



Severe Weather Forecasting Demonstration Project (SWFDP) : Bay of Bengal

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**भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT**

Severe Weather Forecasting Demonstration Project (SWFDP)

SWFDP Main Goals

- ✓ Improve Severe Weather Forecasting
- ✓ Improve lead-time of Warnings
- ✓ Improve interaction of NMHSs with users: media, disaster management, civil protection authorities, public

SWFDP Regional Subprojects

- ✓ Southern Africa (ongoing; 16 countries; RSMC Pretoria, RSMC La Réunion)
- ✓ Southwest Pacific Islands (ongoing; 9 Island States; RSMC Wellington, RSMC Fiji)
- ✓ Eastern Africa (ongoing, 6 countries; RSMC Nairobi, RFSC Dar)
- ✓ Southeast Asia (in development, 4 countries)
- ✓ Bay of Bengal (in development, 6 countries)

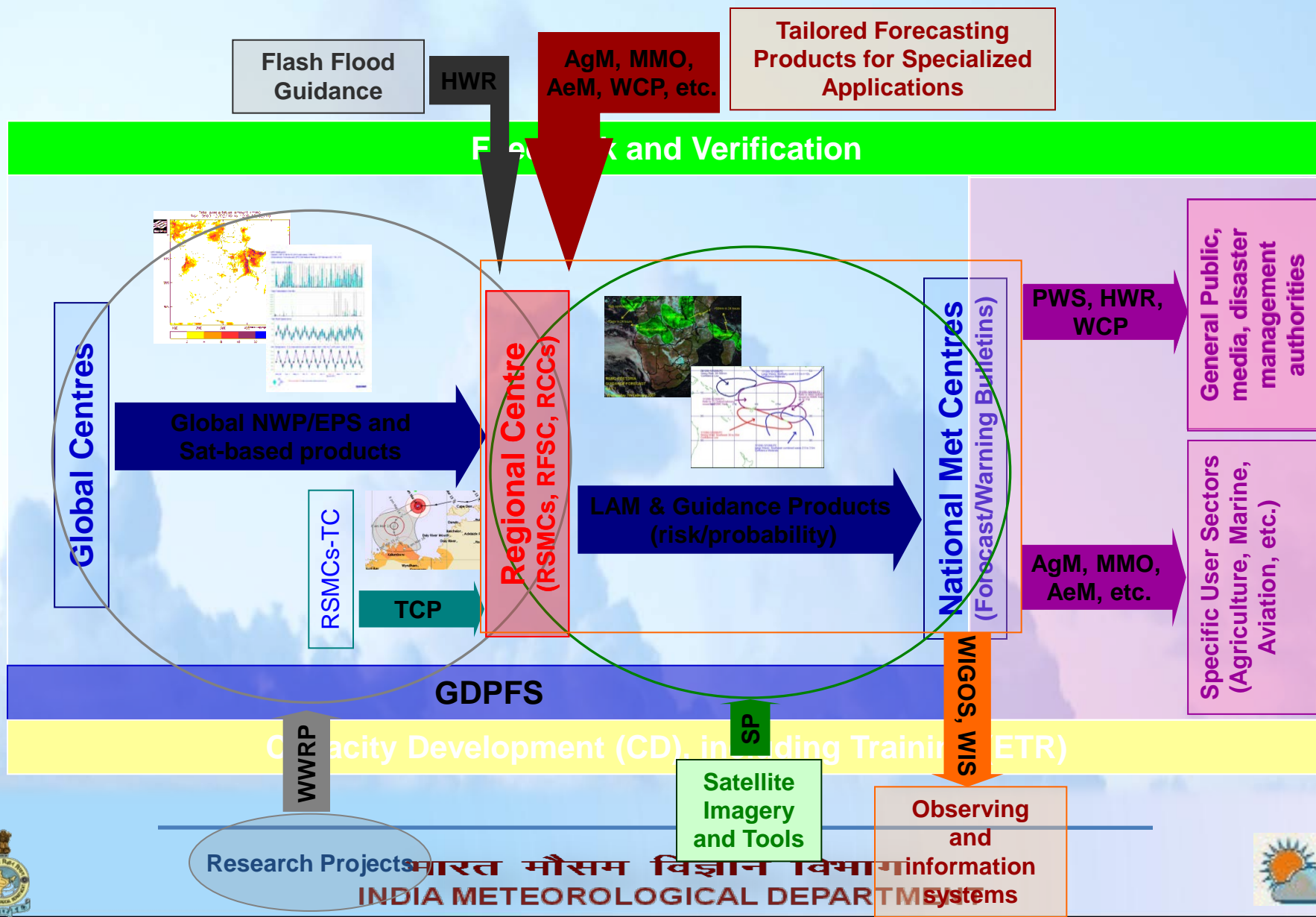


SWFDP Cascading Forecasting Process

- ❖ Global NWP centres to provide available NWP/EPS and sat-based products, including in the form of probabilities, cut to the project window frame;
- ❖ Regional centres to interpret information received from global centres, prepare daily guidance products (out to day-5) for NMCs, run limited-area model to refine products, maintain RSMC Web site, liaise with the participating NMCs;
- ❖ NMCs to issue alerts, advisories, severe weather warnings; to liaise with user communities, and to contribute feedback and evaluation of the project;
- ❖ NMCs have access to all products, and maintained responsibility and authority over national warnings and services.

