Bangladesh Meteorological Department

User List of Meteorological Service in Bangladesh

Sectors		Organizations
01. Agriculture and Forestry		
	1)	IRRI
	2)	BRRI
	3)	BARI
	4)	BSRI
	5)	WRC
	6)	BJRI
	7)	BARC
	8)	Swisscontact
	9)	Katalyst
	10)	BADC
	11)	BRAC-Horticulture
	12)	ACI Input
	13)	Ministry of Agriculture

01. Agriculture and Forestry	14)	Department of Agricultural Extension
	15)	Bangladesh Institute of Nuclear Agriculture (BINA)
	16)	Bangladesh Tea Research Institute (BTRI)
	17)	International Maize and Wheat Improvement Center (CIMMYT)
	18)	Food and Agriculture Organization (FAO), UN
B) Animal Farming	1)	Bangladesh Dairy Farm and Cattle farm Association
	2)	Bengal Meat
	3)	Kazi Farms
	4)	Ministry of fisheries and livestock
	5)	Department of Animal Breeding and Genetics of BAU, Mymensingh
	6)	Department of Animal Breeding and Genetics of Sher e bangla, Dhaka
	7)	Bangladesh Livestock Research Institute (BLRI)

C) Forest and Related Services	1)	Arannayk Foundation
	2)	Forestry Department, CU
	3)	Forestry Department, RU
	4)	Forestry Department, KU
	5)	SPARSO
	6)	Ministry of environment & forest (Climate change cell)
	7)	Bngladesh Forest Department
	8)	Department of Environment
	9)	Bangladesh Forest Research Institute (BFRI)
	10)	Geological Survey of Bangladesh (GSB)
	11)	SAARC Meteorological Research Centre (SMRC)

02. Fishing	1)	Bangladesh Shrimp and Fish Foundation
	2)	Department of fisheries, DU
	3)	Ministry of fisheries and livestock
	4)	Raipur Fish hatchery and training center
	5)	World fish center
	6)	Bangladesh fisheries research institute (BFRI)
	7)	Bangladesh Marine Fisheries Academy
	8)	Department of Fisheries (DoF)
	9)	Bangladesh Fisheries Research Institute

03. Mining and Quarrying	1)	Ministry of energy and mineral resources
	2)	Bangladesh Oil, Gas and Mineral Corporation
	3)	Barapukuria Coal mining company Ltd.
	4)	Moddhyapara granite mining company ltd.

04. Manufacturing	1)	Leather and Footwear
Large & Medium Scale	2)	Food and Beverage
	3)	Light engineering
	4)	Pharmaceuticals
	5)	RMG
	6)	Jute textiles
	7)	Shipbuilding
	8)	Textile
	9)	Agro Processing
	10)	Bangladesh Council of Scientific and Industrial Research (BCSIR)
	11)	Fertilizer Companies
	12)	Steel Manufacturers
	13)	Bangladesh Chemical Industries Corporation (BCIC)
	14)	Cement Manufacturer Companies

05. Electricity, Gas, Water Supply		
		Center for Natural Resource Studies (CNRS)
(I) Electricity	1)	DESCO
	2)	DPDC
	3)	EGCB
	4)	PGCB
	5)	DESA
	6)	West Zone Power Distribution Company Ltd
		BPDB
(II) Gas	1)	Shevron
	2)	Titas Gas
	3)	Linde industrial gases
	4)	Regent Power Ltd.
(III) Water	1)	DWASA
	2)	Alpine Fresh Water System
	3)	Rajshashi Water Supply
	4)	BWDB
	5)	Water Resources Planning Organization (WARPO)
	6)	Institute of Water Modelling (IWM)

06. Construction	1)	Bangladesh Association of Construction Industry (BACI)
	2)	Spectra Group
	3)	Concord
	4)	Abdul Monem Ltd.
	5)	Rupayan
	6)	Lafarge-Holcim
	7)	CEMEX cement
	8)	Eastern Cement Industry Ltd.
	9)	Project Builders
	10)	Brothers Group
	11)	Energypac
	12)	Local Government Engineering Department (LGED)

07. Wholesale and Retail		
08. Hotels & Restaurants		
	1)	Parjatan Hotel(s)
	2)	1 Resort
	3)	1 hotel from dhaka
	4)	2 hotels from Cox's Bazar
	5)	1 hotel from Sylhet/Srimangal
	6)	Restaurants from Dhaka, Chittagong, Barishal (Kuakata), Mawa

09. Transport, Storage & Communication		
A) Land Transport	1)	BRTA
	2)	Hanif Bus Service
	3)	Shohag Bus Service
	4)	Shyamoli Bus Service
	5)	Bangladesh Railway
	6)	Roads and Highways Department(RHD)
B) Water Transport	1)	BIWTA
	2)	Ministry of Shipping

C) Aviation	1)	Biman Bangladesh
	2)	GMG Airlines
	3)	Novo Air
	4)	Regent Airways
	5)	United Airways
	6)	US Bangla
	7)	Civil Aviation Authority, Bangladesh (CAAB)

D) Support Transport Services, Storage	1)	GP
E) Post and Tele Communications	2)	BL
	3)	Airtel
	4)	Robi
	5)	Teletalk
	6)	BTRC
	7)	BTCL
	8)	Post and Telecommunications Division
	9)	1 Courier company

10. Financial Intermediations	1)	Banks
	2)	Insurance Companies
	3)	Investment corporations Bangladesh (ICB)
	4)	United Leasing Company
	5)	IDLC
	6)	Asset Management
	7)	Security and Exchange Commission (SEC)
	8)	Dhaka Stock Exchange
	9)	Chittagong Stock Exchange
	10)	Credit Rating (CLS)

Asian Development Bank (ADB)

11. Real Estate, Renting and Business Activities	1)	Amin Mohammad
	2)	Sheltech
	3)	Concord
	4)	Dommino
	5)	Eastern Housing
	6)	Navana
	7)	Bashundhara
	8)	Artisan Group
	9)	Avenue Builders
	10)	Bangladesh Development Group
	11)	Anwar Landmarks
	12)	ABC Real estate ltd
	13)	Advance Development Technologies
	14)	Alliance Properties

12. Public Administration & Defense	1)	Police
	2)	Ansar
	3)	Ministry of Public Administration
	4)	BPATC
	5)	Army
	6)	Navy
	7)	Air force
	8)	BGB
	9)	Ministry of Defence
	10)	President's Office
	11)	Prime Minister's Office
	12)	District Comissioner (DC) Offices
	13)	Coast Guard Bangladesh
	14)	Bangladesh Fire Service and Civil Defence (FSCD)

13. Education	1)	Ministry of Education
	2)	Ministry of Primary and Mass Education
	3)	Environment related departments of Universities
	4)	School and Colleges outside Dhaka
	5)	BRAC Education Program
	6)	Save the Children
	7)	CARE
	8)	World Vision
	9)	Concern Worldwide
	10)	Concern Universal

14. Health and Social Works	1)	Ministry of Health & Family Welfare (MoHFW)
	2)	Department of Public Health Engineering (DPHE)
(I) Hospitals	1)	United Hospital
	2)	Square
	3)	City
	4)	Ibne Sina
	5)	Popular
	6)	Community Clinic
(II) NGO	1)	BRAC Health Program
	2)	World Vision
	3)	CARE
	4)	PLAN International
	5)	WHO
	6)	UNICEF

(III) Pharmaceuticals	1)	Beximco
	2)	Square
	3)	ACI
	4)	Acme
	5)	Incepta
	6)	Orion
15. Community, Social and Personal Services	1)	Bangladesh Youth Leadership C (BYLC)
	2)	NYF, UNFPA
	3)	Bangladesh Canadian Community Service
	4)	Bangladesh Center and Community Services
	5)	Community Legal Services (CLS), Bangladesh
	6)	Bangladesh American Community Development and Youth Services
	7)	Community Clinics

16. Other	Soil Resource Development Institute (SRDI)
	Institute of Epidemiology, Disease Control and Research (IEDCR)
	International Centre for Diarrhoeal Disease Research, Bangladesh (icddrb)
	Survey of Bangladesh (SOB)
	Center for Environmental and Geographic Information Services (CEGIS)
	BETS Consulting Services Ltd.
	Institute of Water and Flood Management, BUET (IWFM)
	Bangladesh Institute of Development Studies (BIDS)
	Asian Disaster Preparedness Center (ADPC)
	Atomic Energy Research Establishment (AERE)
	Bangladesh Social Science Research Council (BSSRC)
	Bangladesh Atomic Energy Commission (BAEC)
	Bangladesh Centre for Advanced Studies (BCAS)
	Rural Development Academy(RDA)
	United Nations Development Programme (UNDP)
	United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
	Chittagong Development Authority (CDA)
	Bangladesh Television
	Bangladesh Betar
	Bangladesh Sangbad Sangstha(BSS)
	Print Medias
	Private Television Channels
	FM Radio Stations
	Cyclone Preparedness Program (CPP)
	Department of Disaster Management (DDM)
	Bangladesh Red Crescent Society

Table 3.1 Major hazards that affect Bangladesh and the national agency mandated to issue warnings

Hazard Rank	Hazard	National Agency for Mandate	Hazard Type	Remarks
1	Cyclones	BMD	I	
2	Storm surge	BMD	I	
3	Thunderstorm (Nor'wester), Lightning	BMD	I	
4	Tornado	BMD	I	
5	Hailstorm	BMD	I	
6	River flooding	FFWC (BWDB), BMD	III	
7	Flash flood	FFWC (BWDB), BMD	III	
8	Coastal flooding (due to storm surge/tsunami)	BMD	I	
9	Drought	BMD, DAE	II	
10	Heat Wave	BMD	I	
11	Cold Wave	BMD	I	

Table 3.1 Major hazards that affect Bangladesh and the national agency mandated to issue warnings

Hazard Rank	Hazard	National Agency for Mandate	Hazard Type	Remarks
12	Dense Fog	BMD	I	
13	Landslide/Mudslide (due to heavy rain)	BMD	I	
14	Earthquake	BMD		BMD monitors earthquakes and issues reports to government and public
15	Tsunami	BMD	III	Tsunami Watch Information (TWI) Bulletins are received from PTWC and JMA
16	Turbulance/Icing	BMD	I	
17	Strong winds	BMD	I	
18	Wind driven surge	BMD	I	
19	Air pollution	DoE	II	
20	Waterborne hazards	DOHE	II	

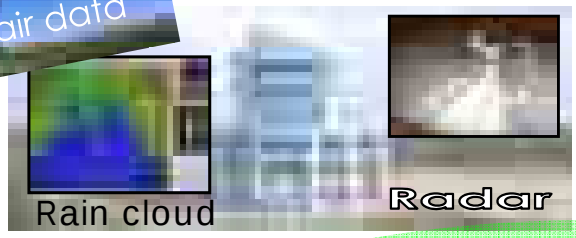
WMO: Cyclone Classification for Bay Bengal

Types	Bar Depth (hpa)	No. of closed isobars	Wind Speed	
			Kts	Km/h
Low	—	1 or not	<17	<31
Well marked low	—	1-2	17-21	31-40
Depression	>3.5	4-7	22-27	41-51
Deep Depression	>8.5	8-9	28-33	52-61
Cyclone Storm	>10	10-11	34-47	62-88
Severe Cyclone Storm	>12	12-15	48-63	89-117
Very Severe Cyclone Storm	>18	16-20	64-119	118-219
Supper Cyclone	>20	>20	>119	>219

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Storm Warning Centre

from Sky



from Space

Satellite

Cloud image

from Ground

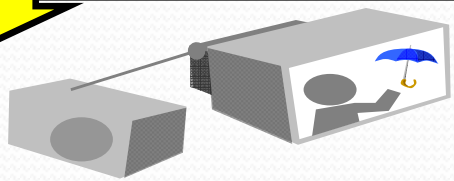
from Overseas

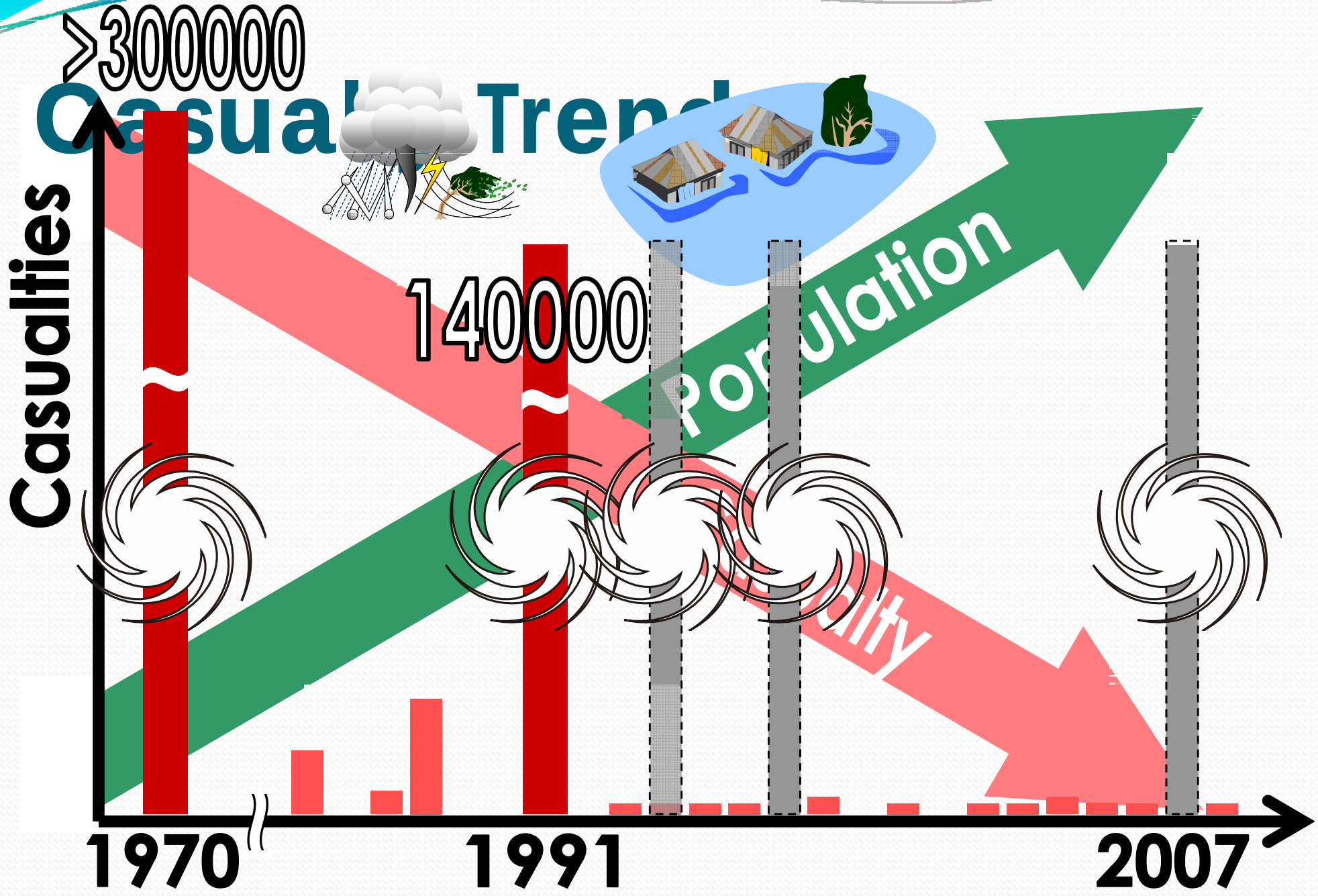
Data Collection

Dissemination

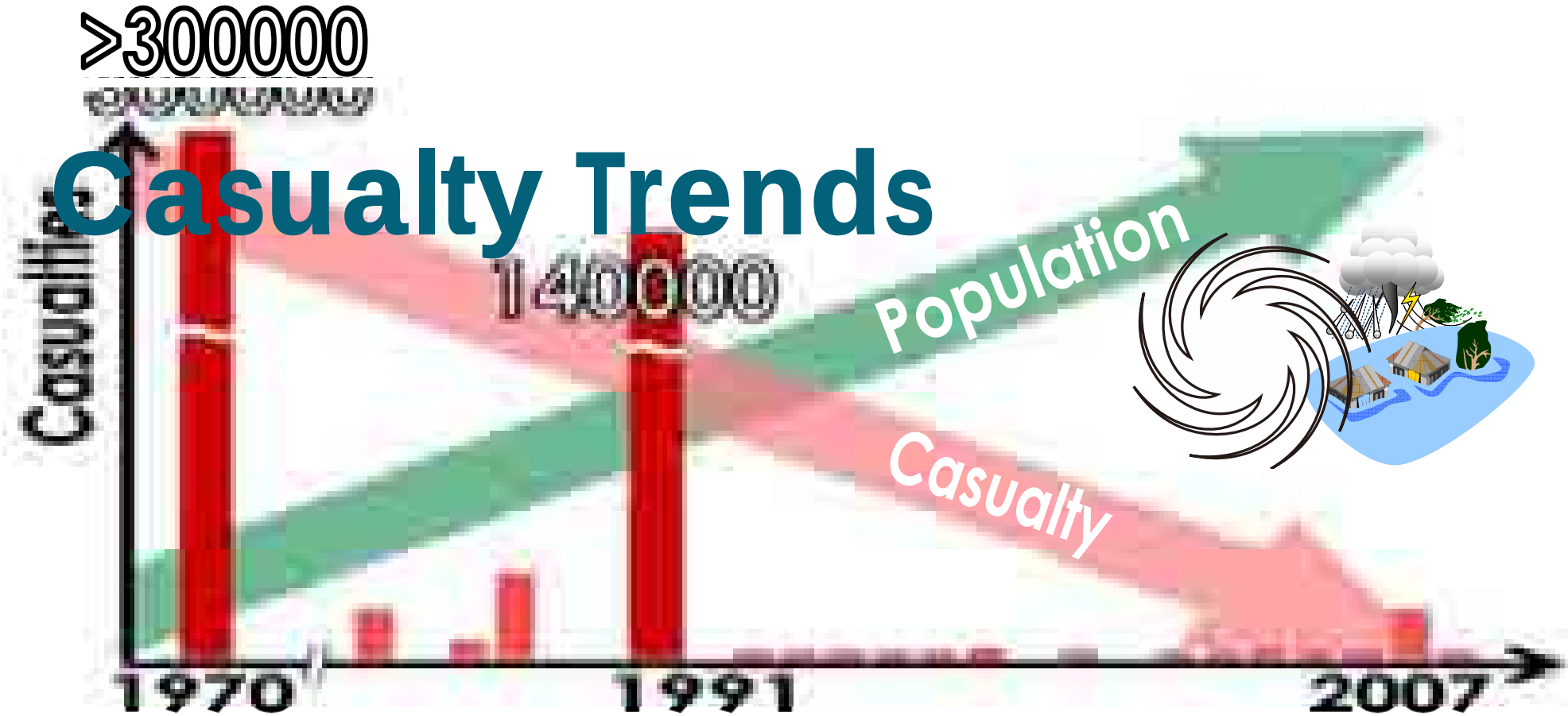
Television. Radio. News paper.

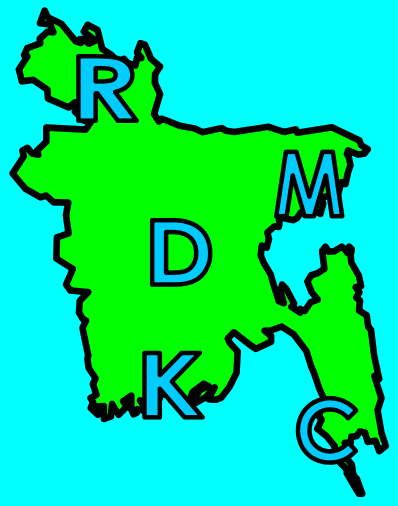
Telephone. Fax. Web page.

