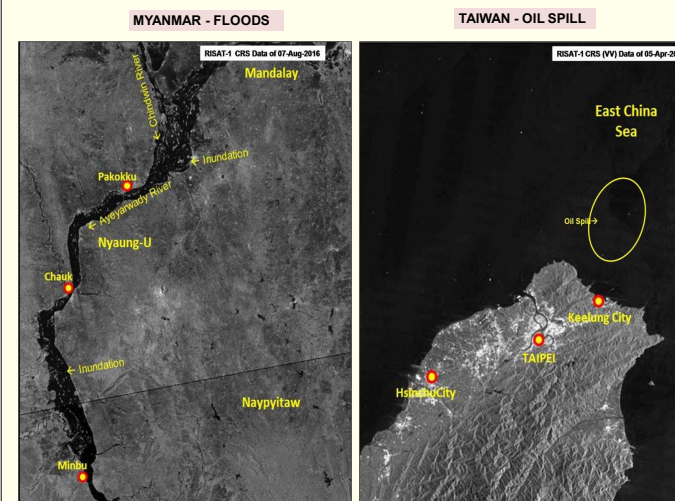
## Emergency requests responded during 2016



## Emergency requests responded during 2008-2015



## Sentinel Asia - 2016



## Sentinel Asia - 2011

### JAPAN-TSUNAMI



# Floods in Kerala – 2018

## Satellite inputs

### Background

Floods were reported in Kerala due to heavy incessant rains during second and third week of August, 2018.

National Remote Sensing Centre (NRSC), ISRO has acquired satellite data from IRS and RADARSAT, SENTINEL Series constellations and also activated International Charter for High resolution satellite data in addition to Sentinel Asia for more satellite observations.

Based on analysis of satellite data, information on flood affected area, damages to road and infrastructure were prepared.

This information was provided to State and Central Government. Departments.

Following images show the inundation status at various locations based on the analysis of satellite data