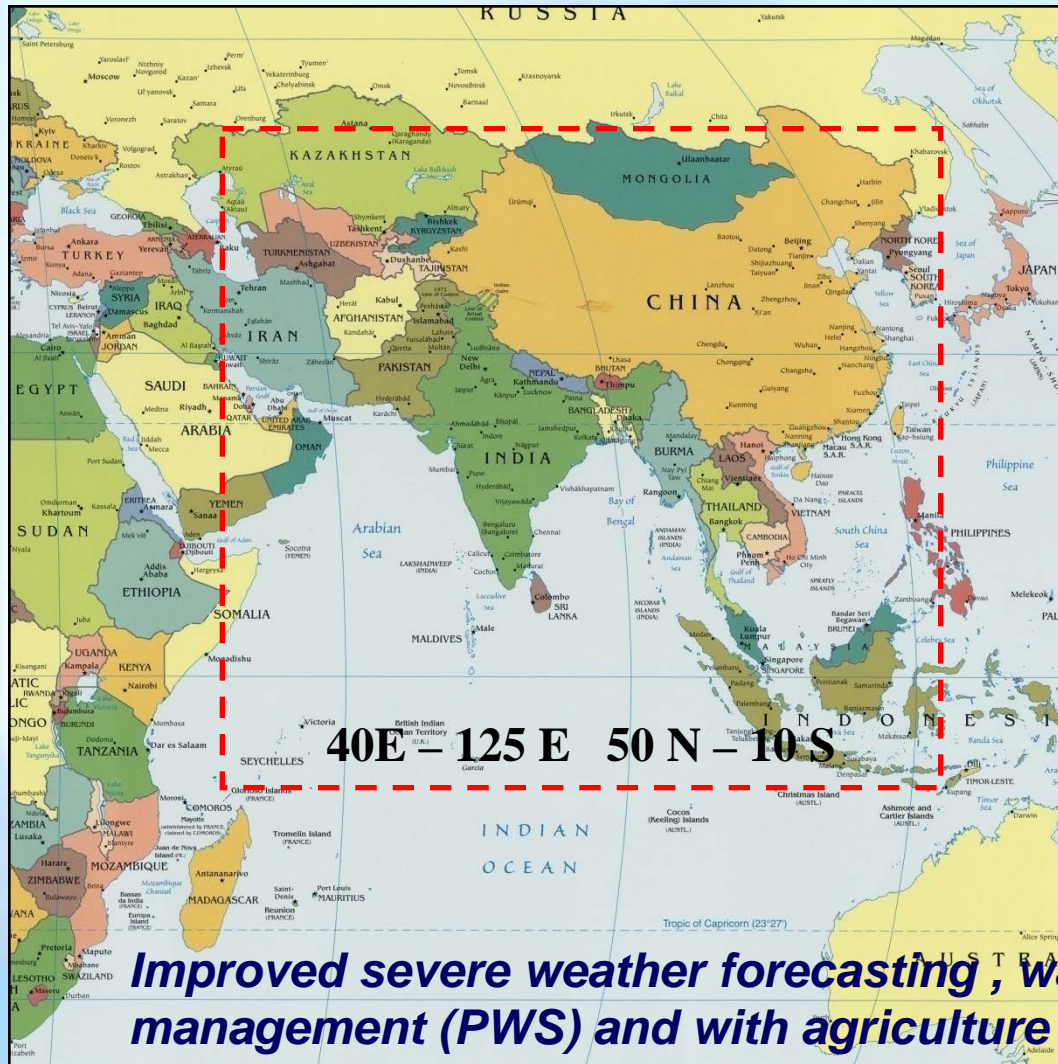


SWFDP: a cross-cutting activity involving multiple Progs, concerning prediction of hydro-meteorological hazards



SWFDP – Bay of Bengal

Focus: Coastal communities and activities



- Bangladesh
- India
- Maldives
- Myanmar
- Sri Lanka
- Thailand
- Bhutan (later)
- Nepal (later)
- Afghanistan (later)
- Pakistan (later)

Severe Weather from TCs,
severe thunderstorms and monsoon:
Heavy precipitation, Strong winds
Large waves / swell, Storm Surge

Improved severe weather forecasting, warning services to disaster management (PWS) and with agriculture



Targeting severe weather events

Recognizing regional dominant and common hazardous weather conditions and associated impacts (such as flooding, drought, high waves and swell etc), SWFDP-BoB project shall focus on the following severe weather events in order of decreasing priority

- ❖ Heavy rain (due to tropical cyclone, thunderstorm, monsoon, etc) /flooding;
- ❖ Strong winds (due to tropical cyclone, thunderstorm, monsoon, etc);
- ❖ Deficit of precipitation/dry spells;
- ❖ High waves / swells;
- ❖ Storm surge;
- ❖ Heat waves and cold waves / frost;
- ❖ Fog;