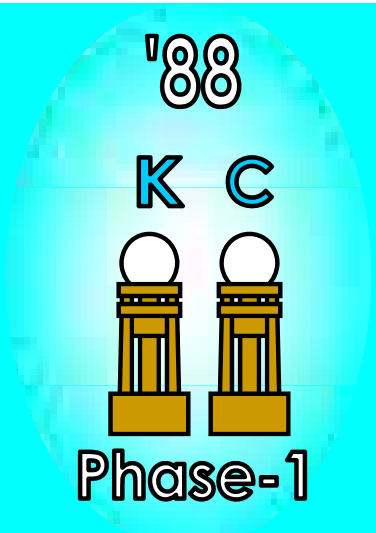


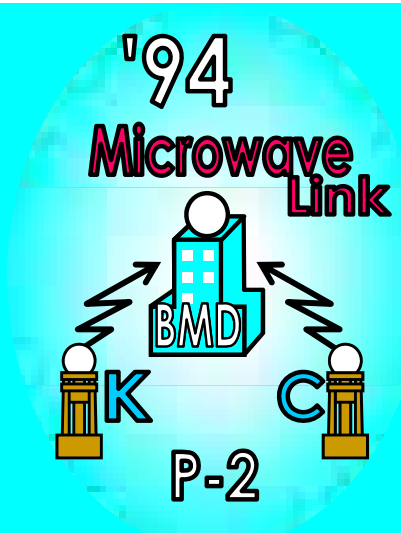

>300000
Casualty Trend
Casualties
140000
Population
Mortality
1970
1991
2007

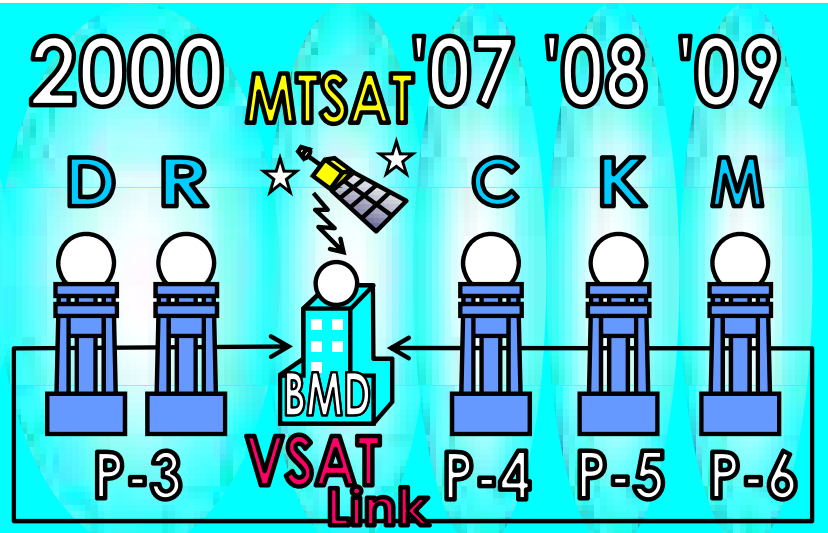
Casualty Trends









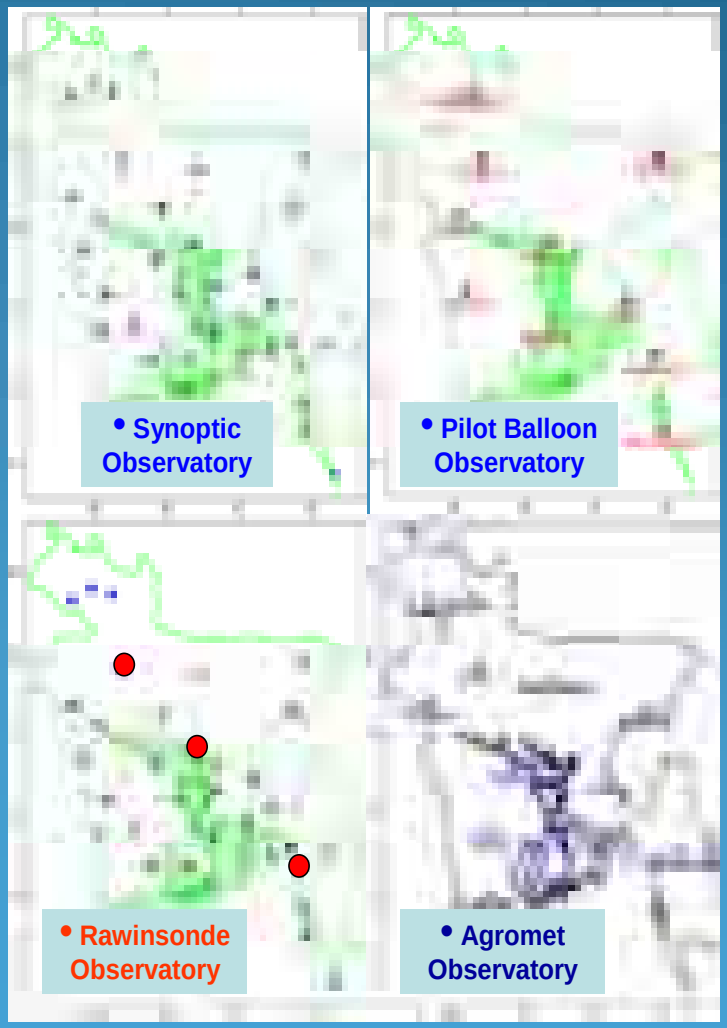


Meteorological Satellite Reception and data processing System

Under the programme of Japan International Cooperation Agency, BMD is receiving **MTSAT** satellite image at 30 minutes interval. Recently BMD is using MICAPS 3.1 to receive satellite imagery from **FY2D** through Cma Cast system.

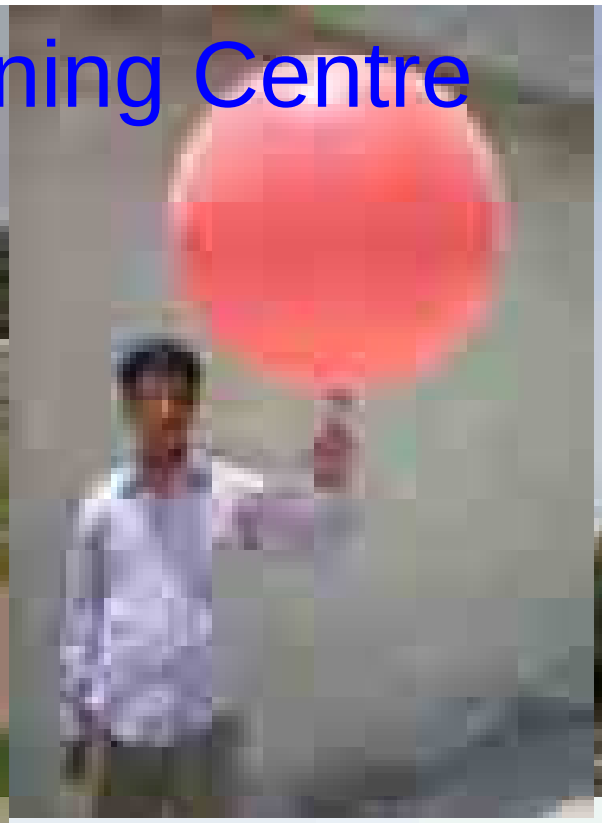
Observational Facilities

a. Synoptic observatories : 35+5
b. Pilot Observatories : 10
c. Rawinsonde Observatories : 3
d. Agromet observatories : 12
e. RADAR Stations: 5
(operational, out of 3 is Doppler Radar)
f. Earthquake Monitoring Stations: 4



Storm Warning Centre

Conventional Observatory



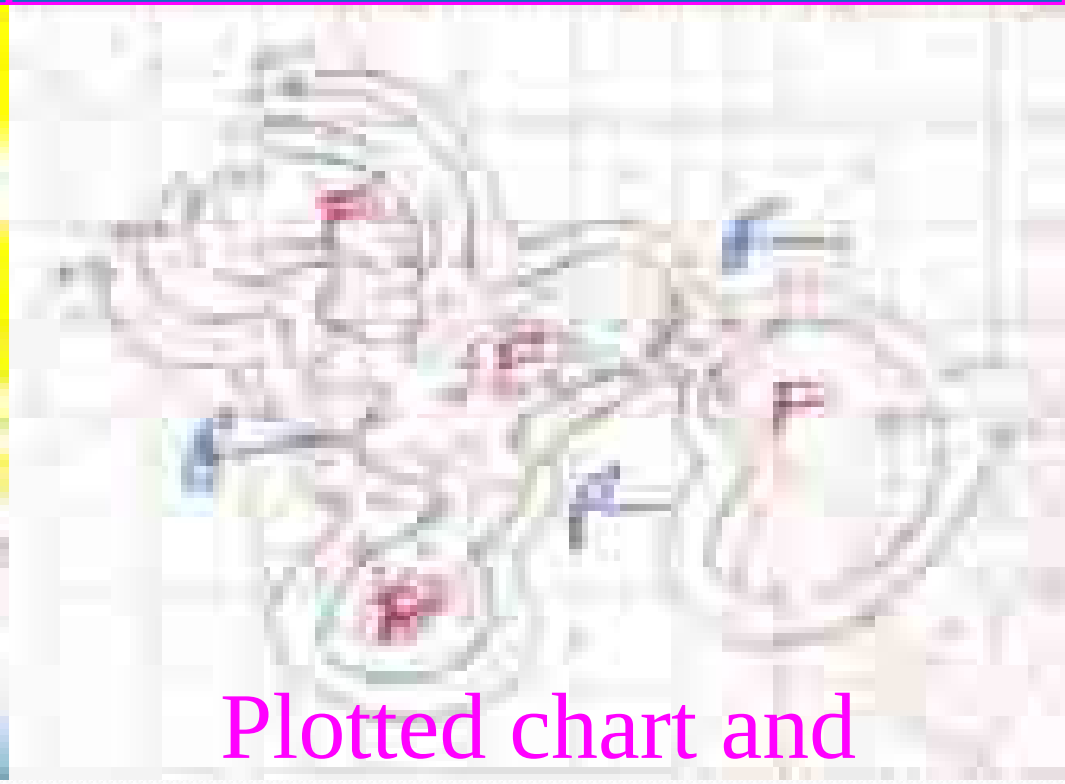
An Observer is taking observation

Storm Warning Centre

An Observer is plotting the Synoptic data

An Observer is plotting Radiosonde data

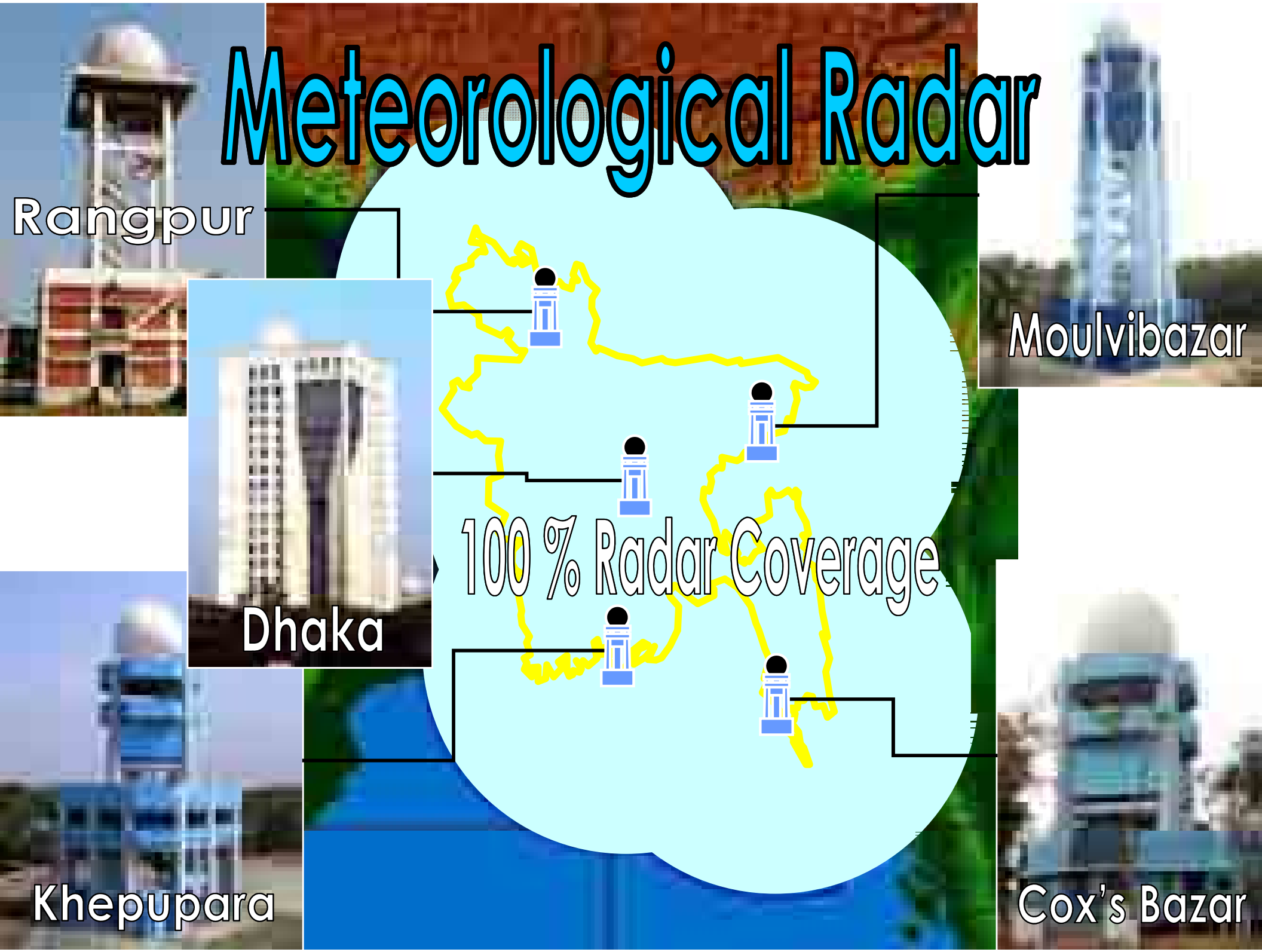
Plotted Chart

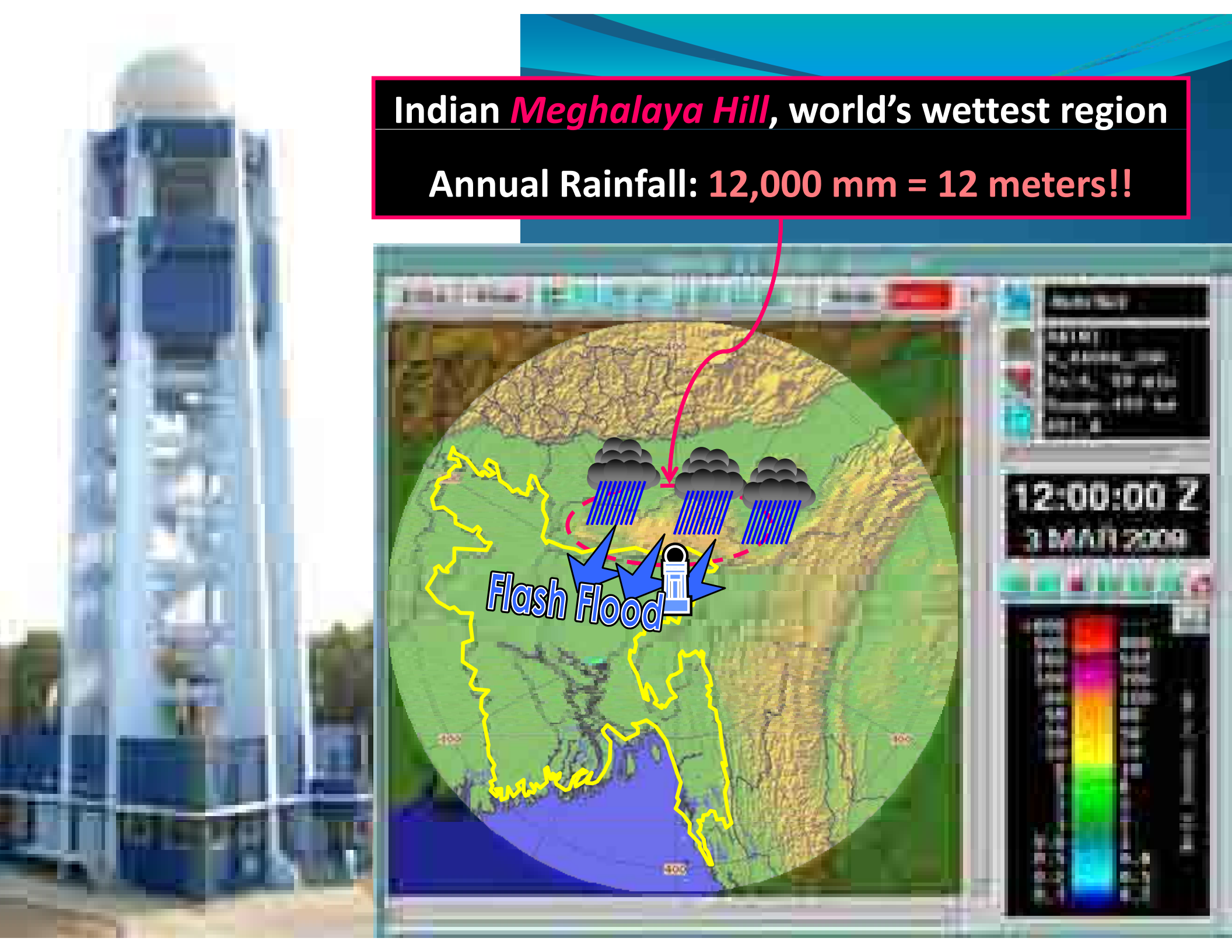


Plotted chart and

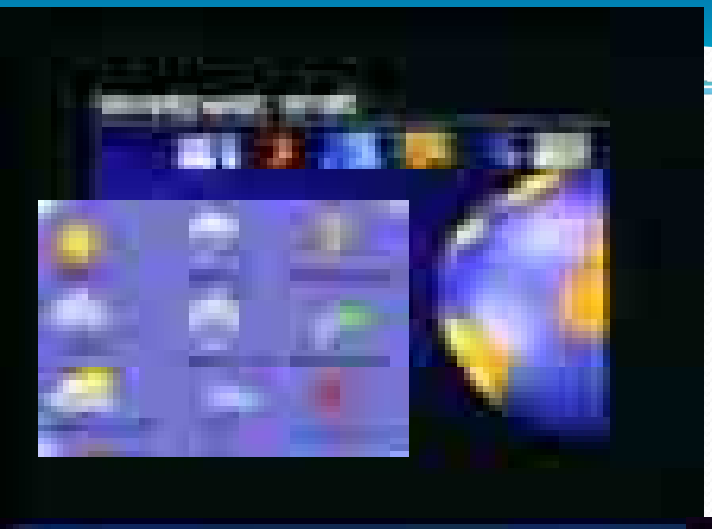
ইন্টারনেট প্রযুক্তি ও আবহাওয়া অধিদপ্তরের নিজস্ব ওয়েবসাইট ব্যবহার করে আবহাওয়া ও জলবায়ু সম্পর্কিত তথ্য, পূর্বাভাস, সতর্কবার্তা, নদী-বন্দর ও সমুদ্র বন্দরের জন্য প্রদর্শিত সিগন্যাল, ঝড় ও ঘেলেসহ সর্বস্তরের জনগণের জন্য প্রচার সতর্কবার্তা দ্রুত ও সময়মত প্রচার

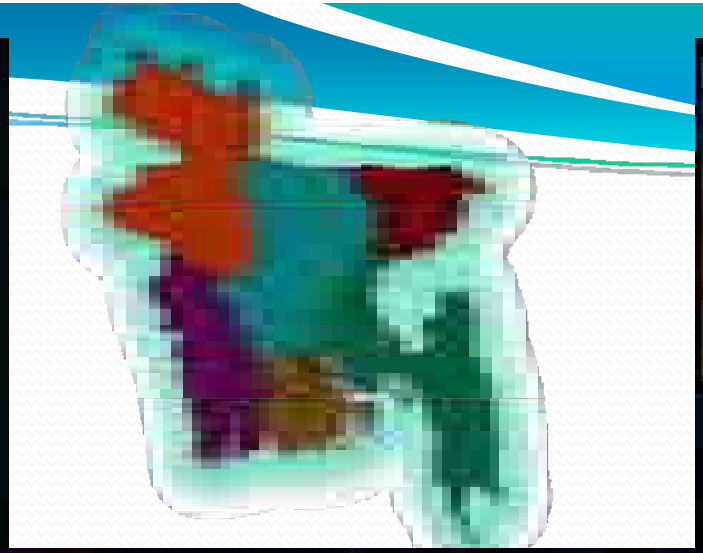
Meteorological Radar

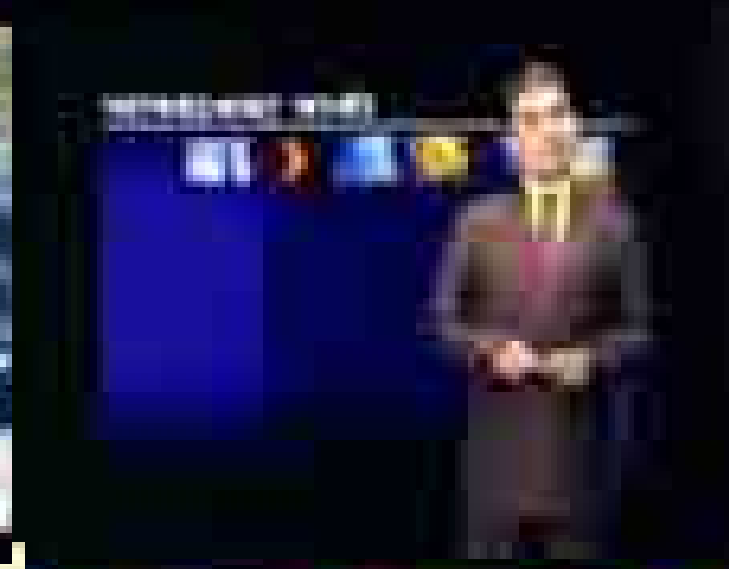


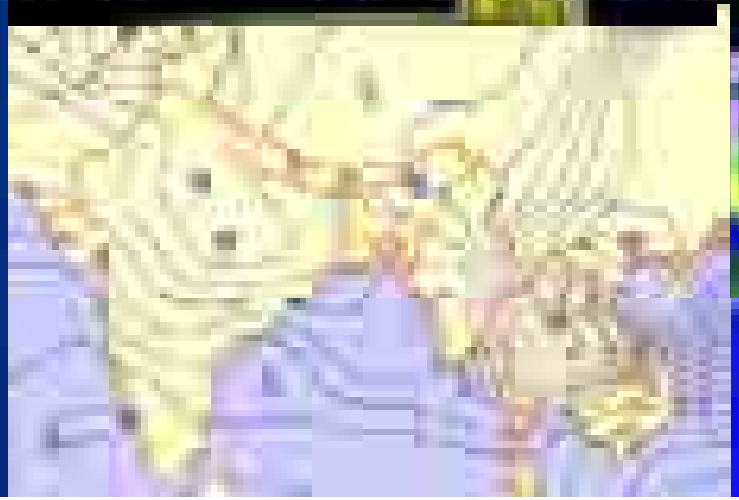

Indian *Meghalaya Hill*, world's wettest region
Annual Rainfall: 12,000 mm = 12 meters!!
Flash Flood
12:00:00 Z

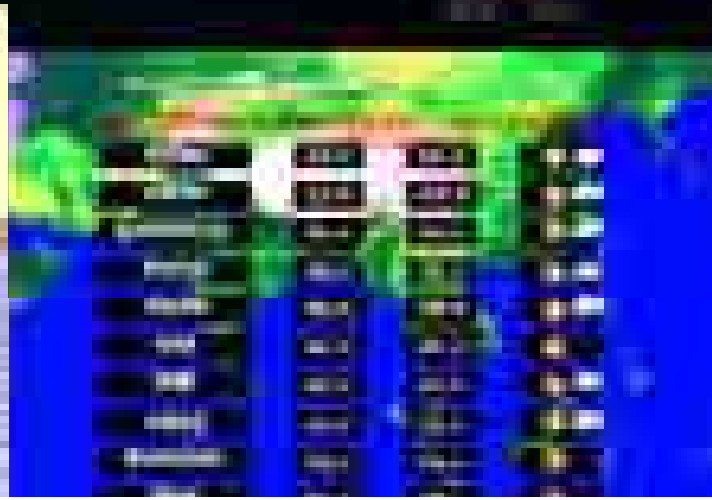

Rangpur
Nor'wester
Torrential Rain
Moulvibazar
Dhaka
Khepupara
Cyclone
Cox's Bazar