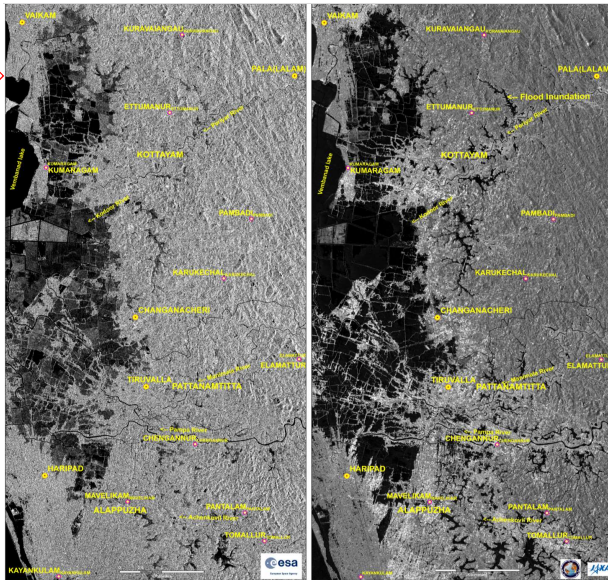


Field Photograph

Kerala State

Pre Data :Sentinel-1 SAR Data  
09-May-2018

Post :ALOS PALSAR-2 Data  
Date:17-Aug-2018

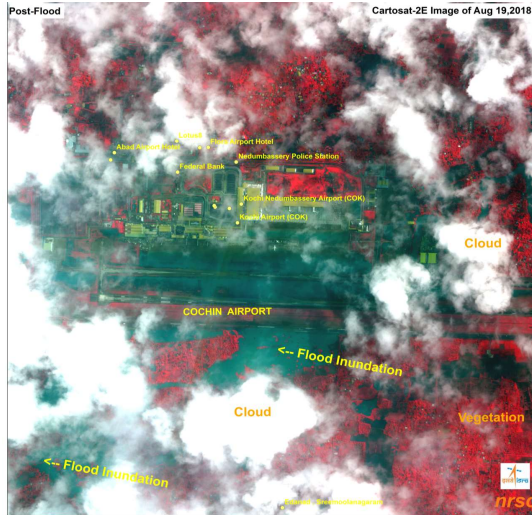


Pre Data :Sentinel-1 SAR Data  
09-May-2018

Post :ALOS PALSAR-2 Data  
Date:17-Aug-2018

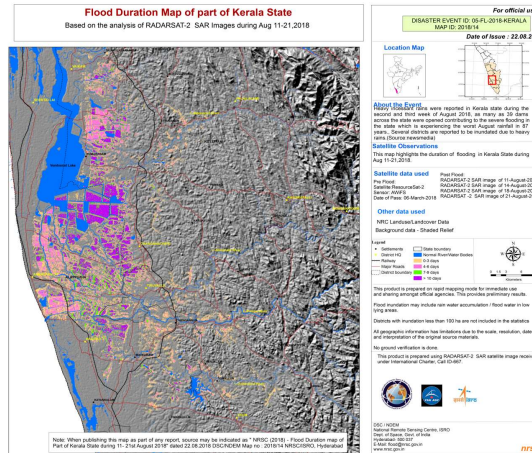
### Detailed View of Airport

Flood Inundation surrounding Cochin Airport



### Flood Duration Map

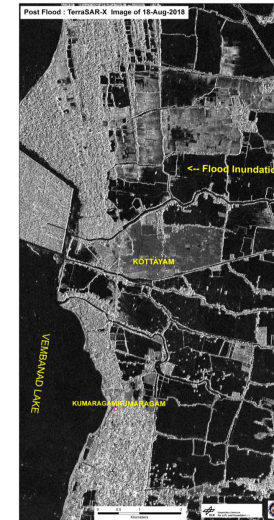
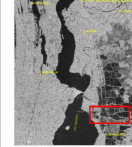
Based on the analysis of Satellite data acquired during Aug 11<sup>th</sup>, 14<sup>th</sup>, 18<sup>th</sup> and 21<sup>st</sup>, 2018



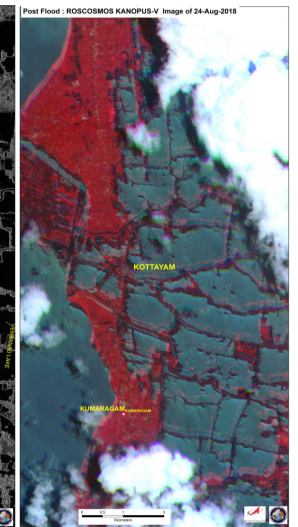
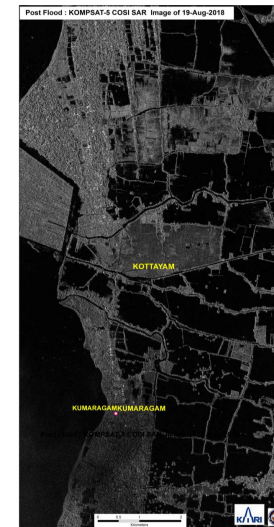
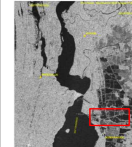
### Detailed View

Satellite Images showing the flood inundation near Vembanad lake surroundings in Kottayam District

Location Map



Location Map



## Floods - 2018

120 districts in 7 states and 1 UT were flood affected



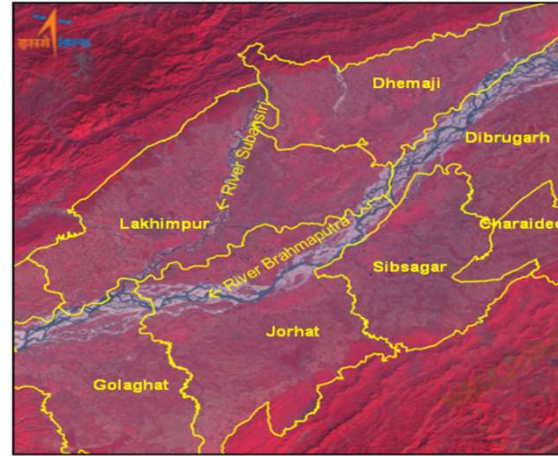
## Status of flood maps

State	June	July	Aug	Sep	Total
Assam	6/6	5/5	3/3	4/4	18/18
Bihar	-/-	2/2	5/5	5/5	12/12
Delhi	-/-	1/1	-/-	-/-	1/1
Kerala	-/-	2/2	18/27		20/29
Manipur	2/2	-/-	-/-	-/-	2/2
Odisha	-/-	2/3	1/1	3/2	2/3
Tripura	1/1	-/-	-/-	-/-	1/1
Uttar Pradesh	-/-	-/-	4/4	5/5	9/9
<b>Total</b>	<b>9/9</b>	<b>12/13</b>	<b>31/40</b>	<b>17/16</b>	<b>69/78</b>