Targeting severe weather events

- ❖ The following thresholds values shall be used in the RSMC Daily Severe Weather Forecasting Guidance:
- ❖ Heavy rain
 - 50mm
 - 100mm
 - Strong winds
 - 17 knots
 - 34 knots
- ❖ High waves / swells
 - 2.5 m
 - Storm surge
 - 1 m



SWFDP – BOB : Global Centres

The following Global centres will provide NWP/EPS products to regional centre

IMD (NWP, Satmet) , NCMRWF, INCOIS, , IITM

NCEP, USA

ECMWF, UK

UKMO, UK

JMA, Japan



Project Implementation : Gobar Centres

- to provide the other centres with medium-range NWP guidance and EPS output including probabilistic products specially adapted to the concerned severe weather events;
- to tailor products to the requirements of the Regional Centres including the provision of sub-domain and probabilistic products.
- to suggest suitable existing satellite imagery and satellite based products that are helpful in assessing the current meteorological situation, and therefore also assess the quality of global NWP/EPS products;
- to maintain a dedicated Web site to provide satellite, NWP guidance and EPS products;
- to evaluate the efficiency of products dedicated to medium-range severe weather forecasting through the feedback provided by the other centres.



Role and Responsibility of Global centre and RSMC

- *The lead person for each participating Global Centre and RSMC will be responsible for:*
- coordinating all aspects of project implementation and execution at their respective centres;
- evaluating possible data-processing developments (e.g. work required to adjust or tailor NWP products);
- arranging for verification of products from his/her global centre.



RSMC Daily Severe Weather Forecasting Guidance

- Daily Severe Weather Forecasting Guidance should be issued by RSMC New Delhi once per day at 0800UTC to indicate the likelihood of severe weather occurrence. It will have five parts
- a short range (up to 48 h) guidance, including the risk-table, and a medium range (up to 5 days) guidance.
- This guidance contains:
- Synopsis of weather (analysis and forecast);
- the interpretation of deterministic and ensemble NWP products from the Global and Regional Centres;
- severe weather predictions (risk or probability estimates) including tropical cyclone information and storm surge



Project Implementation : National Centre

The responsibilities of the National Meteorological Centres of the NMHSs are:

- to interpret the guidance provided by the global centre and the regional centre;
- to issue special bulletins and warnings as required by the users (hydrological services, Disaster Management Civil Protection Authorities (DMCPA) services, media...) for dissemination to the end users when severe weather is expected;
- to use available nowcasting tools (satellite imagery or satellite based products, radar products) to update warnings;
- to exchange information on warnings between participating NMHSs, and between NMHSs and RSMC;
- to provide regional and global centres with a feedback on the efficiency of the global and regional products;
- to develop a communication strategy and plan with the media and end users to ensure effective response when warnings are issued;
- to establish contacts with DM services and end users prior and during severe weather events;



Project Implementation : National Centre

- to obtain feedback from media, the public and other users as appropriate after the event (opportunity of warning, usefulness of warnings, lead time, degree of impacts)
- to obtain feedback from the disaster risk management agencies on utilization/benefits of warnings issued by NMHSs (under the SWFDP);
- to prepare a compiled report on the severe weather events that contains all the data needed to perform the evaluation of both RSMC Daily Severe Weather Forecasting Guidance relevant to the country, and actual warnings issued by NMHSs;
- to evaluate the warnings;
- to develop training to facilitate improved communication with the users;
- to develop a generic basic set of standard operational procedures between a NMHS and disaster risk management agencies to ensure effective use of the SWFDP products.



regional PWS representative Responsibility

- promote the awareness of the SWFDP-BoB to stakeholders (disaster management centre, agriculture and fisheries sectors, media and the public), including through existing forums and organizations;
- enable and assist staff of participating NMHSs to build effective dialogue with stakeholders for service provision;
- in liaison with stakeholders, identify improvements and changes to products for consideration of the NMHSs' forecasting team;
- advise participating NMHSs on methods of evaluation of public forecasts and warnings and their use by stakeholders.
- **Each of the participating NMHSs are requested to involve their respective national PWS focal point nominated at the invitation of WMO in the SWFDP-BoB to also act as the PWS focal point for the project. Where such a national focal point has not been nominated yet, the NMHSs concerned are invited to do so and inform the Secretariat.**



swfdp-bob WEB PORTAL - home page



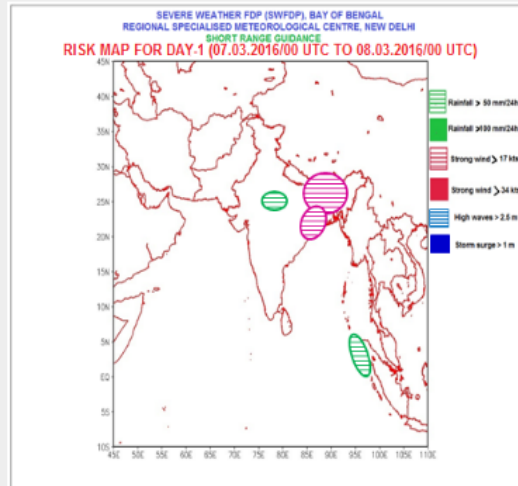
SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP) -BAY OF BENGAL
REGIONAL SPECIALIZED METEOROLOGICAL CENTRE - NEW DELHI