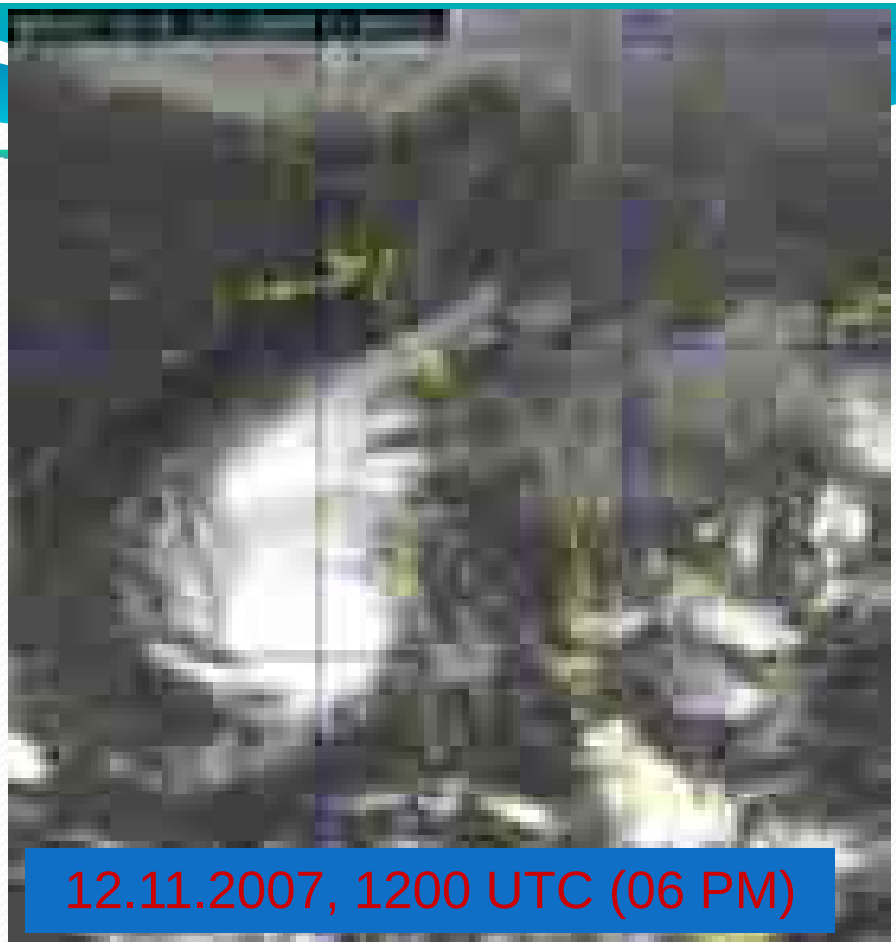




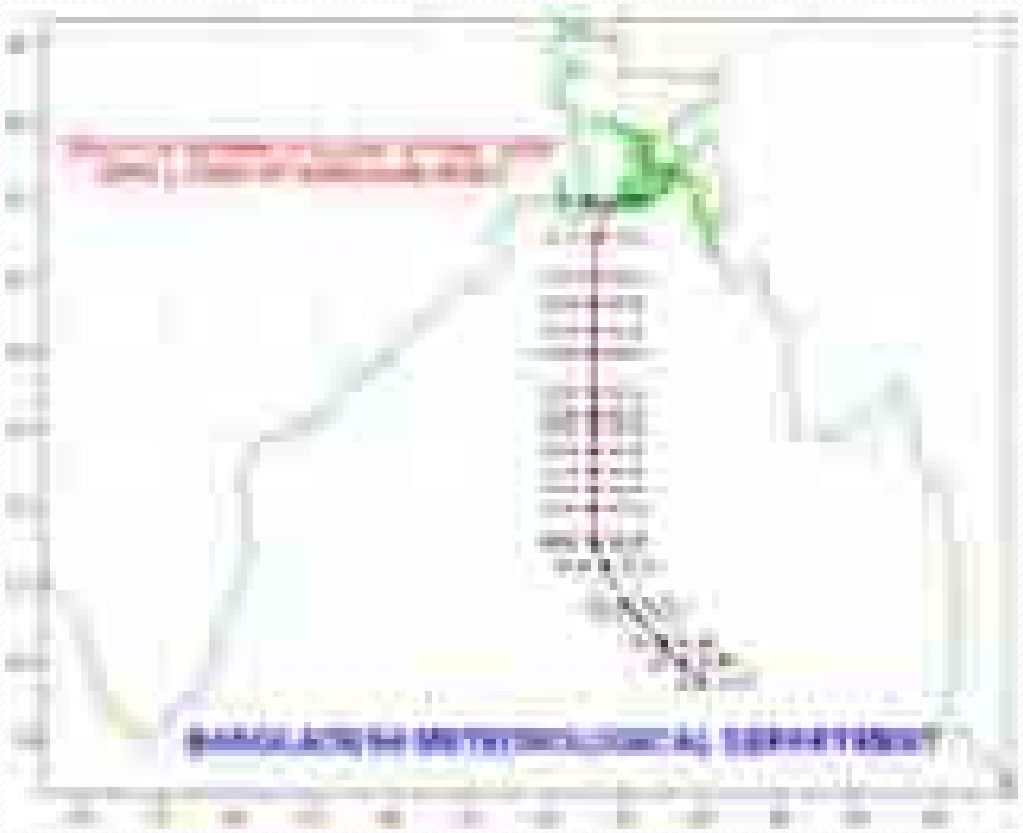


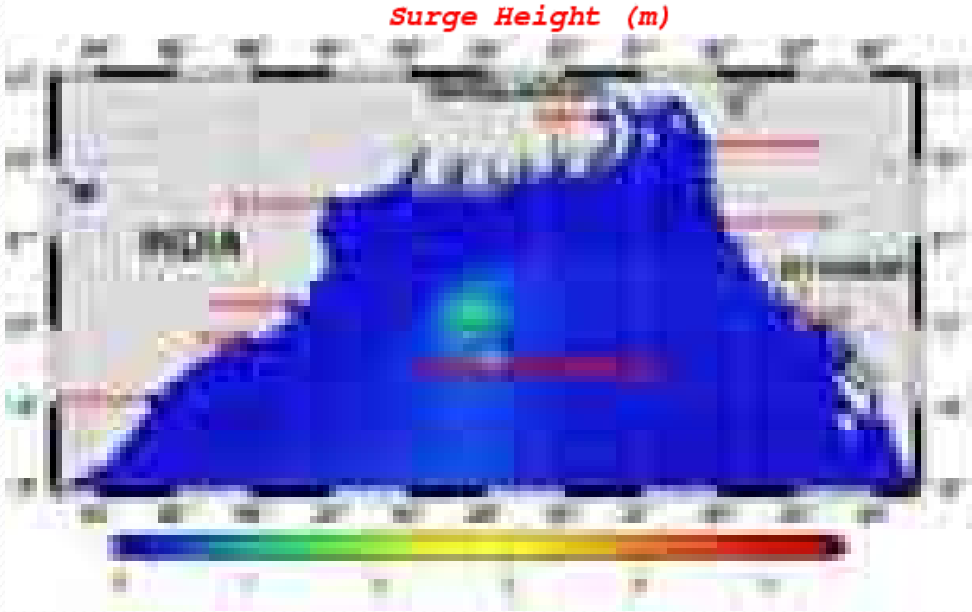
কেস স্টাডি-সিডর

Case Study-SIDR



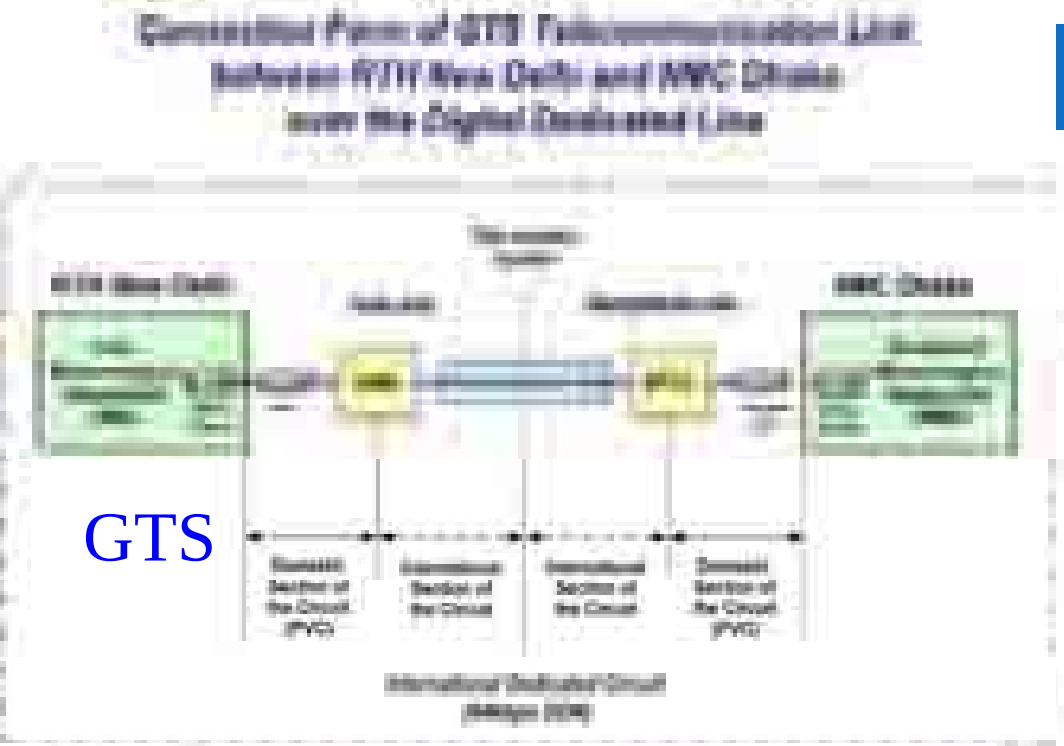
12.11.2007, 1200 UTC (06 PM)