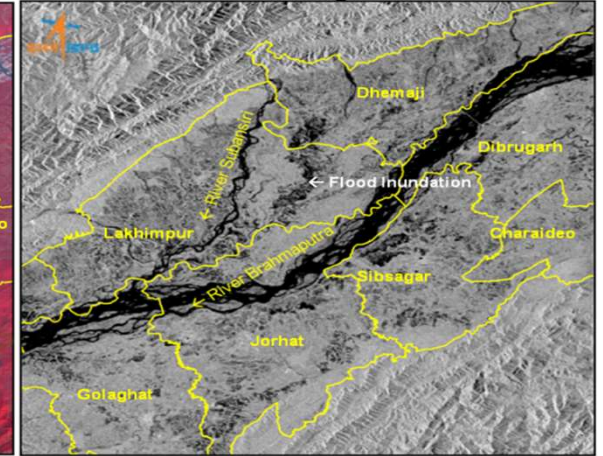
Note : Green color indicates no. of maps and Red color indicates no. of satellite datasets used

## Assam Floods - 2018

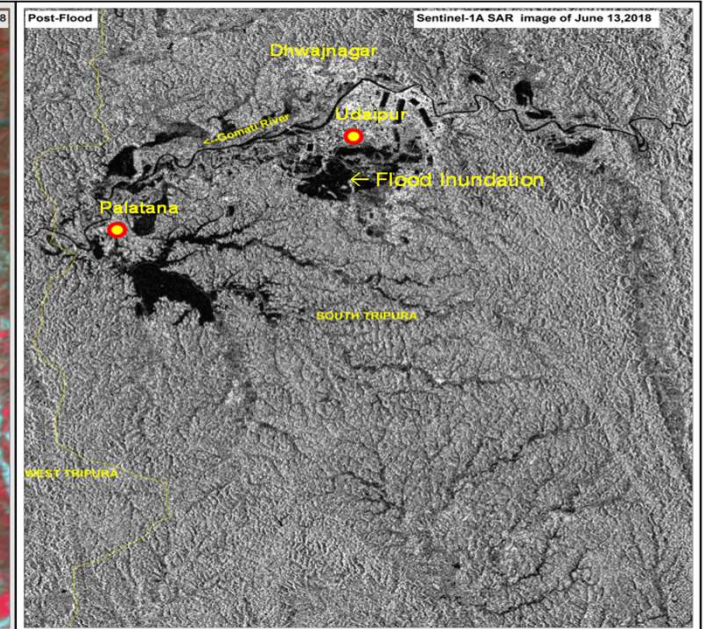
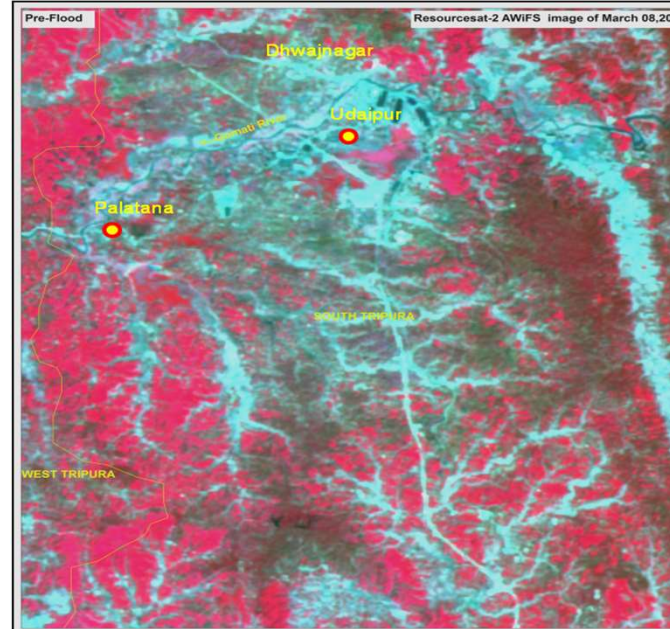
Resourcesat-2 AWiFS image of 12-Feb-2018