[Home](#) [Logout](#)

[Guidance Prod.](#) [Satellite](#) [Global/Regional NWP Prod.](#) [Global EPS Prod.](#) [Ocean Forecast](#) [BOB-NWS Link](#) [SWFDP-BOB & RSMC Link](#)

[SWFDP-BOB Guidance Products \(1-2 days\) \(click to download the file\)](#)



Disclaimer : The country boundaries shown here do not necessarily correspond to the political boundary.



swfdp-bob WEB PROTAL

Available links:

SATELLITE:

INSAT-3D imageries

QPE products

INSAT-3D Nowcast products

SCOPE Nowcast products

NWP:

IMD

NCMRWF

JMA

NCEP

ECMWF

IITM

UKMO

EPS:

NGEFS WIND

NGEFS RAIN PROB

NGEFS EPS GRAMS

OCEAN FORECASTS:

INCOIS

BOB-NMHSs:

INDIA

BANGLADESH

MYANMAR

MALDIVES

SRI LANKA

THAILAND



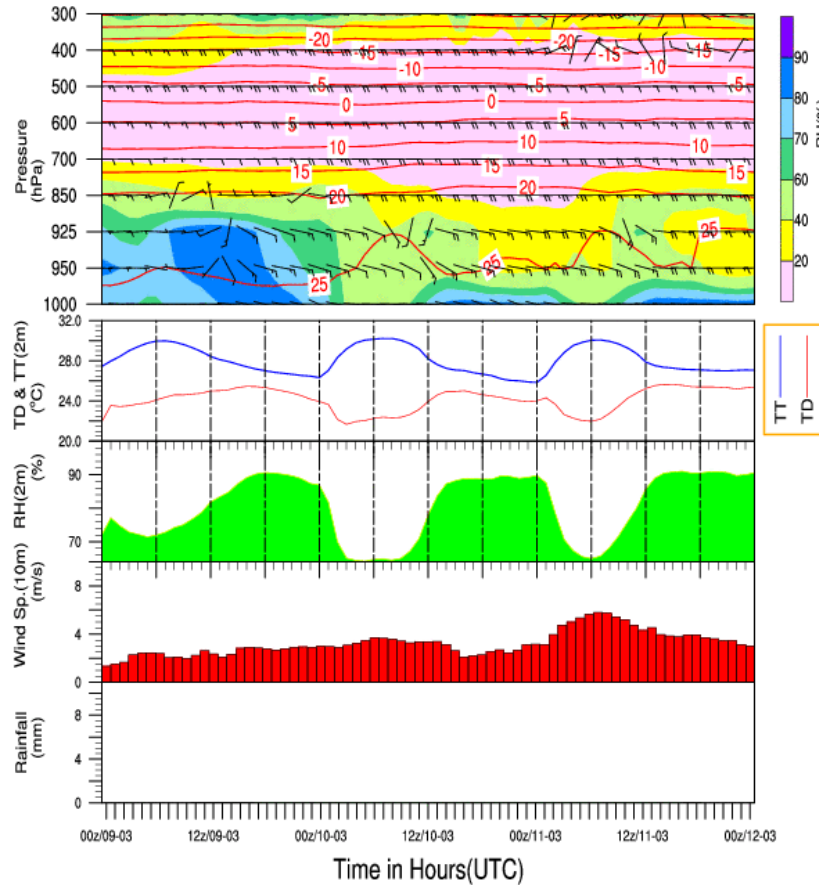
LINK TO IMD-WRF Meteograms



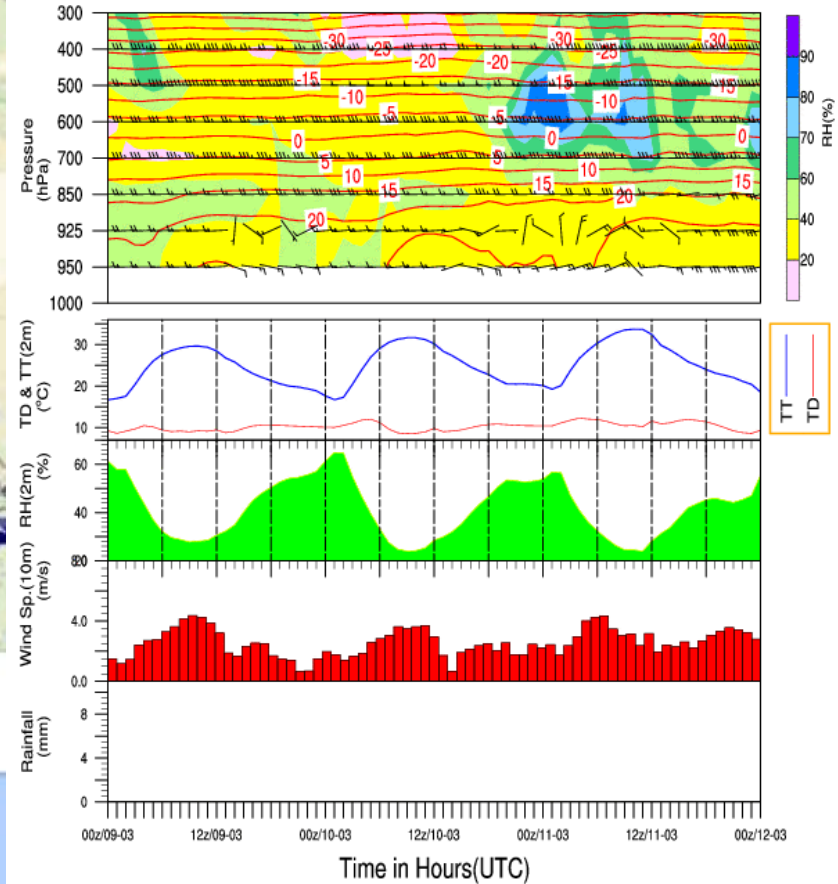
WRF Location Specific Forecast for Airports