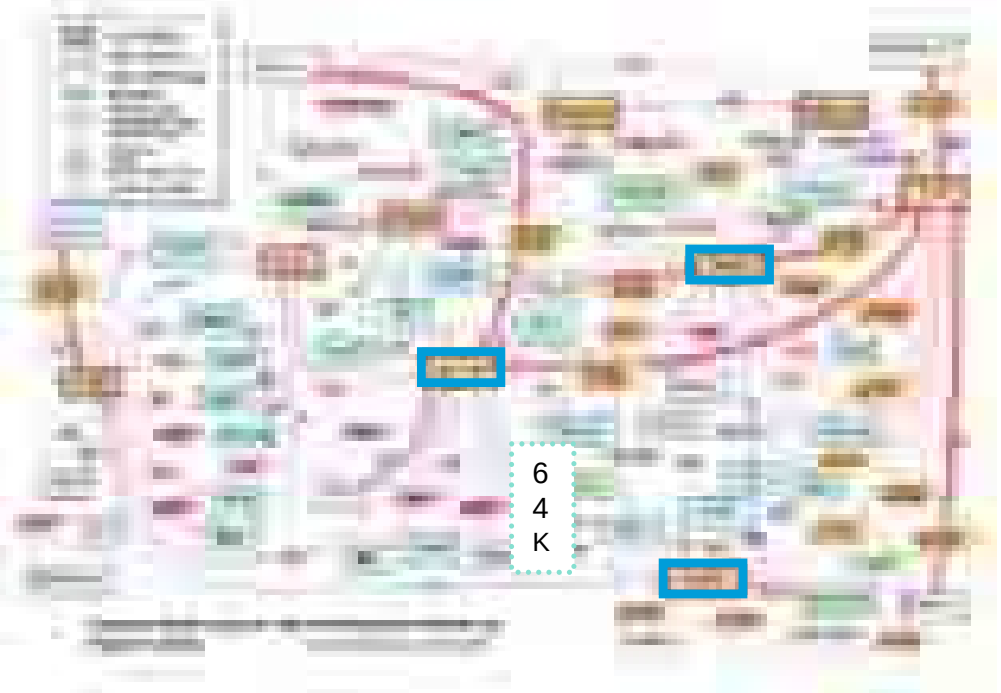


National Meteorological Communication Center

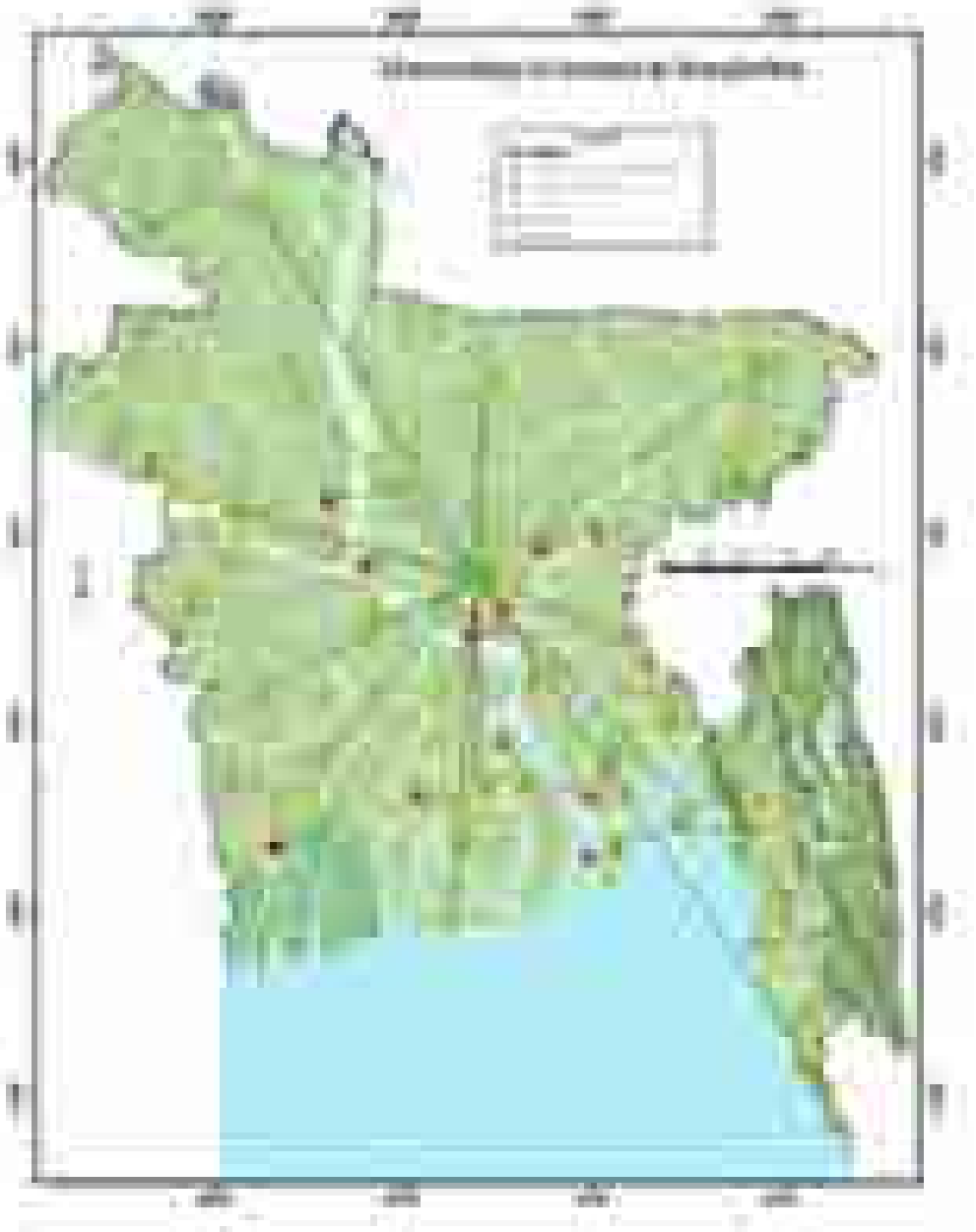
Storm Warning Centre



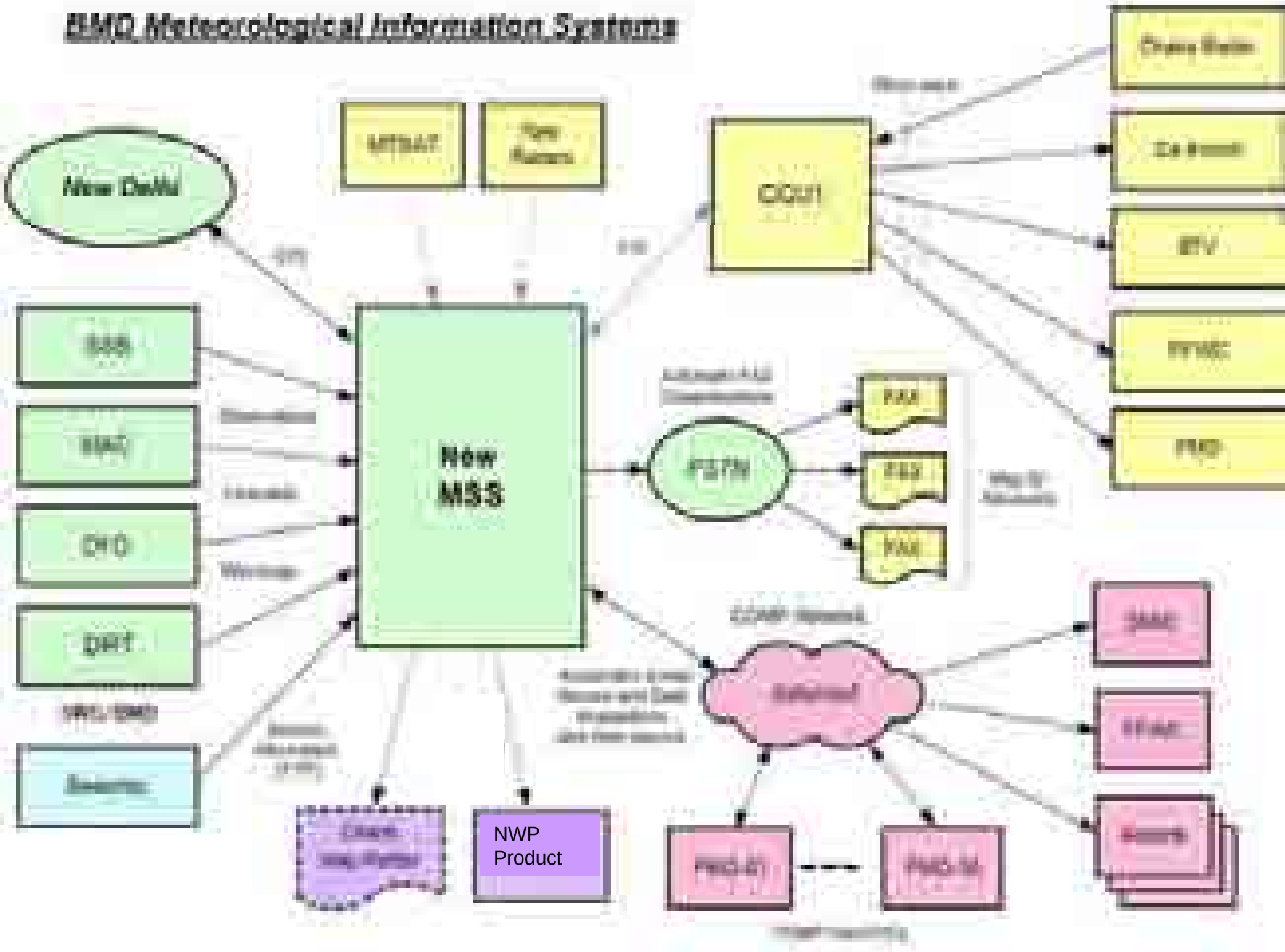
GTS



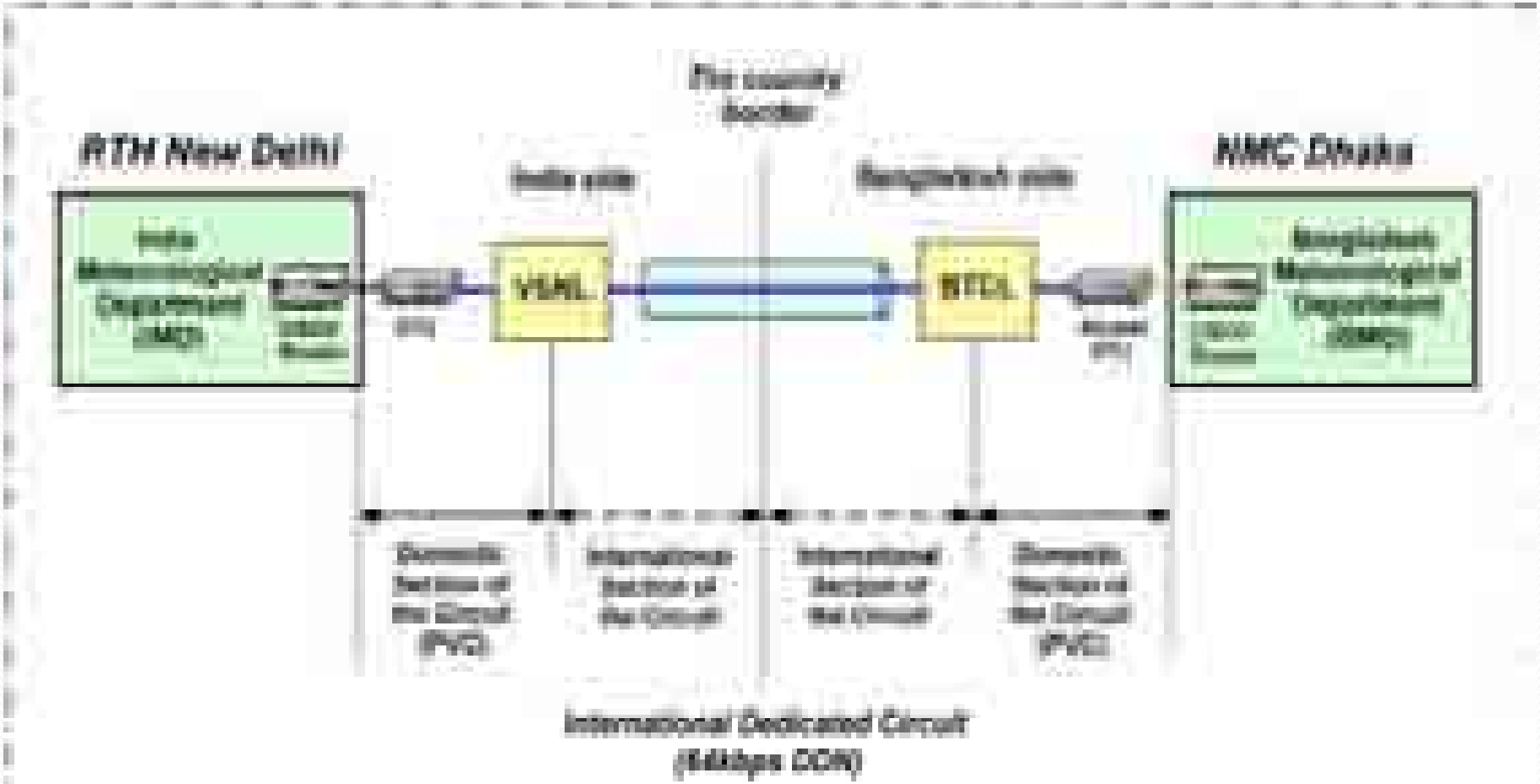
Local data communication link



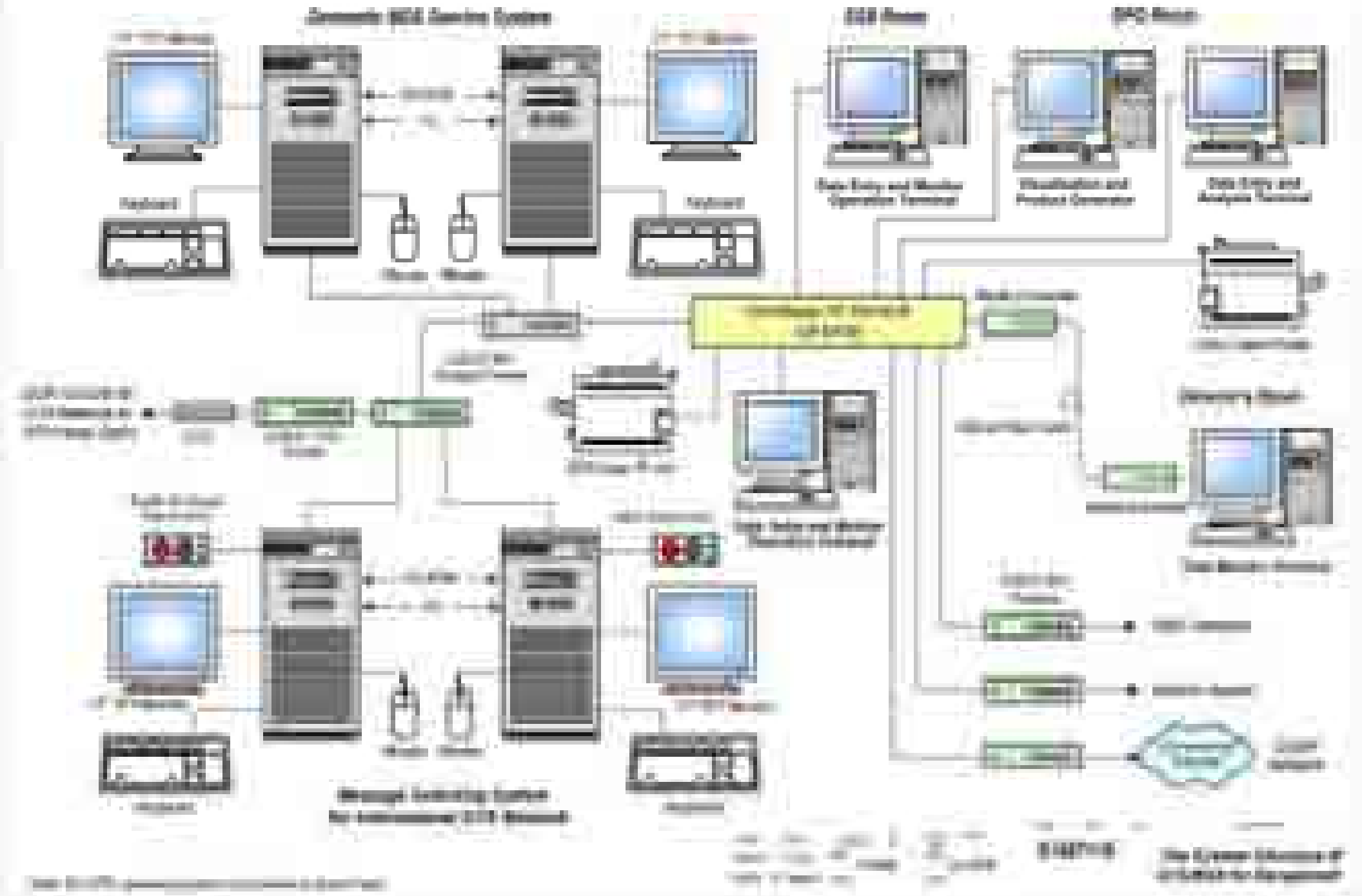
IMD Meteorological Information Systems



Connection Form of GTS Telecommunication Link between RTH New Delhi and NMC Dhaka over the Digital Dedicated Line

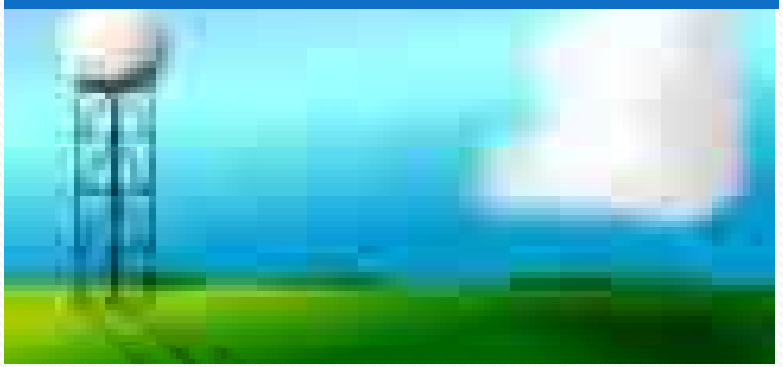


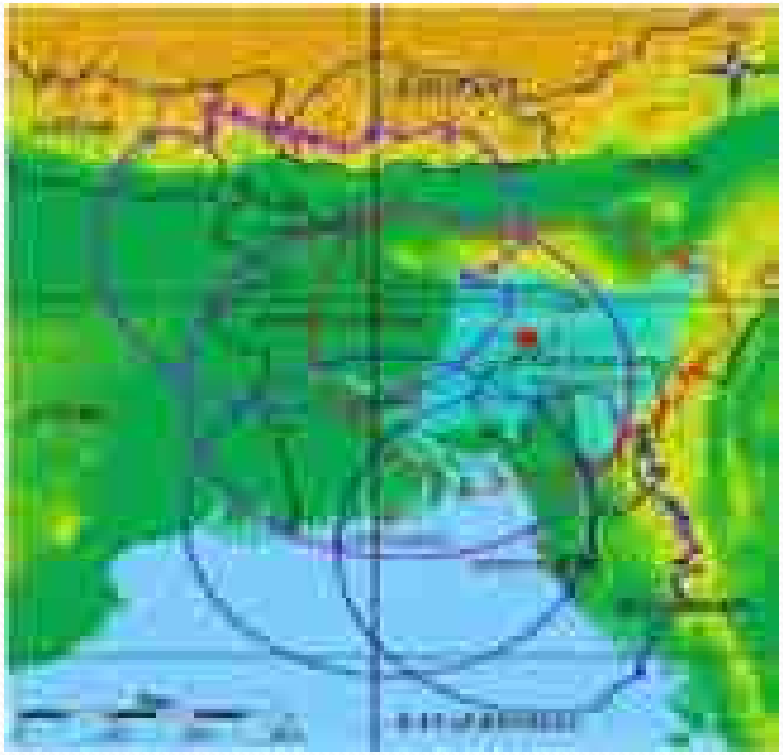
বাংলাদেশ আবহাওয়া অধিদপ্তরের পূর্বাভাস জনগনের কাছে পৌঁছে দেয়ার জন্য তথ্য-প্রযুক্তি ব্যবস্থাপনা

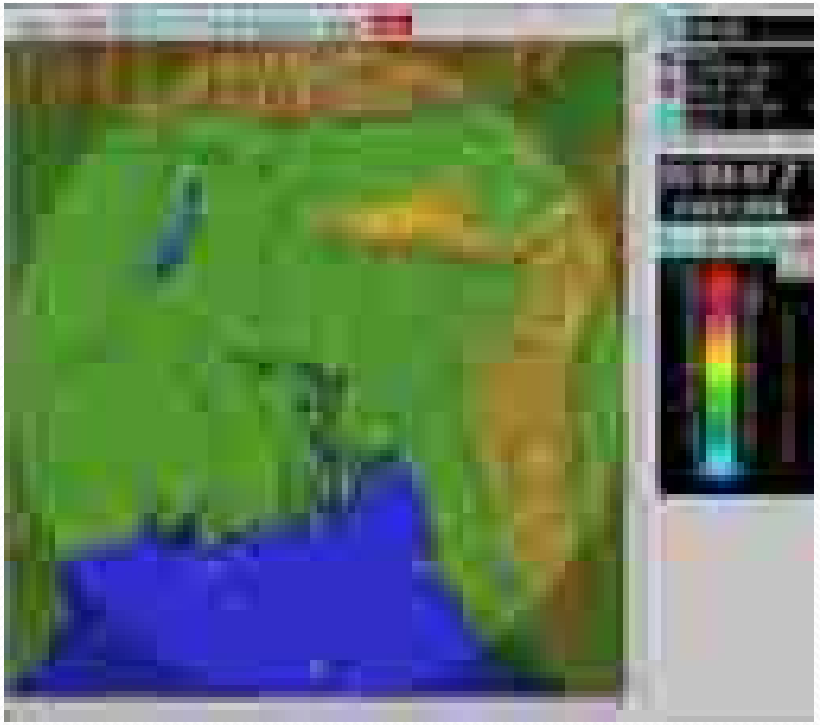


প্রাকৃতিক দুর্যোগের পূর্বাভাস প্রদানে ব্যবহৃত আধুনিক তথ্য প্রযুক্তি ঃ

S-band Doppler Radar







During the last two decades the Met Office has used state-of-the-art supercomputers for numerical weather prediction and more recently, also for predictions of global climate.

This is a picture of a supercomputer

Weather forecasters are helped by several things. These include:-

1. **The computer's advice**
2. **Information from radar**
3. **Information from satellite pictures**

The computer makes millions of calculations.

The sums are called differential equations

Before the computer can do the calculations, data has to be collected first.

Collecting data on the weather is very important.

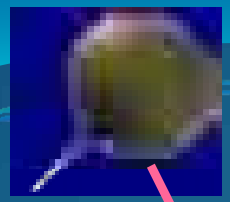
Without the data, the computer could not do the calculations that enable it to make weather predictions.

The next slide shows where the data comes from.

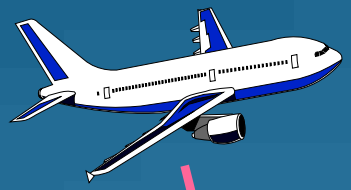
It also shows where the forecasts are sent.

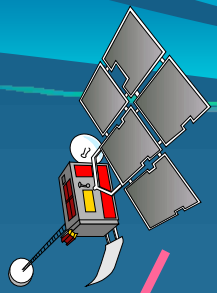
Always remember that the forecasters are highly trained people and they use their judgement and expertise to make their forecast based on the information the computer gives them and the information from the radar and the satellite pictures.

Radio-sonde

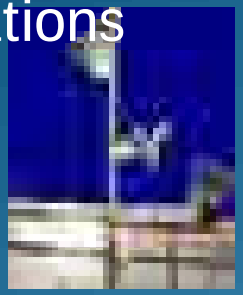


Satellites

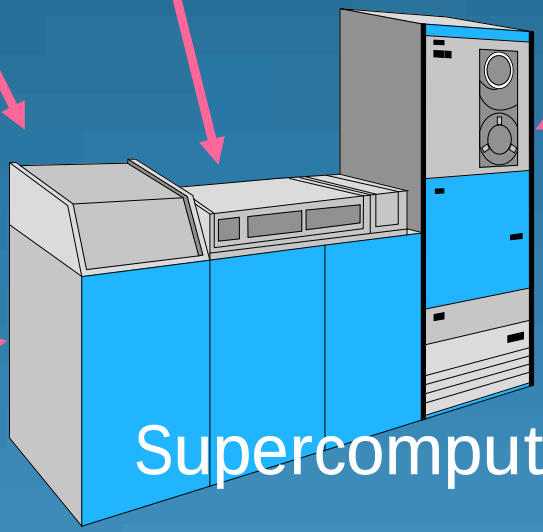




Weather stations



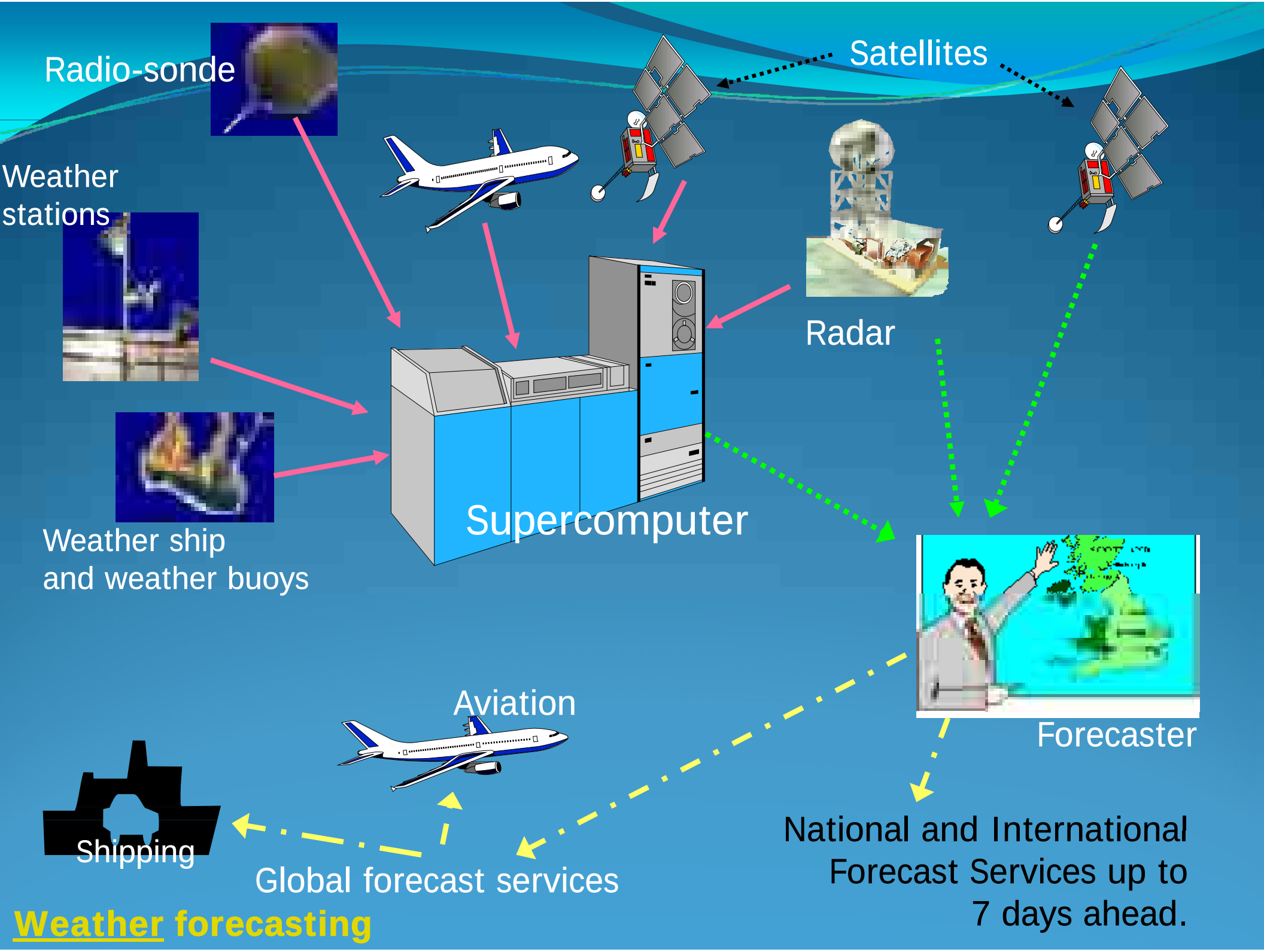
Radar

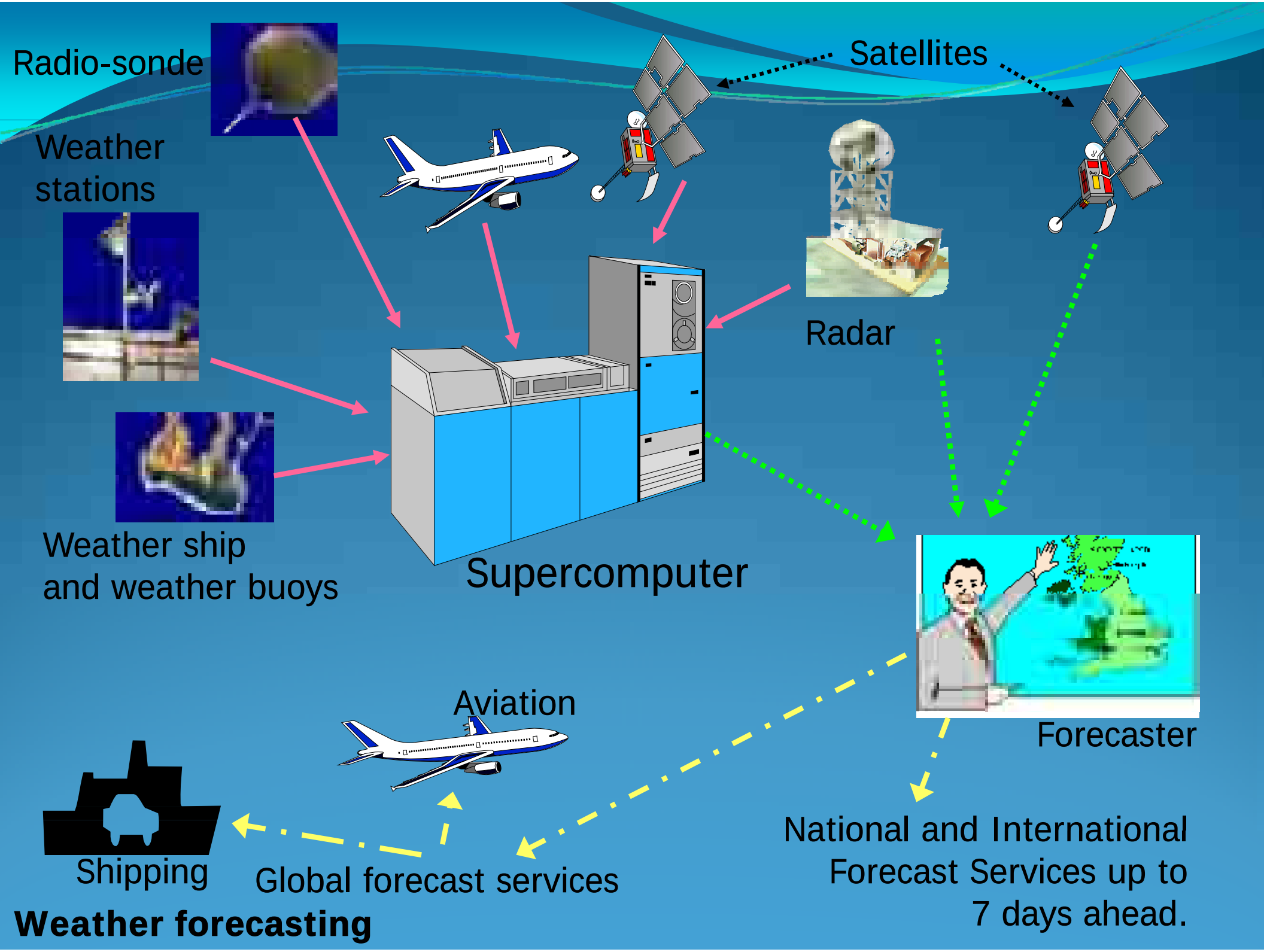


Supercomputer

Weather ship and weather buoys

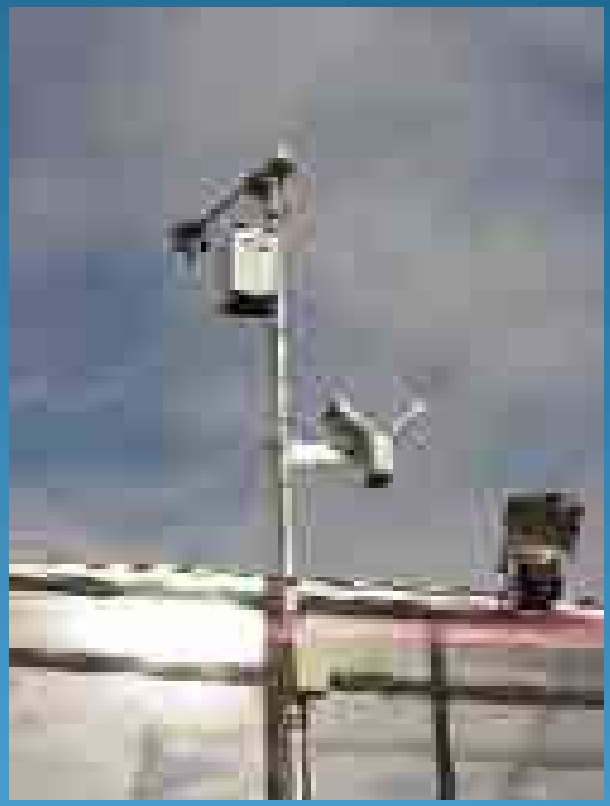
Weather forecasting


Radio-sonde
Satellites
Weather stations
Radar
Supercomputer
Weather ship and weather buoys
Forecaster
Aviation
Shipping
Global forecast services
National and International Forecast Services up to 7 days ahead.
Weather forecasting


Radio-sonde
Satellites
Weather stations
Radar
Supercomputer
Weather ship and weather buoys
Forecaster
Aviation
Shipping
Global forecast services
National and International Forecast Services up to 7 days ahead.
Weather forecasting

Data is collected continuously for the computer from the following:-

1. Weather stations
2. Automated weather stations
3. Satellites
4. Radar
5. Radiosondes
6. Weather ships
7. Mini-radiosondes
8. Radar
9. Aeroplanes
10. Drifting buoys



The data measurements are made by sensors

A sensor is a transducer which responds to some physical property such as pressure, temperature, rate of flow.