RADARSAT-2 SAR image of 07-Jul-2018



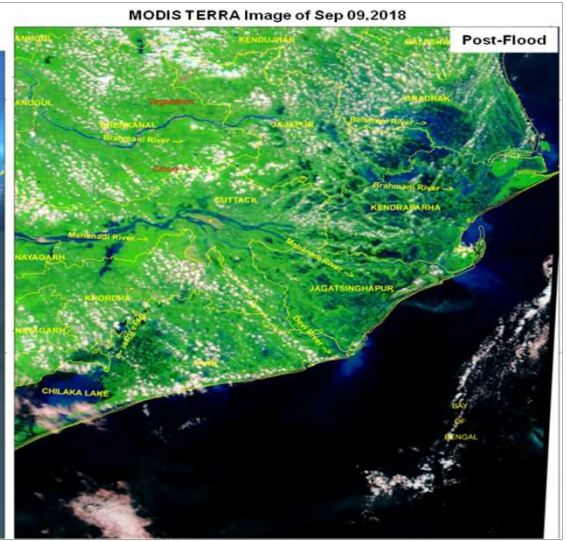
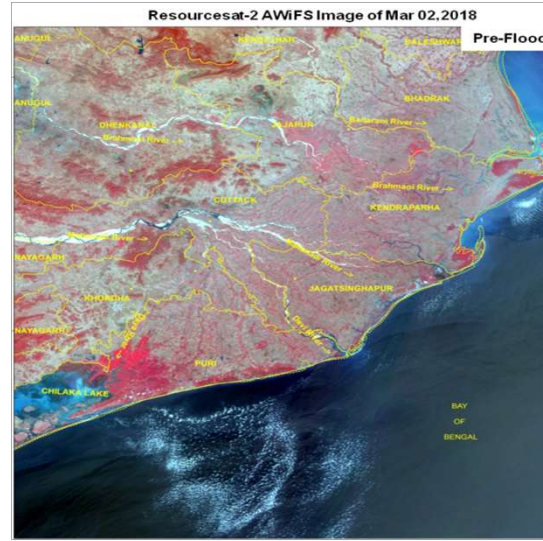
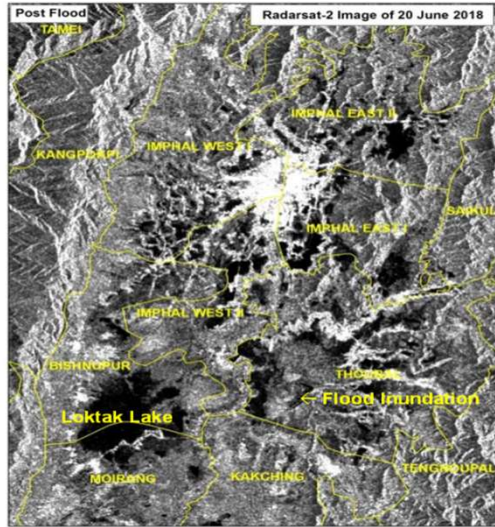
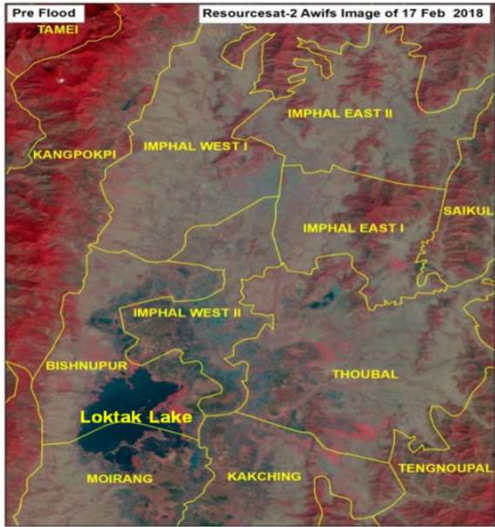
## Tripura Floods - 2018



# Space Inputs for Disaster Management

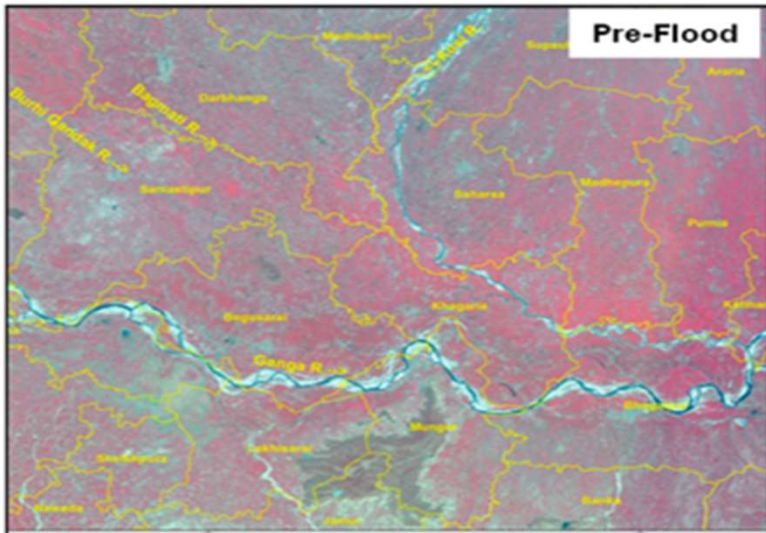
Manipur Floods - 2018

Odisha Floods - 2018



Bihar Floods - 2018

Resourcesat-2 AWiFS Image of Mar 07, 2018



Radarsat-2 Image of Sep 11, 2018