Map Satellite

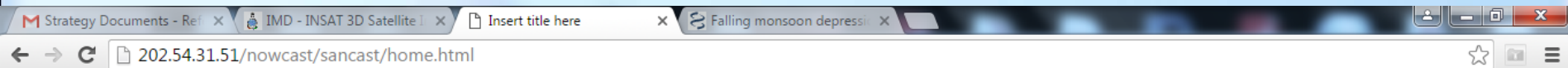
PORTBLAIR 00UTC/09-03-2016



PALAM 00UTC/09-03-2016



LINK TO SATELLITE BASED NOWCAST PRODUCTS

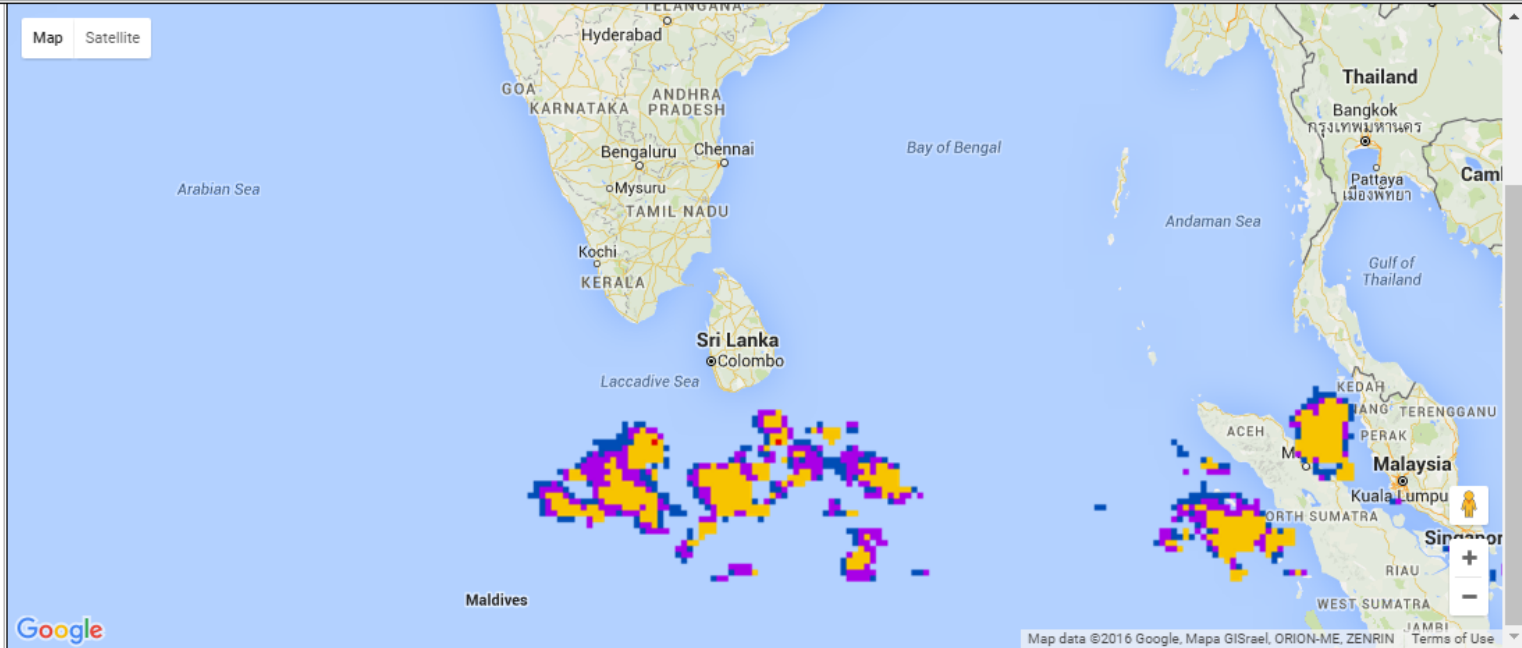


INDIA METEOROLOGICAL DEPARTMENT (Ministry of Earth Sciences, Govt of India) **SATELLITE TOOL**