A transducer is an electronic component which converts energy from one form to another.

We want the transducers to send signals to the computer in the Met. Office.

The measurements needed include:-

1. Temperature .. Air, surface and subsurface temp.

2. Atmospheric Pressure

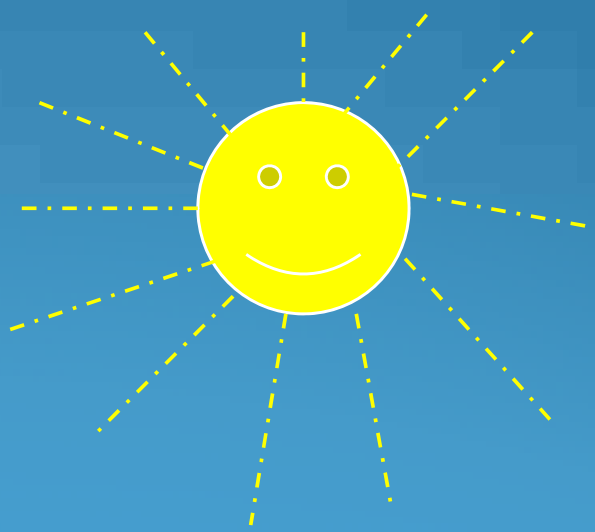
3. Wind speed

4. Wind direction

5. Humidity

6. Rainfall

7. Sunshine



These are some of the sensors used to collect data.

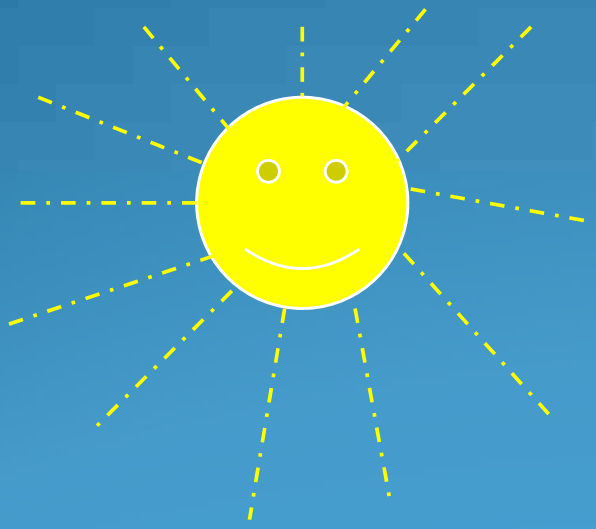
Data logging is the capture and storage of data for future use.

All the measurements from the sensors are stored because:-

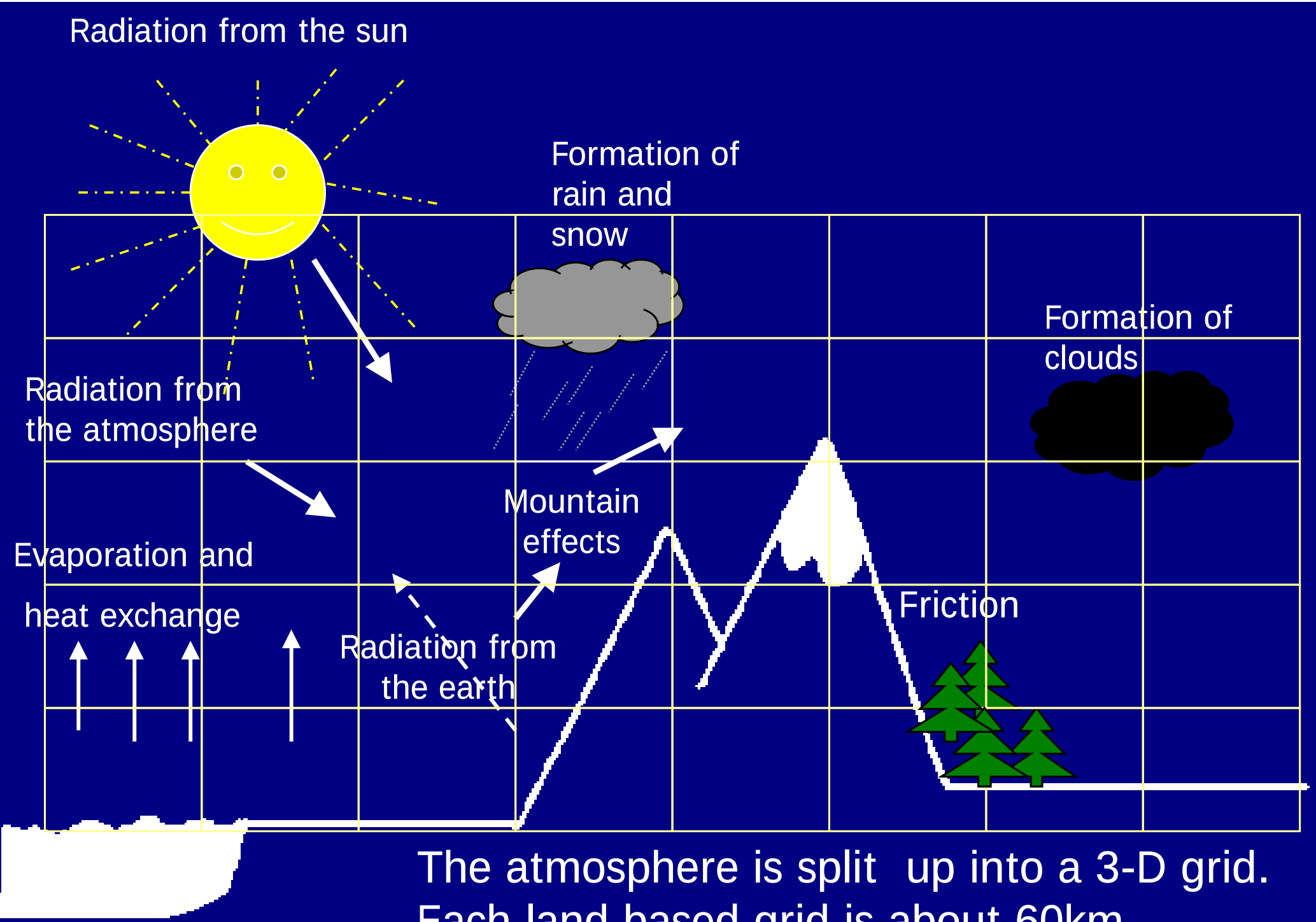
- The computer processes the data in batches
- People need to refer back to weather data for many reasons

So data logging is used in weather forecasting.

The next slides explain more about data collection.



Weather forecasting



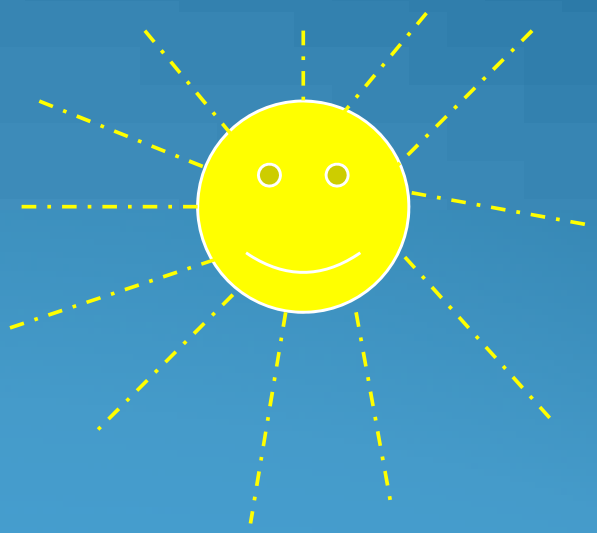
The atmosphere is split up into a 3-D grid.
Each land based grid is about 60km.

Weather forecasting

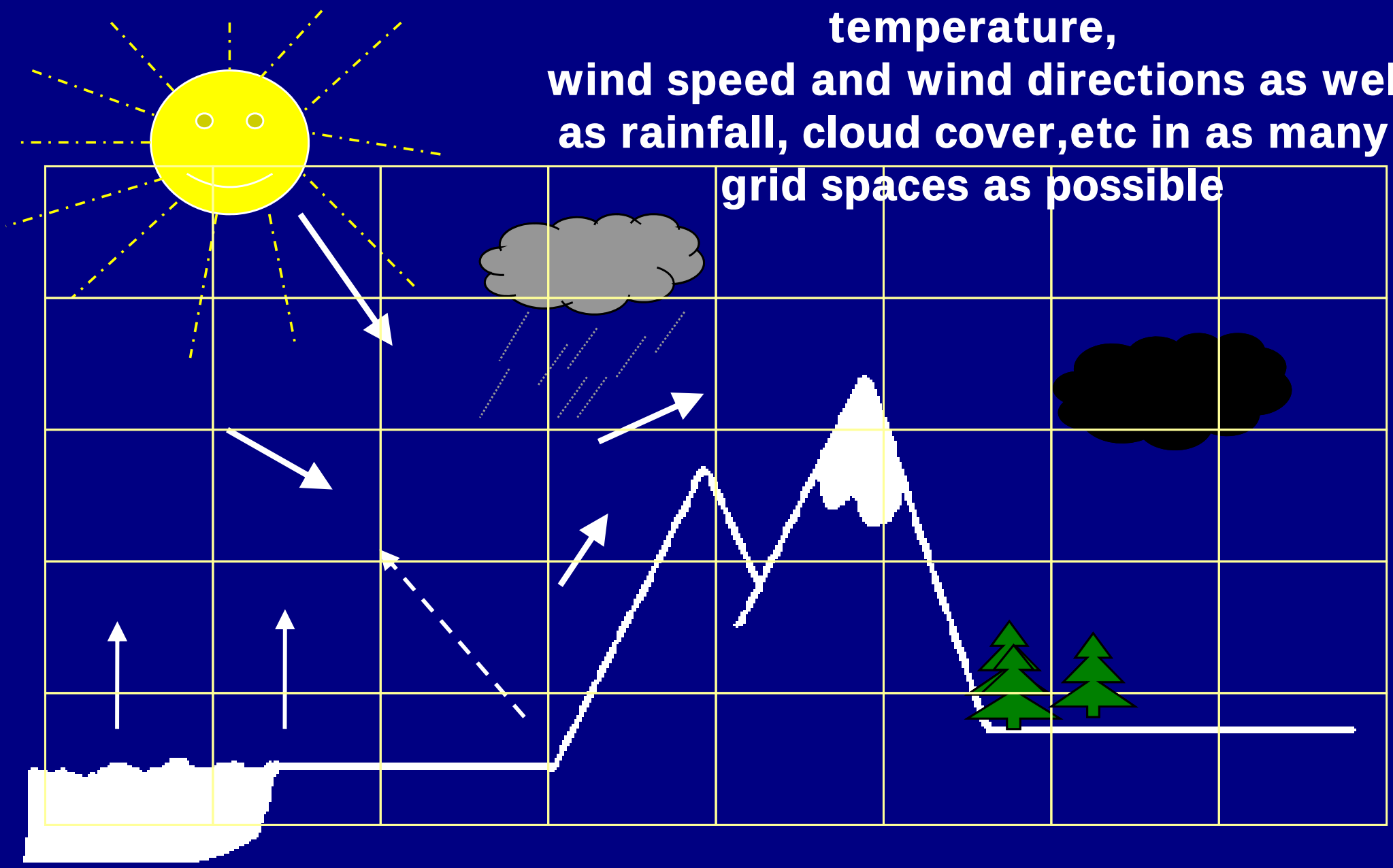
The vertical grid you just saw only had 5 levels.

The Met Office uses far more, some computer models work on 40 vertical levels.

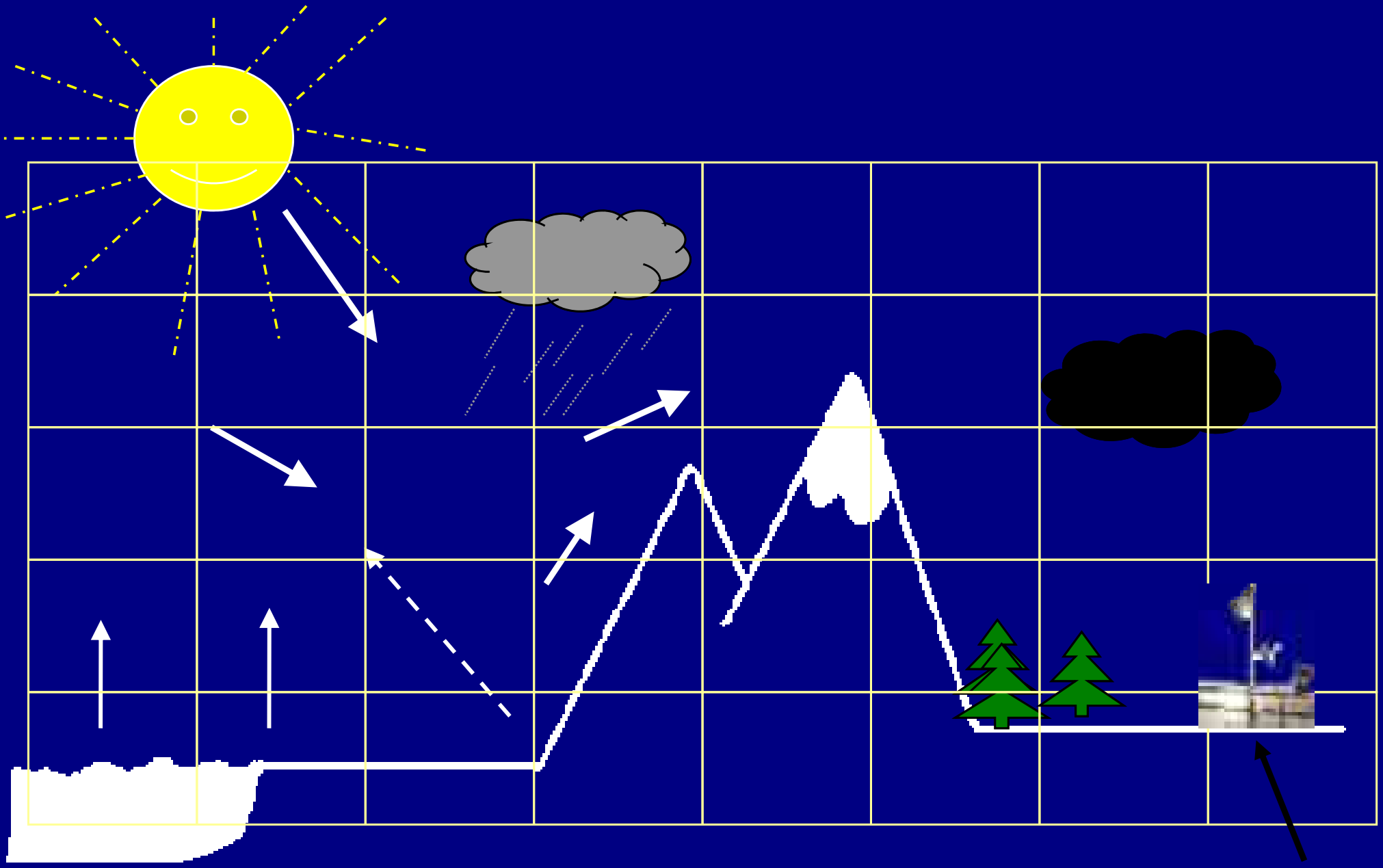
For the global forecasts the horizontal grid is 60km



We need to measure pressure, temperature,
wind speed and wind directions as well as rainfall, cloud cover,etc in as many grid spaces as possible



Weather forecasting



Weather stations are used here.

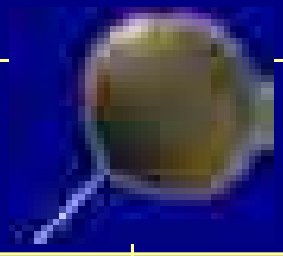
Weather forecasting

A weather station sends signals back to the Met Office computer.

The instruments measure pressure, temperature and humidity.

Some weather stations are automated. These send their measurements back to the computerdirectly.

We need to measure pressure, temperature, wind speed and wind directions as well as rainfall, cloud cover,etc

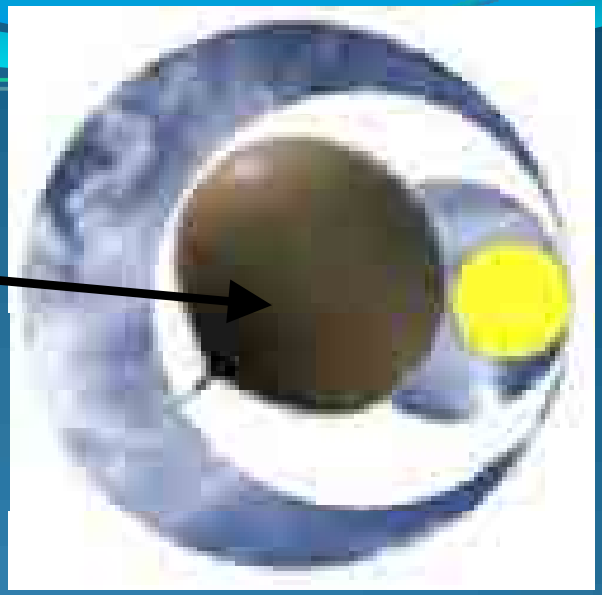


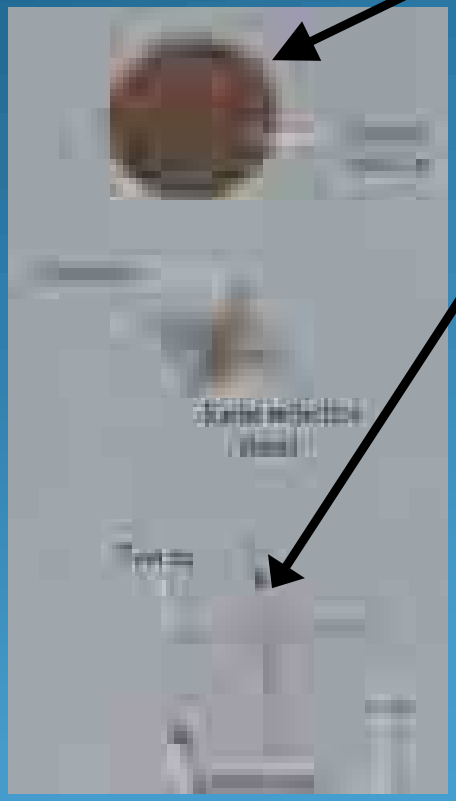
Radiosondes are used up here.

20 km

er forecasting

A **radiosonde** sends signals back to the Met Office computer. They are attached to a balloon carrying instruments.





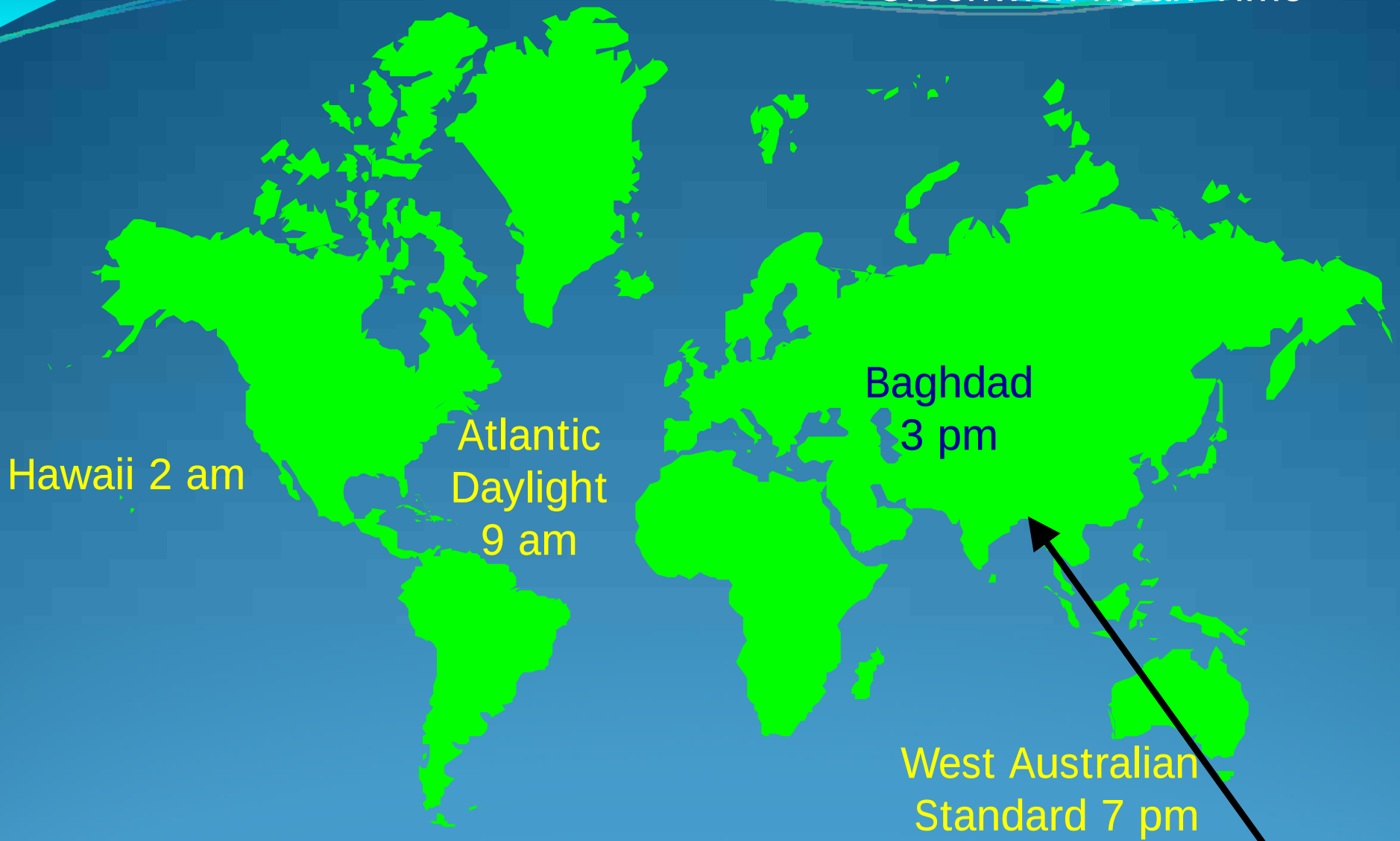
The instruments measure pressure, temperature and humidity.