Legends
CTBT (Celsius)

| | |
|--|--------------------|
| | > -30 °C |
| | -30 °C to > -40 °C |
| | -40 °C to > -50 °C |
| | -50 °C to > -70 °C |
| | <= -70 °C |



Designed By Satellite Application Unit



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Link to SCOPE-NOWCAST page

sigma.cptec.inpe.br/scope/

SCOPE - Nowcasting

Co-Ordinated Processing of Environmental Satellite Data for Nowcasting

INPE NASA NOAA WMO

175.651 6.180

Products [Read More](#)

Current rain rates (mm/h)

Date/Hour: 2016-03-09 - 08:00:00

Opacity:

Animation:

Label:

0.25 0.5 1 2 3 4 5 7 10 12 15 20 mm

Nowcasting [Read More](#)

60min lead time(mm/h)

120min lead time(mm/h)

180min lead time(mm/h)

Accumulated Precipitation (mm) [Read More](#)

Last 24 hours

Last 48 hours

Last 72 hours

Additional Layers [Read More](#)

Countries

States

Distance calculator

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<http://sigma.cptec.inpe.br/scope/>



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INCOIS-OCEAN FORECAST PRODUCTS

✓ **Linked to SWFDP-BOB web page**

The screenshot displays the INCOIS web portal interface. At the top, the header reads "INCOIS - Indian National Centre for Ocean Information Services (An Autonomous Body under the Ministry of Earth Sciences, Govt. of India)". The navigation menu includes "Organisation", "Services", "Data & Information", "Ocean Observations", "Modelling & Research", "Satellite Oceanography", and "ITCOcean". The main content area is titled "Ocean State Forecast" and features a breadcrumb trail: "Home > Services > Ocean State Forecast > Regional Forecast > swh". Below this, there are tabs for "D20", "Mixed Layer Depth", "SST", "Surface Currents", "Wave", "Wave Period", "Swell", "Swell Period", and "Wind". The "Wave" tab is selected, showing three forecast maps for the Bay of Bengal region (70°E to 102°E, 0°N to 22°N).

- SEA SURFACE CURRENT (cm/s) IN THE BAY OF BENGAL**
Forecast for : 0530IST of 28-04-2016 Issued on : 26-04-2016
The map shows current vectors and a color scale from 0 to 100 cm/s.
- Significant Wave height (m) and Direction (°)**
Forecast for 05:30 IST 09 Mar 2016
The map shows wave height vectors and a color scale from 0.0 to 7.0 m.
- TamiNadu Mean Wave Period(s)**
Forecast for 14:30 IST 28 Apr 2016
The map shows wave period contours and a color scale from 0 to 12 seconds.

At the bottom of the page, there is a "Terms & Conditions | Disclaimer" link and a copyright notice: "Copy Right © ESSO - Indian National Centre for Ocean Information Services (INCOIS), Govt. of India. All Rights Reserved."

**High Wave Alerts,
Ocean State forecasts: Wave height, wave period & wind forecasts
Coastal forecasts
BOB SST, D20, Sea surface current etc.**

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LINKS TO NMHS

www.meteorology.gov.mv

Maldives Meteorological Service
Republic of Maldives

Public Aviation Climate Earthquakes Awareness Media About us

Maldives

Male 32°C fine

Provide accurate, timely and reliable meteorological information to minimize the impact on life and property while supporting sustainable socio-economic development of the Maldives

| | | | | |
|------|------------|---------|---------------|------|
| Male | Hanimadhoo | Kahdhoo | Kaadehdhoo | Gan |
| 32°C | 32°C | 32°C | 32°C | 31°C |
| fine | fine | fine | partly cloudy | fine |

www.bmd.gov.bd/?/home/

Bangladesh

Bangladesh Meteorological Department

Home About Us Service Contact Us AWS Data WB Project Phone

Today's Condition Sylhet
MAX 22.8°C / MIN 22.5°C
Sunrise: 6:05 AM
Sunset: 6:00 PM

Forecast
Warning
NWP Products
Cyclone Page
Monsoon
Agromet
Seismology

Dhaka last 7 Days Temperature

Director (Current Charge)
Details
Press Release

www.meteo.gov.lk/index.php?lang=en

Sri Lanka

Department of Meteorology

Weather / Climate Services
Warnings
Weather
Seasonal Forecast
Climate
Maritime Forecast

Information Services
Astronomy
Department Internal Examinations - 2016
New Education
Procurement Notice (Tenders)
Recruitment
Services
Weather Summary
New Research Journal
Agrometeorology Information

Weather Data / වාතයේ දත්ත / වාතයේ දත්ත

2016.03.11

Sun Rise & Set - 06:19 / 18:22
Moon Rise & Set - 08:08 / 20:41

Today Video Report
20160309

Latest Cloud Images

www.tmd.go.th/en/

Thailand

MUKDAHAN
11-03-2016 13:00
26.8°C
Overcast Sky
Wind Sp 5.6 km/hr
Dir 060
Rain 0.0 mm.