By measuring the track of the radiosonde, the wind direction and speed can be calculated.

Photo courtesy of the British Atmospheric Data Centre

UTC = Universal Time Co-ordinated

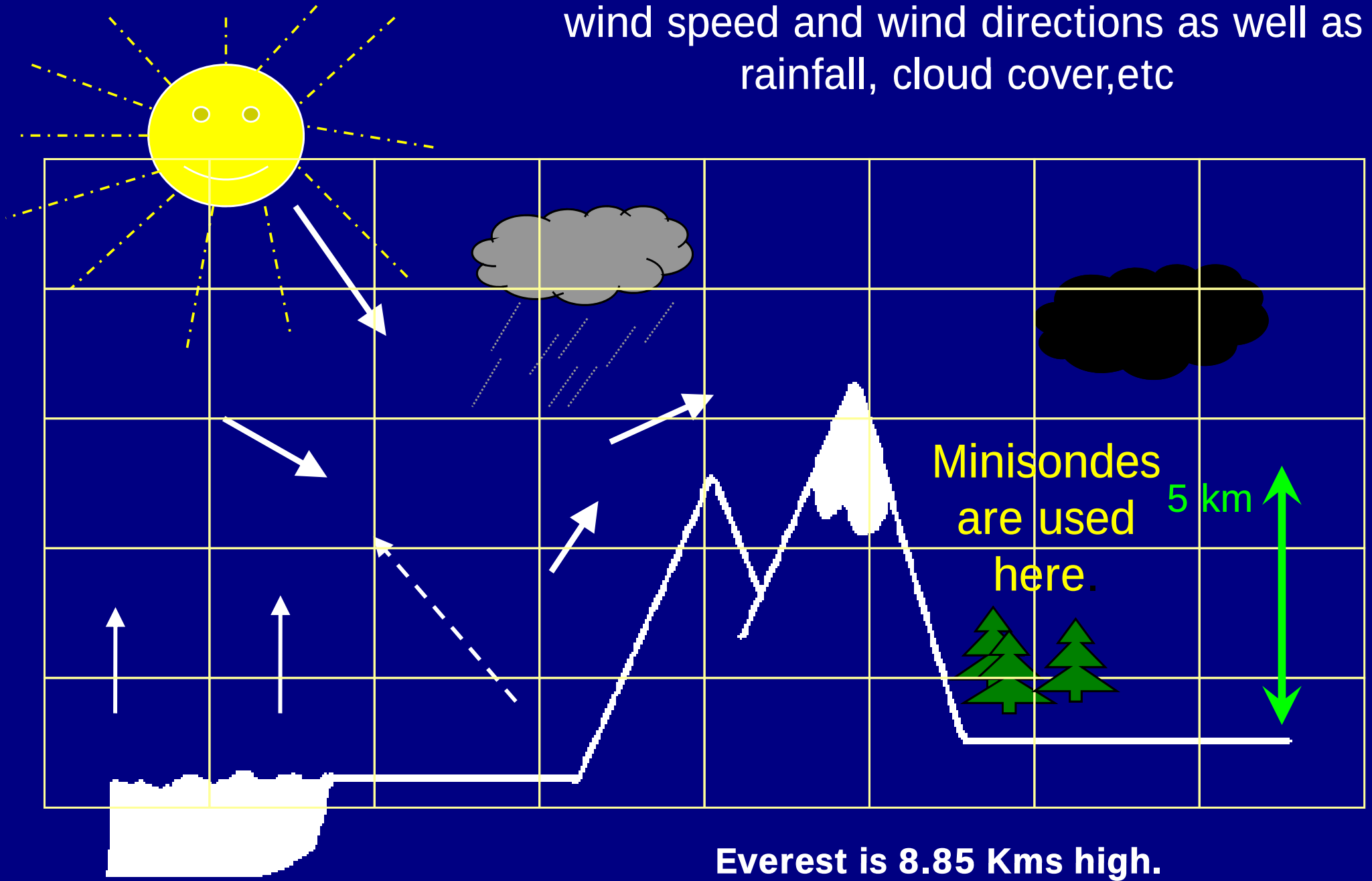
UTC is also known as GMT
Greenwich Mean Time



Here are some of the times when the radiosondes are released to correspond with the ones in Bangladesh.

Weather forecasting

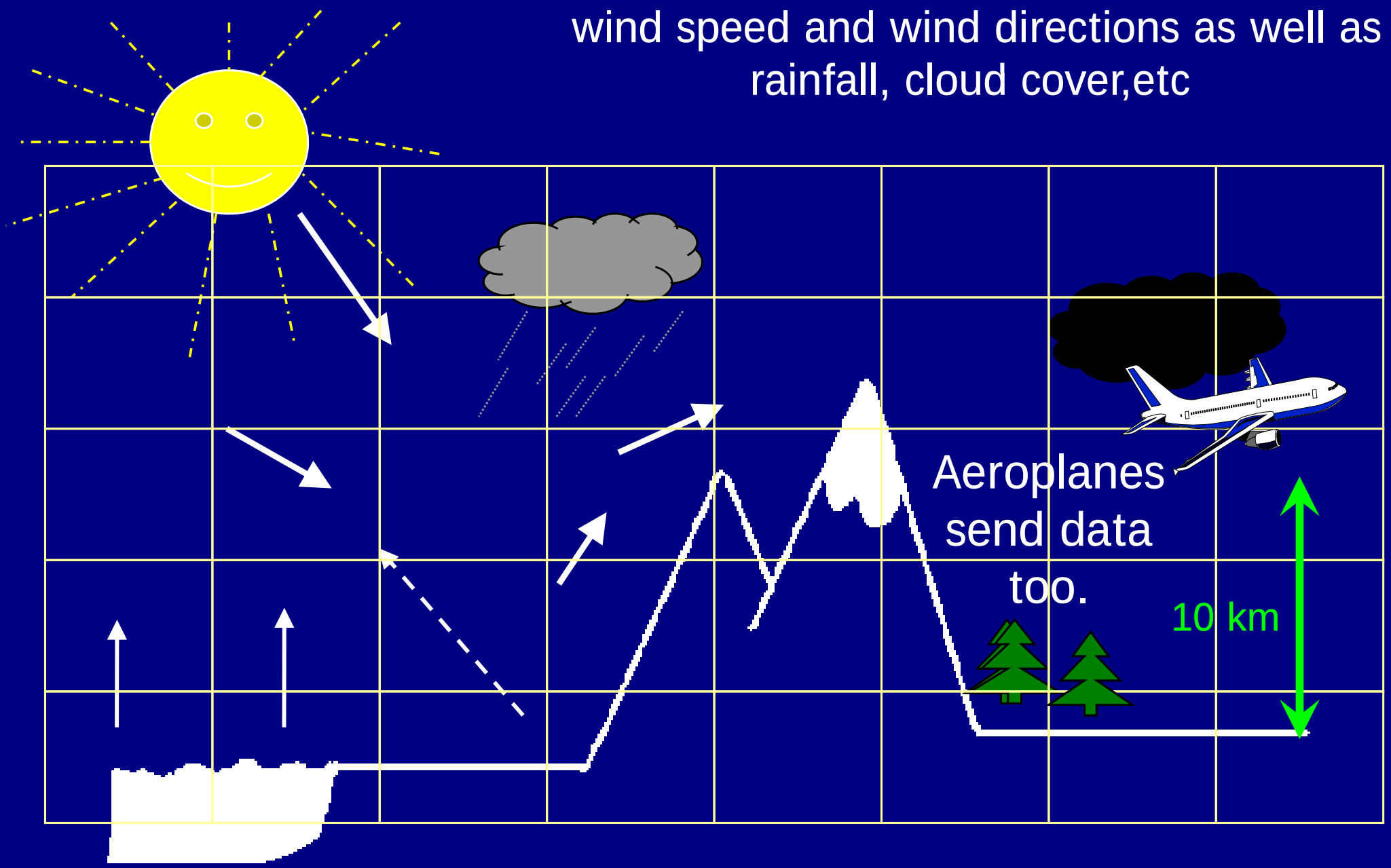
We need to measure pressure, temperature, wind speed and wind directions as well as rainfall, cloud cover,etc



Everest is 8.85 Kms high.
So we have shown you a very high mountain!

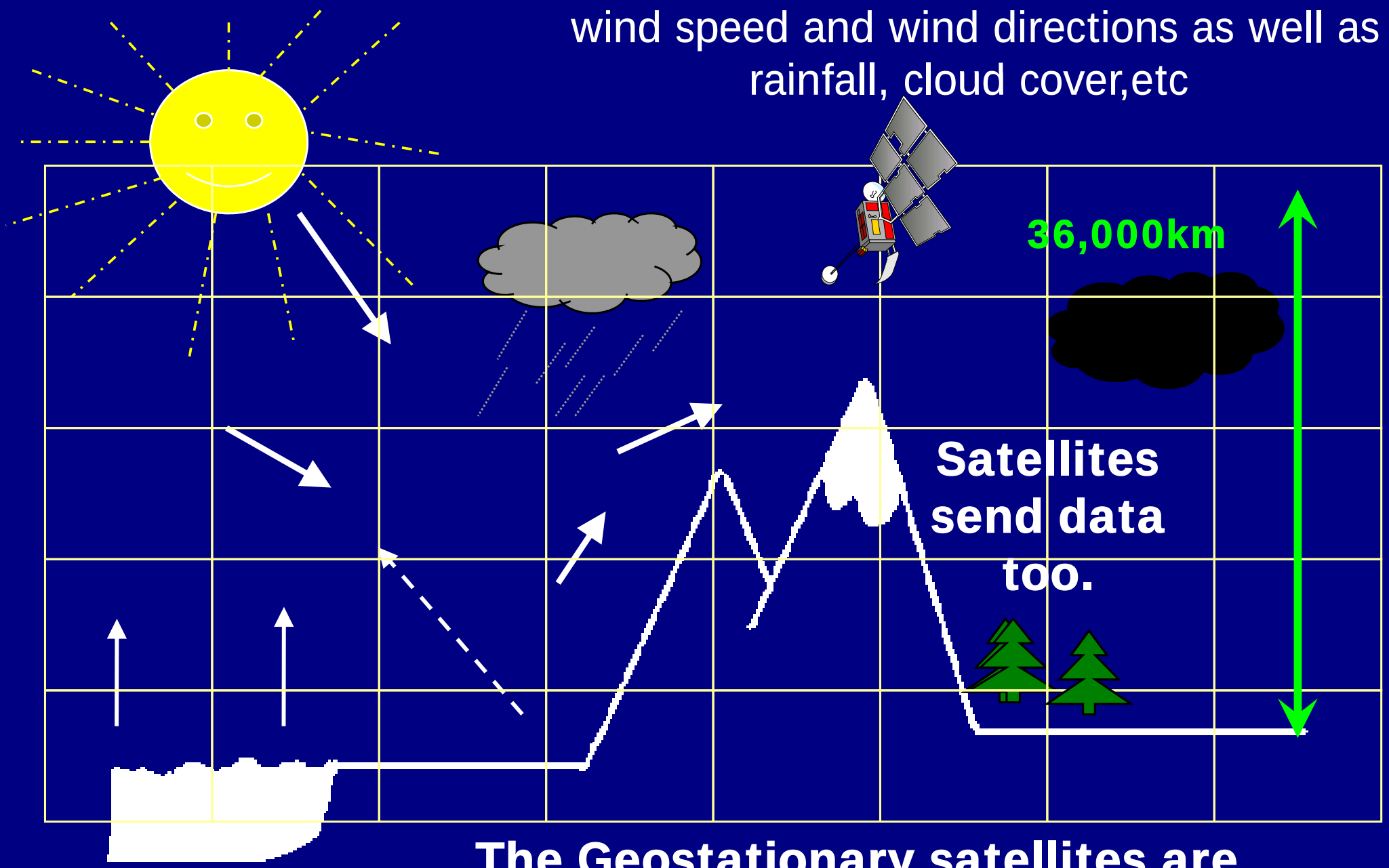
Weather forecasting

We need to measure pressure, temperature, wind speed and wind directions as well as rainfall, cloud cover,etc



Weather forecasting

We need to measure pressure, temperature, wind speed and wind directions as well as rainfall, cloud cover,etc



The Geostationary satellites are 36,000 Km above earth.

Weather forecasting

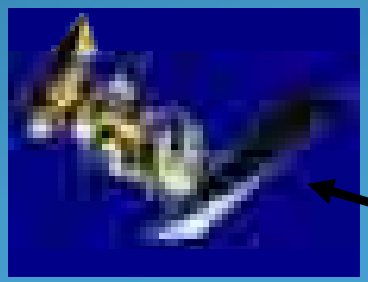
There are two types of satellites.

- **Geostationary.** These stay in the same spot. They orbit the earth at exactly the same speed as the earth rotates. They are very high above earth - **36,000 km.**

  5 geostationary satellites are enough to give global coverage.

- **Polar orbiting.** These orbit the earth about 14 times a day. They orbit at **1000 km** above the earth.

A **Geostationary satellite** stays in the same place with respect to earth all the time



A **Polar orbiting satellite** moves above the earth's surface

Weather forecasting

©Eumetsat 2003

Meteosat: a geostationary satellite. It sends microwave signals back to earth.

The satellite's signals are received by antennae.

The URL (Uniform Resource Locator) www.sat.dundee.ac.uk/tour.html will tell you more about satellites if you are interested

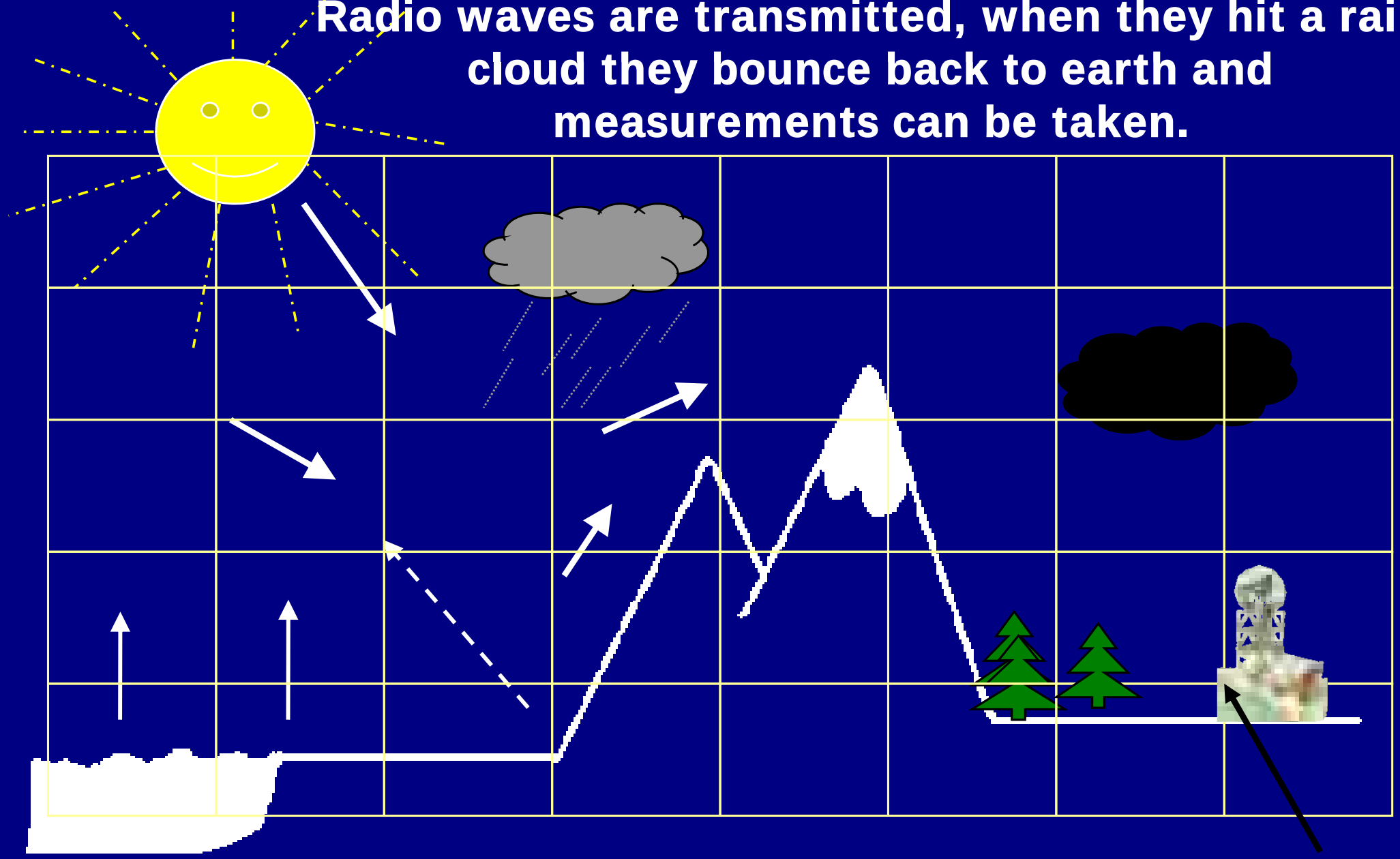
Weather forecasting

This is a Polar Orbiting Satellite

The satellite can take readings across the entire earth during the course of one day.

Radar stands for **r**adio **d**etection **a**nd **r**anging.

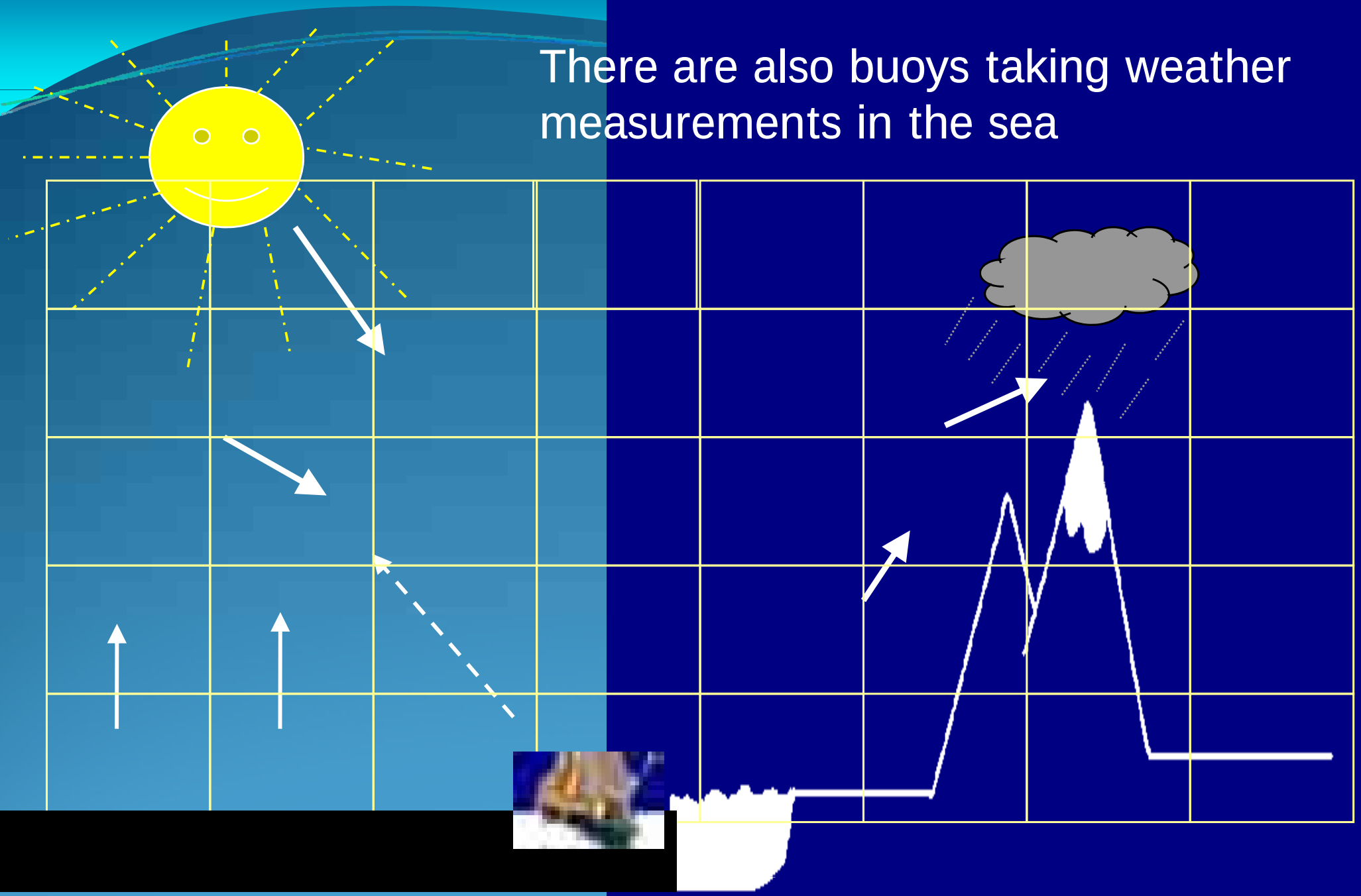
Radio waves are transmitted, when they hit a rain cloud they bounce back to earth and measurements can be taken.



Radar systems are used here.

Weather forecasting

There are also buoys taking weather measurements in the sea



There are weather ships out to sea

Weather forecasting

Radar measurements let the forecaster and the computer know if the radar has seen rain clouds.

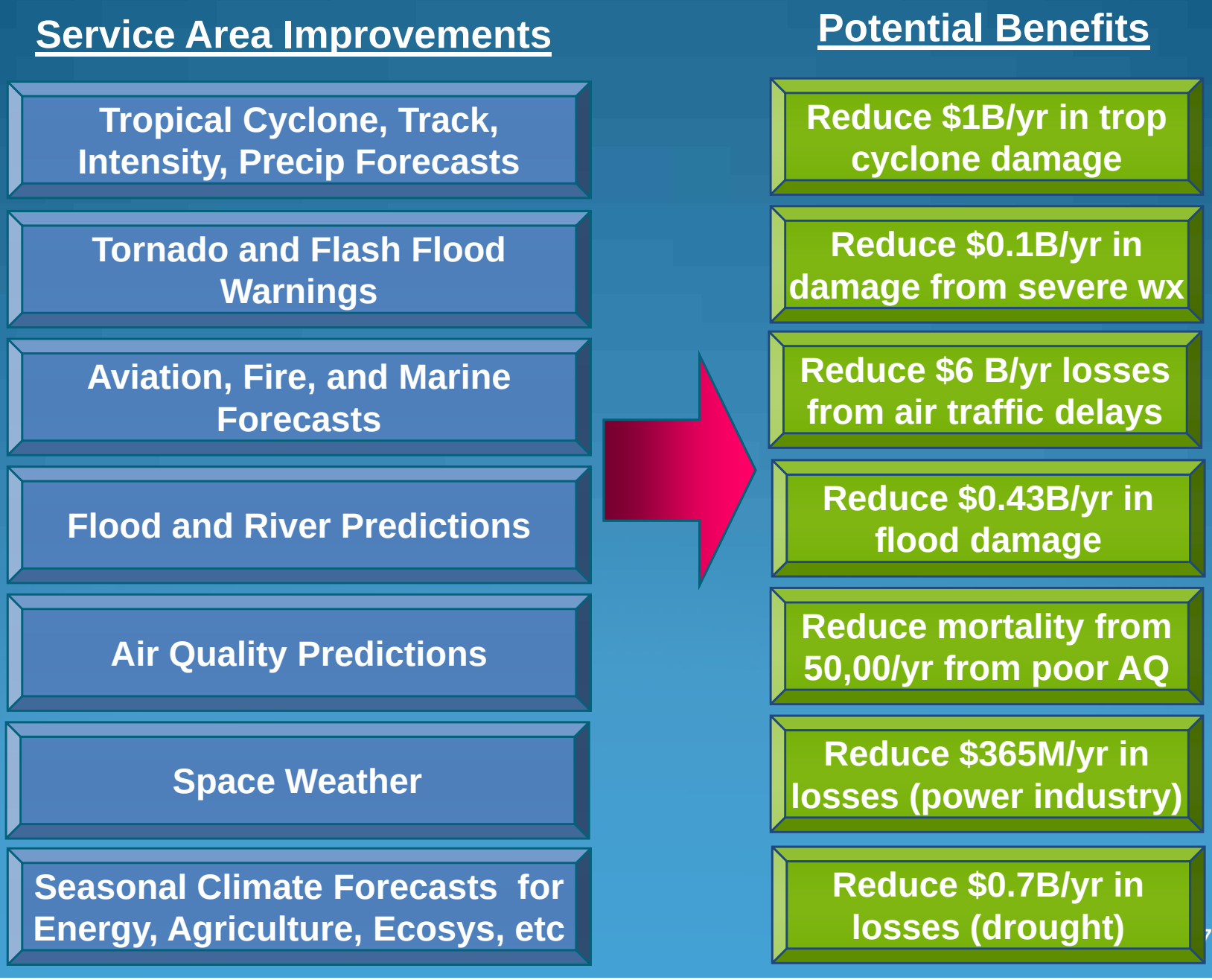
This is a radar station.

The computer and the forecaster receive data from the radar systems.

This is a Weather ship.

Buoys are used at sea more than weather ships these days. They send their data automatically back to the computer.

Potential Societal Benefits



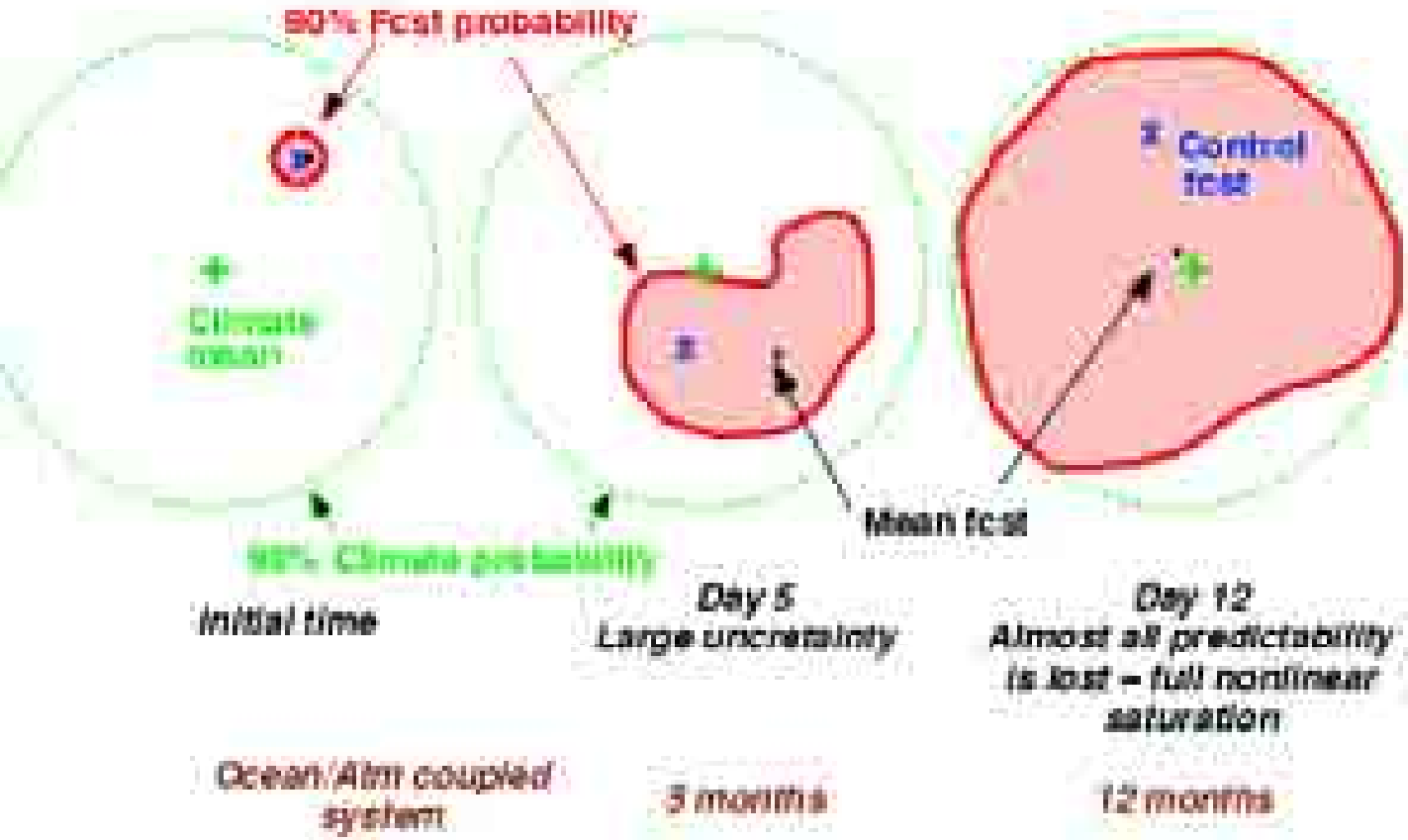
SCIENTIFIC BACKGROUND: WEATHER FORECASTS ARE UNCERTAIN

ORIGIN OF FORECAST UNCERTAINTY

1) The atmosphere is a **deterministic system** *AND* has at least one direction in which **perturbations grow**

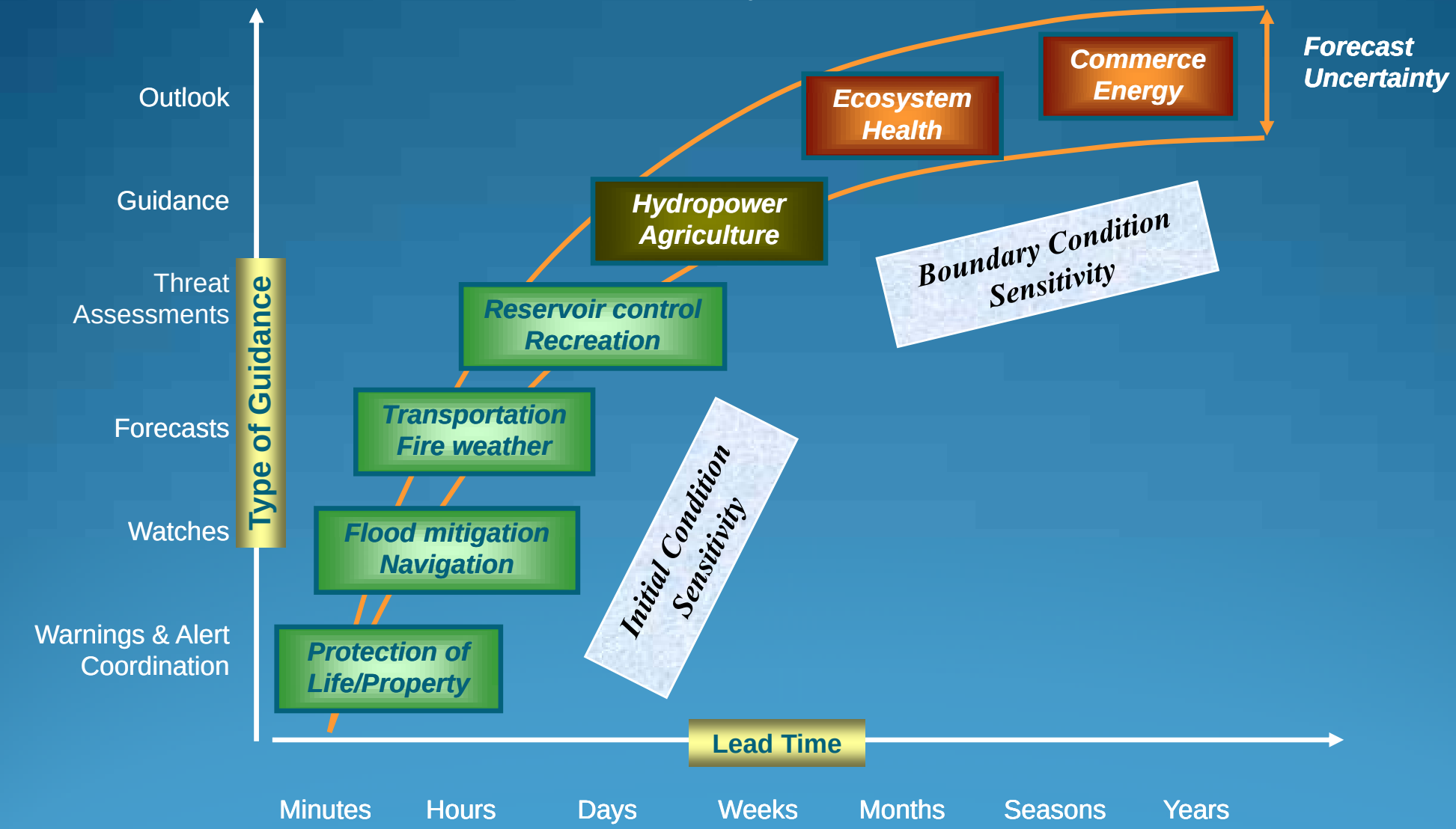
2) **Initial** state (and model) has **error** in it ==>

Chaotic system + Initial error =(Loss of) Predictability

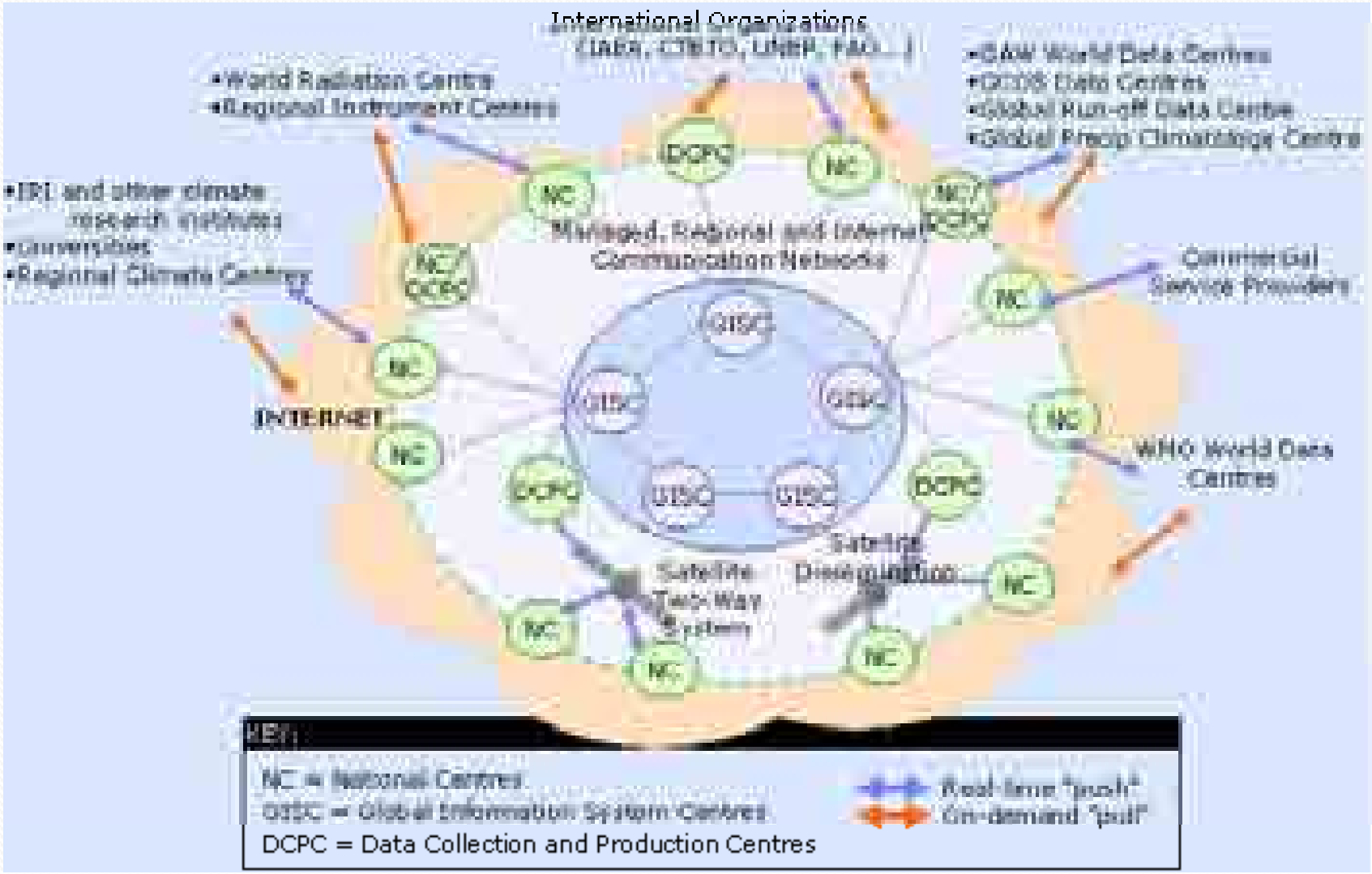


Buizza 2002

SOCIO-ECONOMIC BENEFITS OF SEAMLESS' WEATHER/CLIMATE FORECAST SUITE

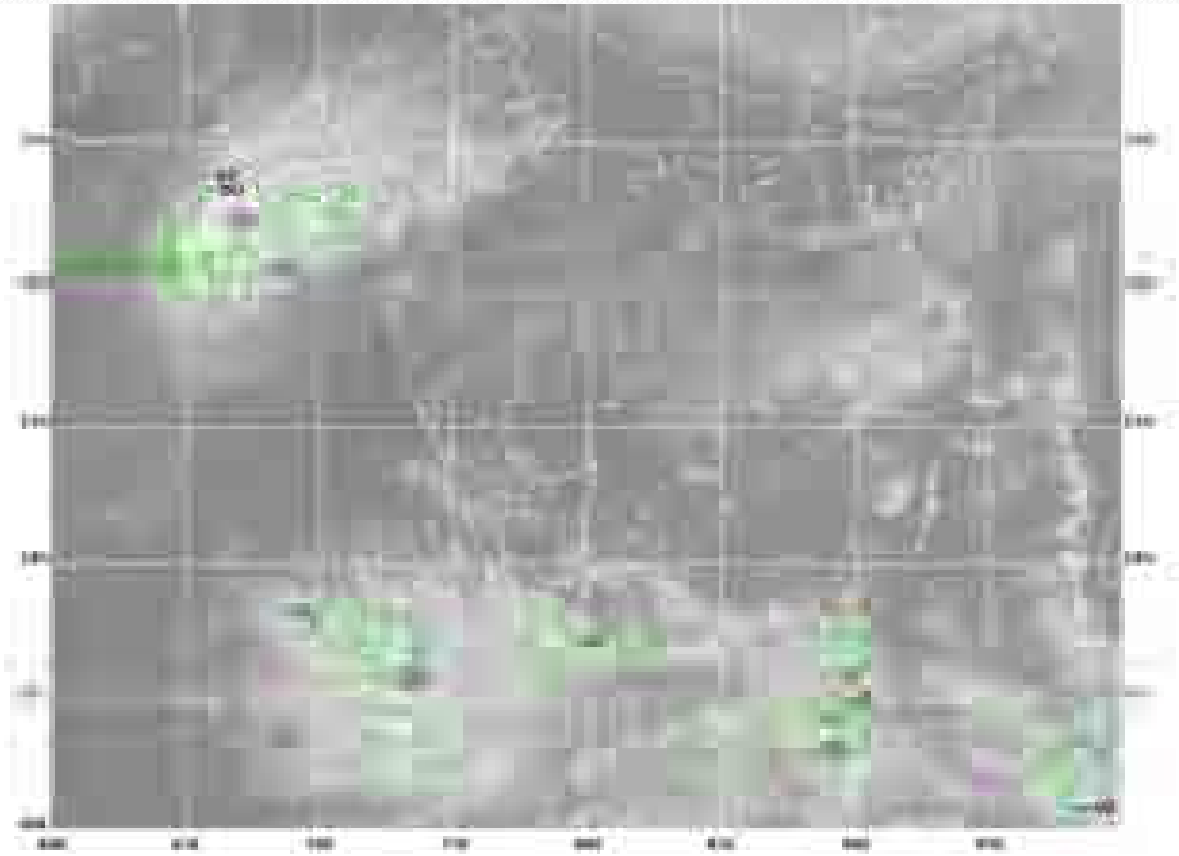


WIS

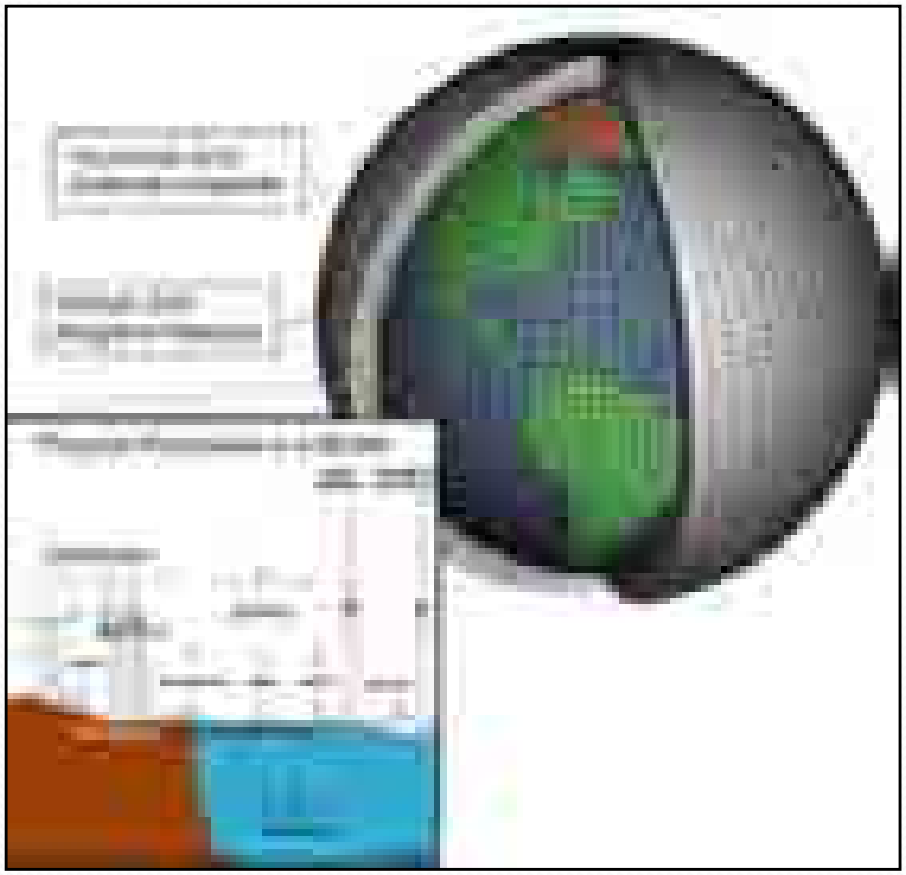

International Organizations
(IAEA, CTBTO, UNEP, FAO...)
•World Radiation Centre
•Regional Instrument Centres
•IRI and other climate research institutes
•Universities
•Regional Climate Centres
•GAW World Data Centres
•GCOS Data Centres
•Global Run-off Data Centre
•Global Precip Climatology Centre
Commercial Service Providers
WMO World Data Centres
INTERNET
NC
DCPC
GISC
Satellite Two-Way System
Satellite Dissemination
KEY:
NC = National Centres
GISC = Global Information System Centres
DCPC = Data Collection and Production Centres
Real-time "push"
On-demand "pull"

National Centres (NC)