Weather Warning
Summer Thunderstorm in Upper Thailand
No. 10 Time Issued March 11, 2016

The intense high pressure covers the North, the Northeast and the South China Sea where hot to very hot spells occurs. Summer thunderstorms will be likely with gusty winds and possible hail over the North, the Northeast, the East and the Central lasting 12 March. The areas includes Phetchabun, Chaiyaphom, Khon Kaen, Nakhon Ratchasima, Buri Ram, Surin, Amnat Charoen, Si Sa Ket, Ubon Ratchathani, Lop Buri, Saraburi, Chonburi, Rayong, Chantaburi and Trat. A decrease in temperature by 2-4 °C will follow along the North and the Northeast. People should beware of the severe weather and keep off unsecured buildings. This advisory is in effect on 11 March 2016 at 11:00 a.m. The next... more

Thailand Weather Smart Device Applications
App Store
Google play
Daily weather forecast

Magnitude 6.1
Origin : Tonga Islands
Date-time (Local) : March 08, 12:36
Date-time (UTC) : March 08, 05:36
Latitude, Longitude : -15.19 - 173.56



SOP for preparation of regional forecast guidance products

➤ **SOP** for preparation of regional forecast guidance products prepared.

➤ **Nowcast** → mainly based on Meso scale products

➤ **Day-1 f/c** → mainly based on Synoptic obs

➤ **Day-2-5 f/c** → mainly based on NWP guidance

➤ **Training & Testing** during Mar-April 2016

Consensus

L5

L4
NWP – Ana
& F/C fields

L3

Meso –RADAR,
AWS, T- ϕ gram

L2

SYNOPTIC – MSLP,
10m & UA winds

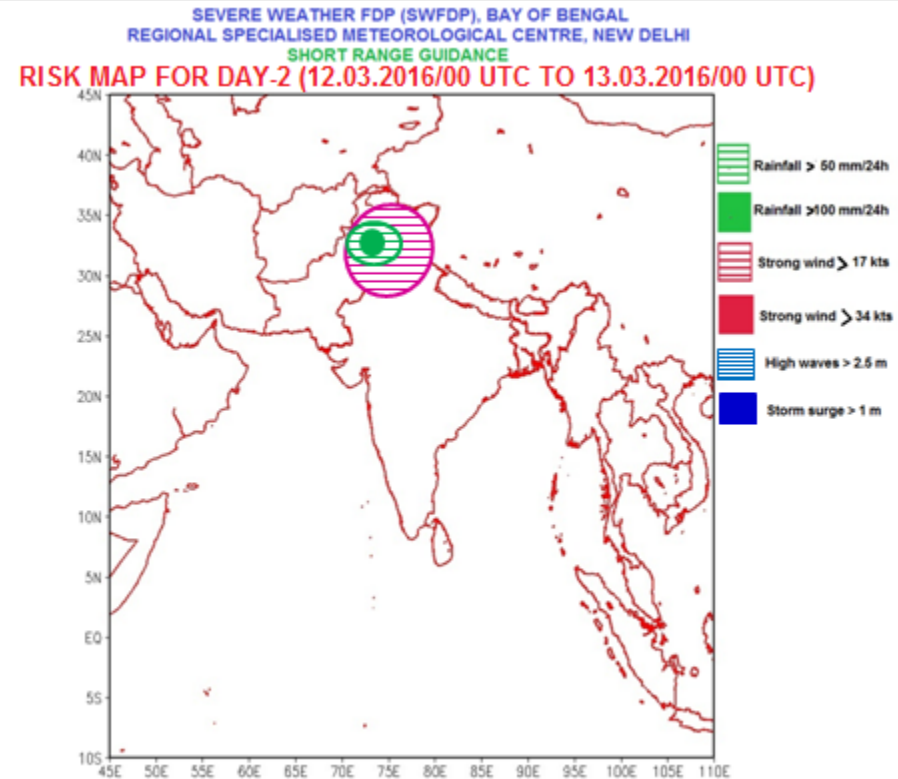
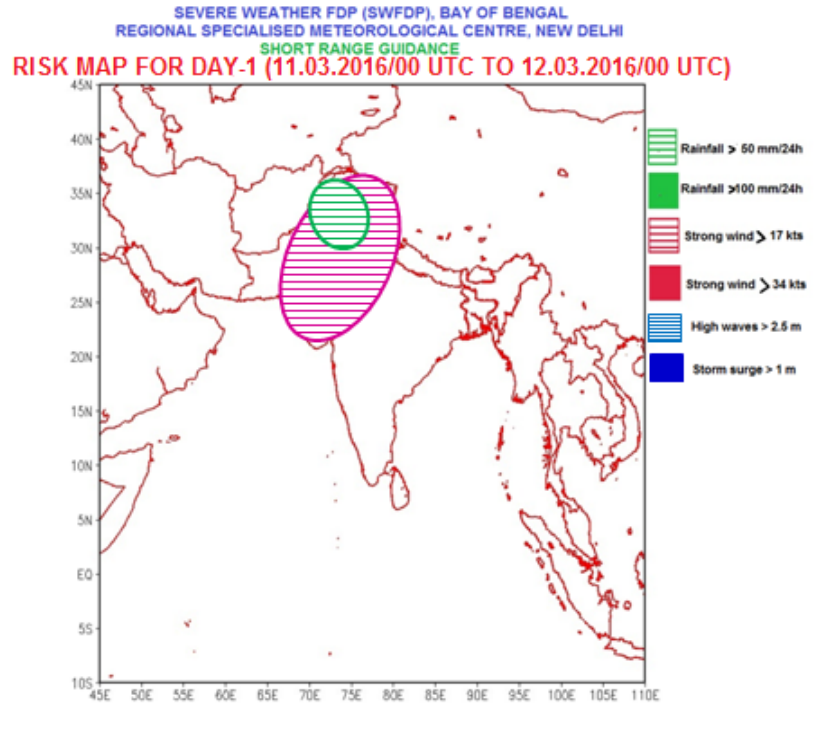
L1

CTT < -40°C

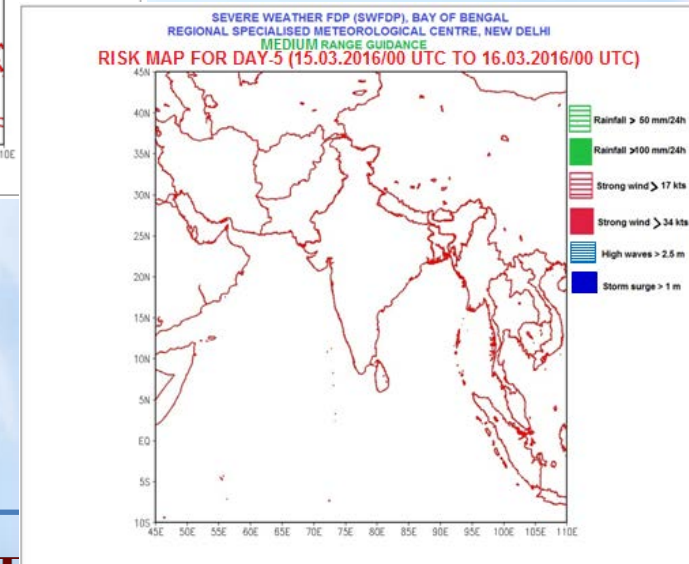
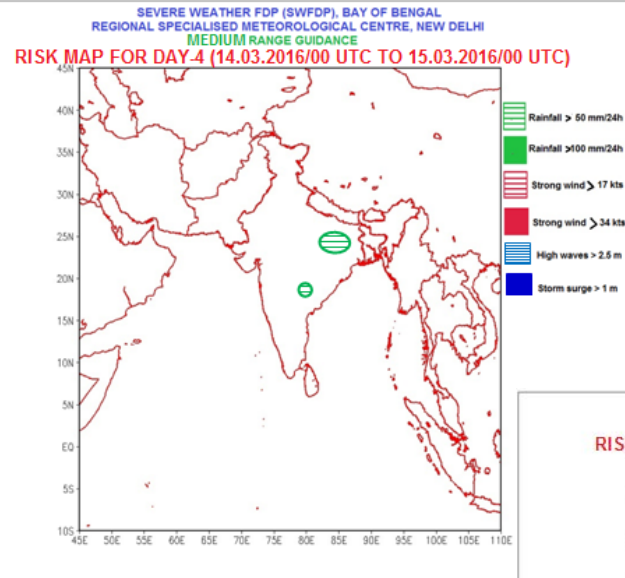
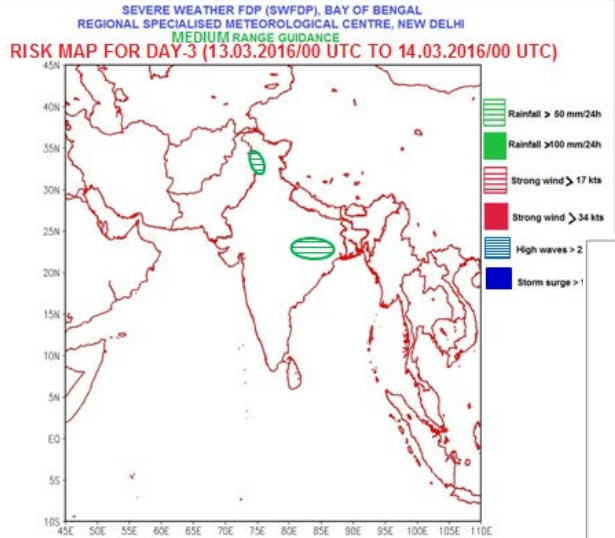
Sat - Vis / IR imagery



Sample Short range FORECAST guidance : Day-1 & day-2



SAMPLE MEDIUM range FORECAST guidance : Day-3, DAY-4 & day-5



Initiation and training

- **1st training workshop on Severe Weather Forecasting and Warning Services (GDPFS/PWS) was held in Macao, China during 8-19 April, 2013 - jointly organised for SWFDP-BoB and SWFDP- Southeast Asia.**
- **2nd training was organised in Bangkok, Thailand during 14-19 September, 2015.**
- **Further training programmes will be planned as and when suggested by WMO**



Thank you



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