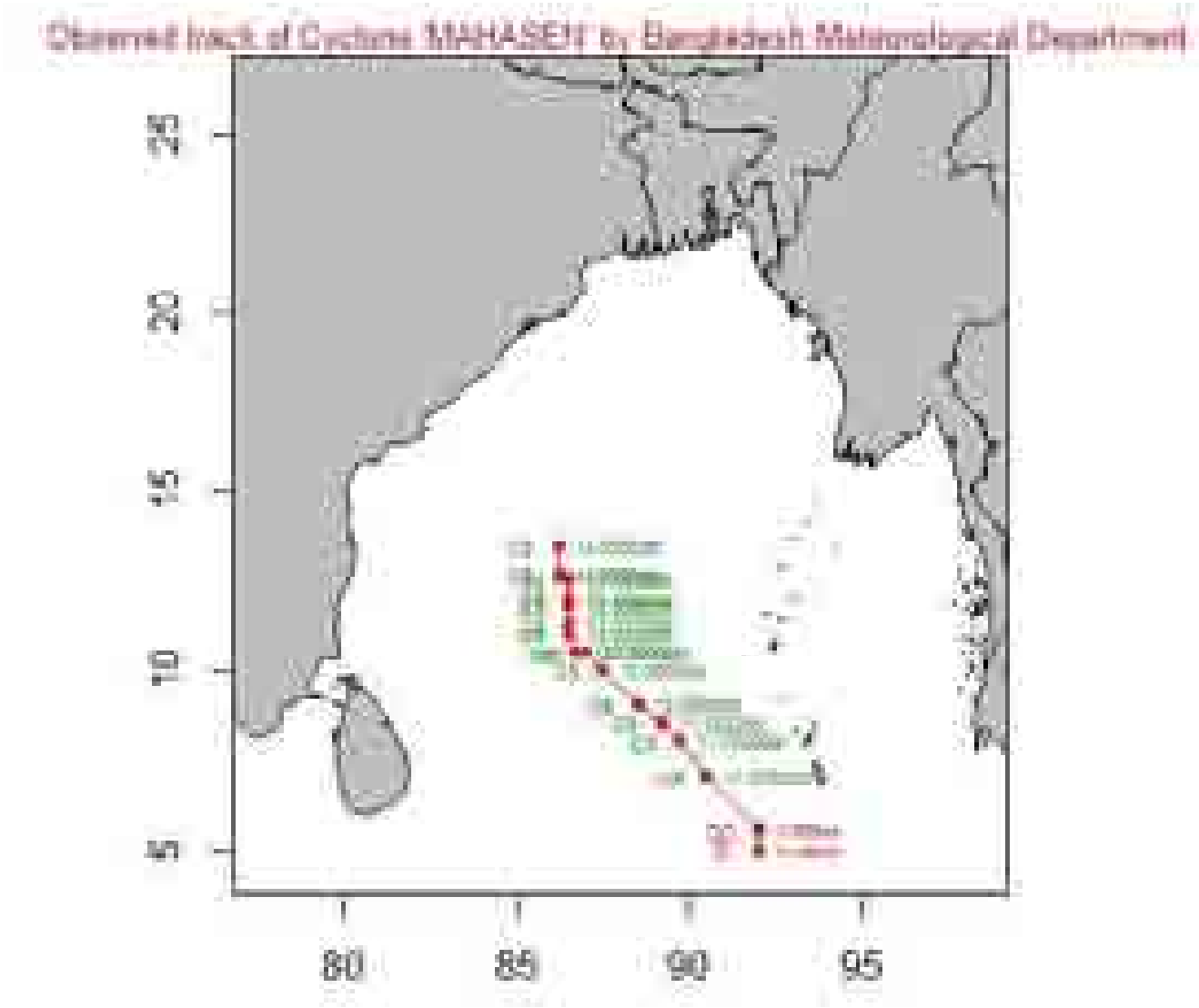
- Collect observational data from within their country
- Collect, generate and disseminate products for national use
- Authorise their national users to access WIS, as required
- Provide observations and products intended for global dissemination to their responsible GISC (possibly via a DCPC)
- Provide observations and products intended for regional or specialised distribution to the responsible DCPC
- Participate in monitoring the performance of the system

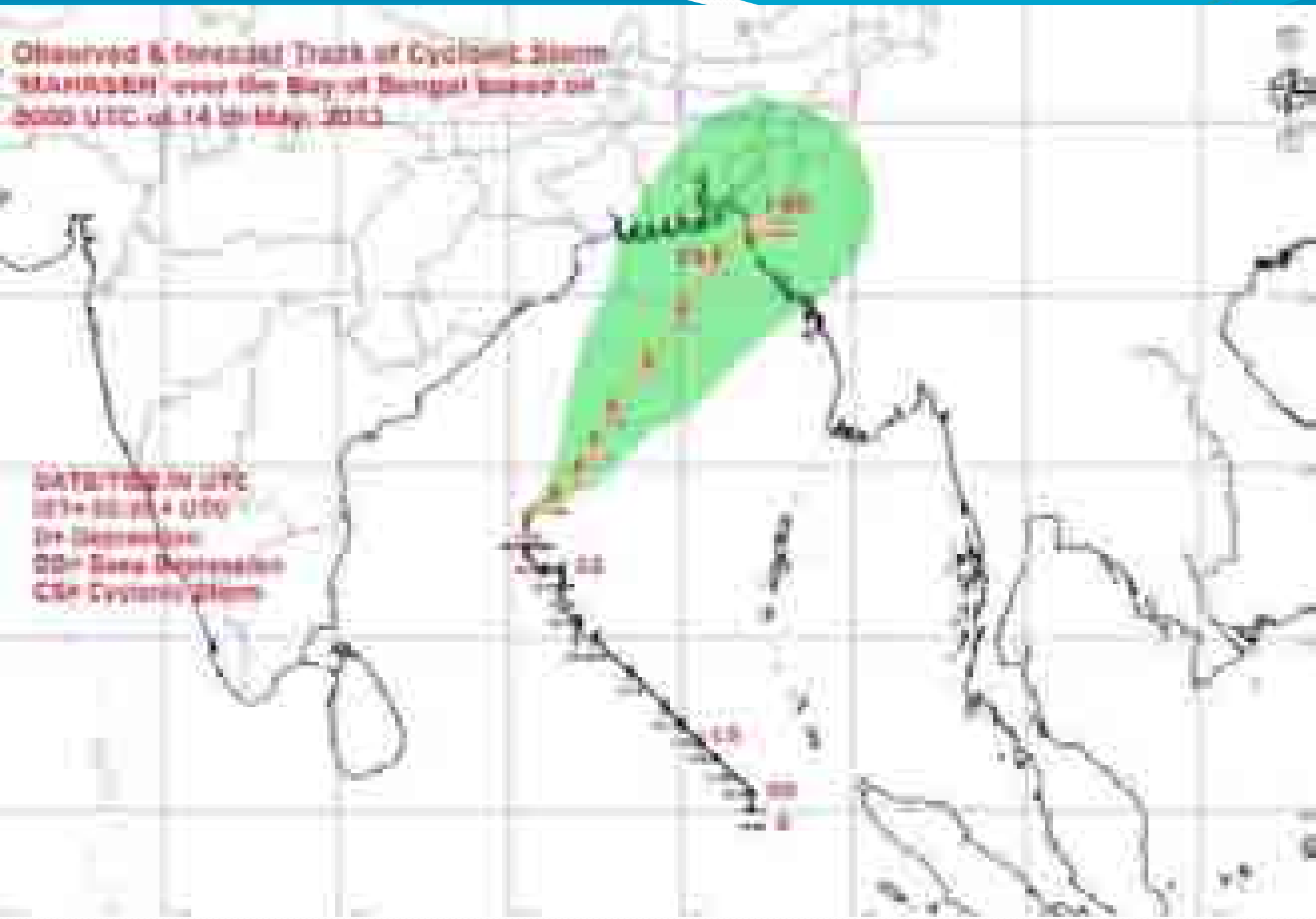


ANATOMY OF A WEATHER MODEL

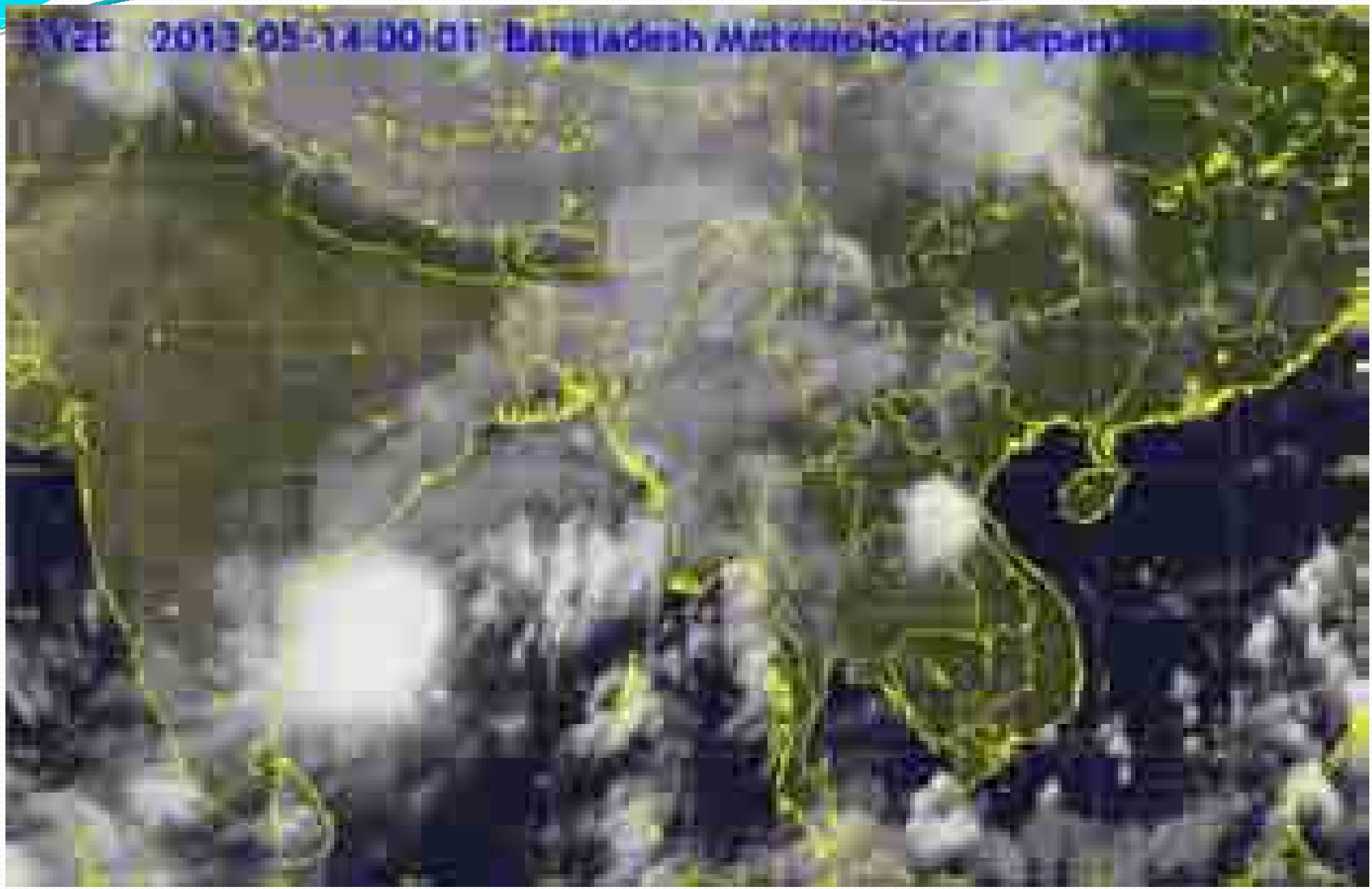


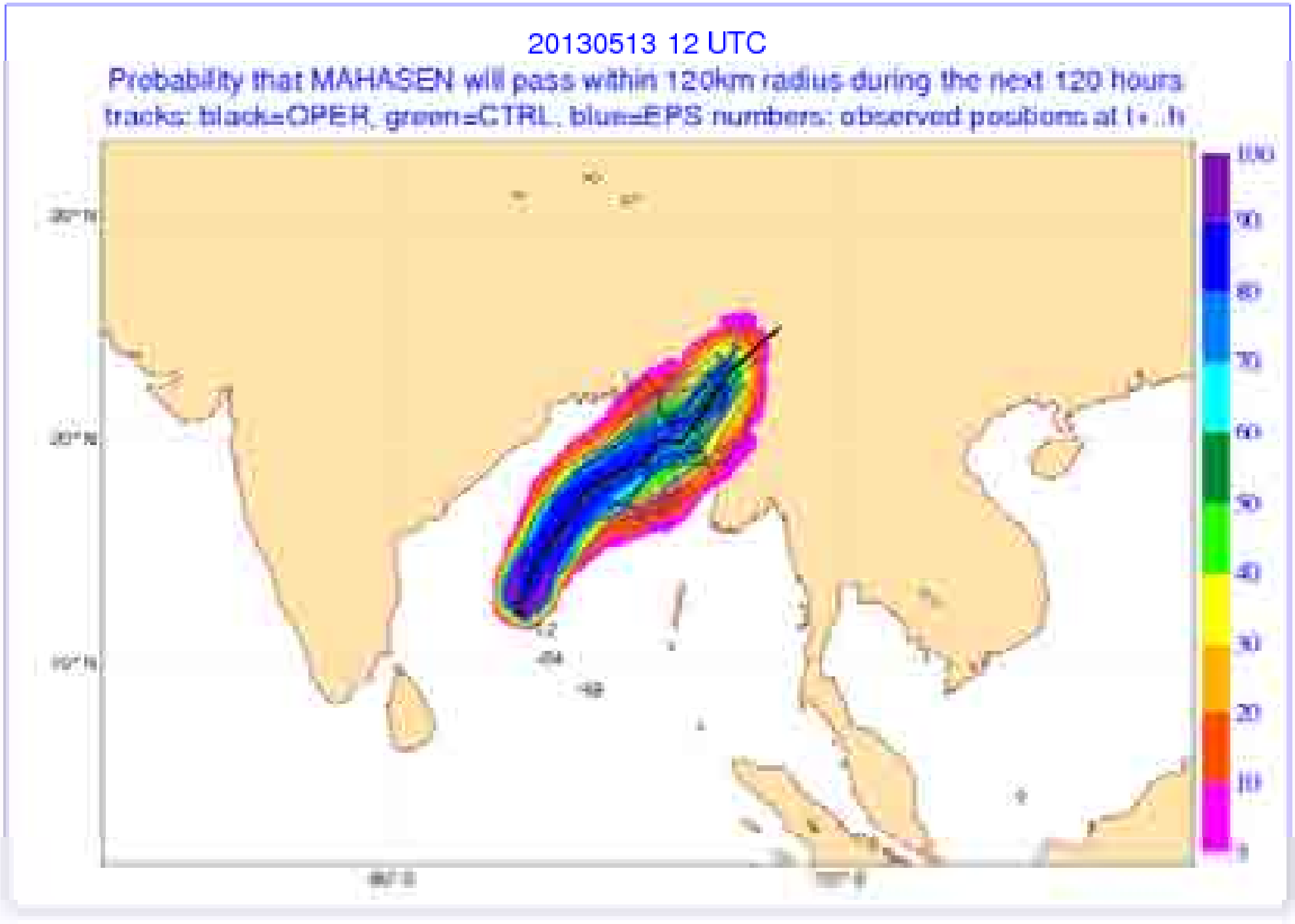
1. Earth Surface is Divided Into Segments or Grids.
2. Atmosphere Above Each Grid Area Is Then Layered.
3. Observational Data Are Used To Estimate Conditions At Each Grid Point.
4. Model Uses Complex Mathematics Determine How Atmosphere Will Evolve.

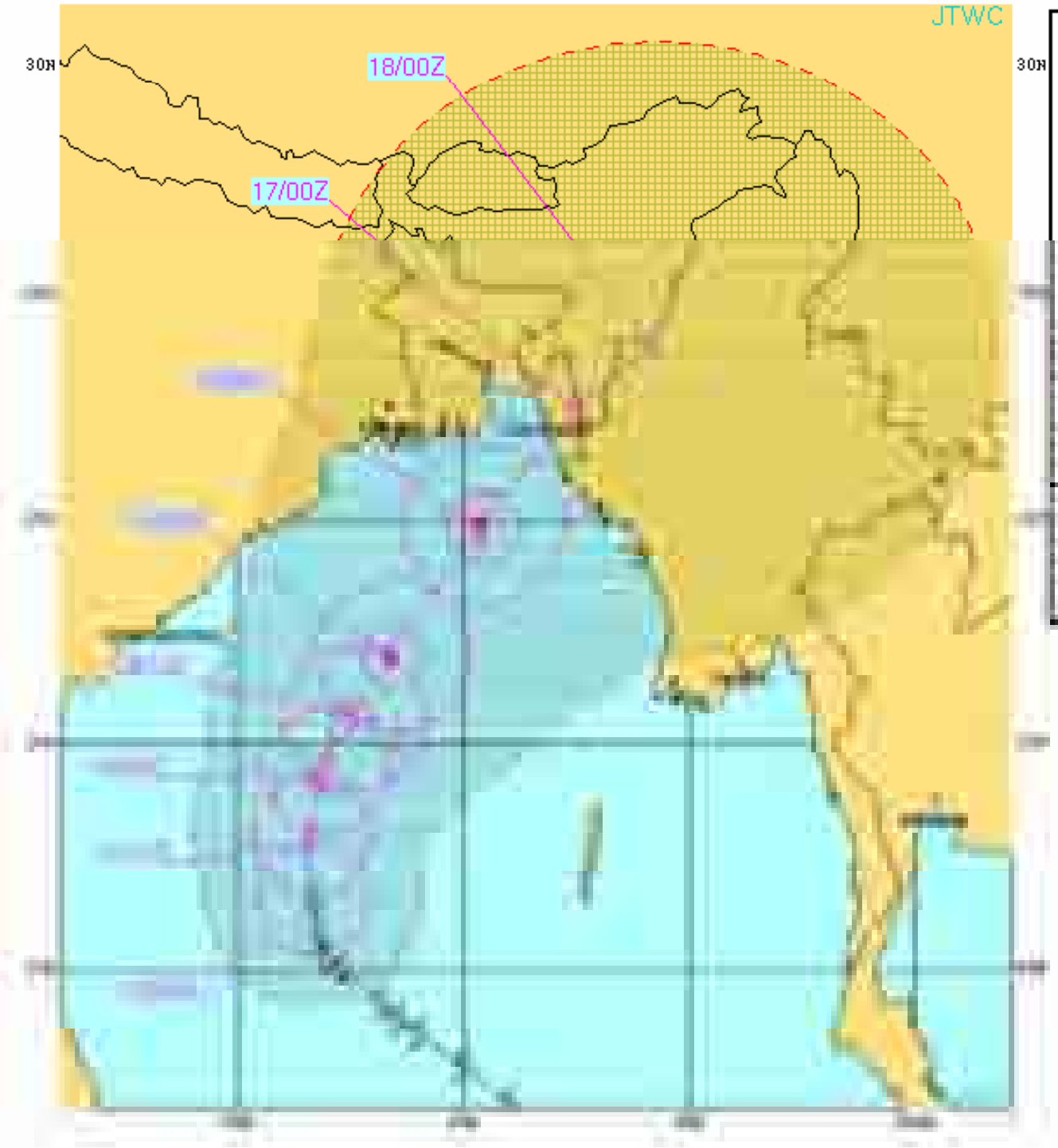

Observed track of Cyclone MAHASEN by Bangladesh Meteorological Department
80
85
90
95


Observed & forecast Track of Cyclonic Storm
'MAHASEN' over the Bay of Bengal based on
0000 UTC of 14 th May, 2013

Cyclone “MAHASEN”

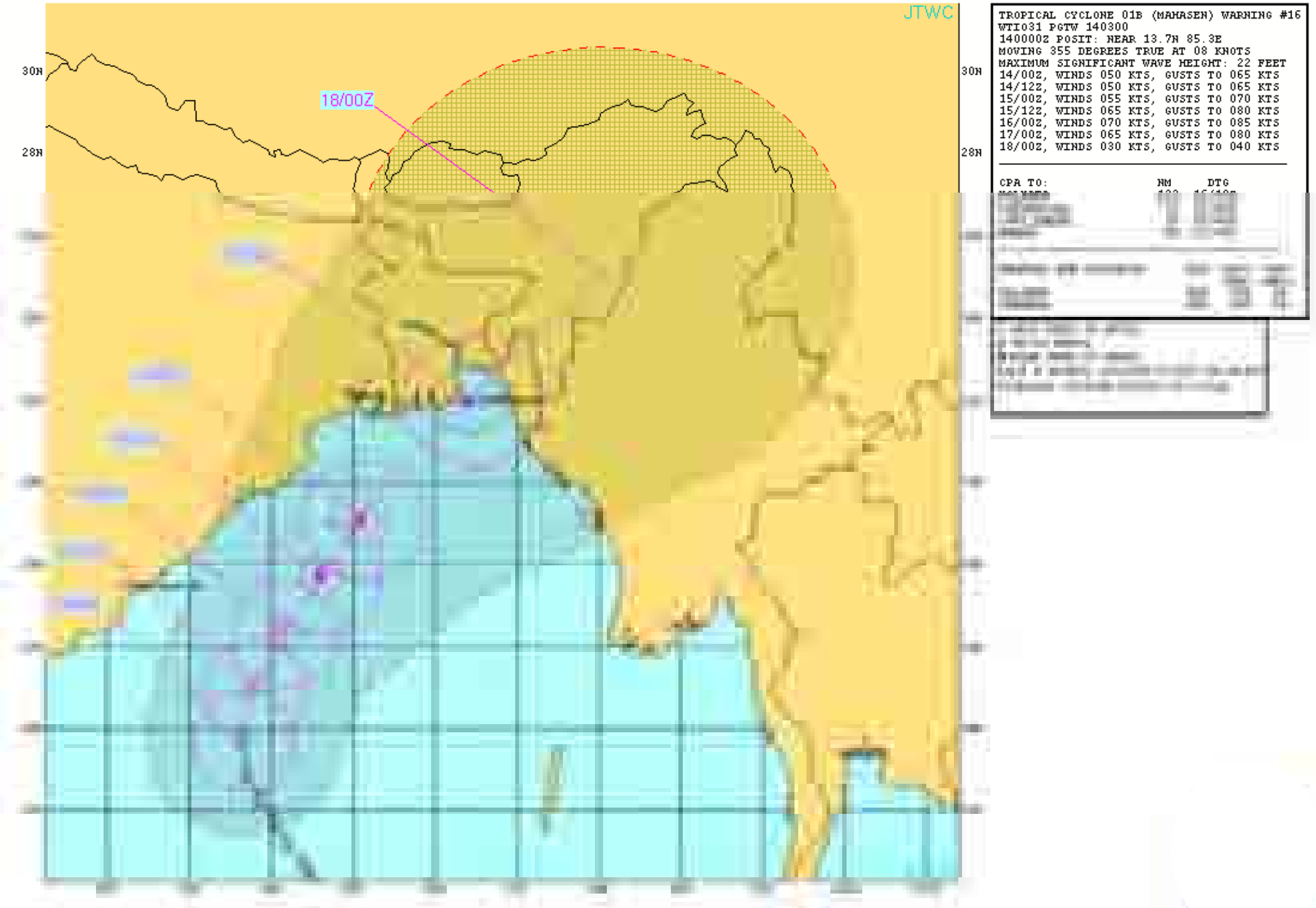


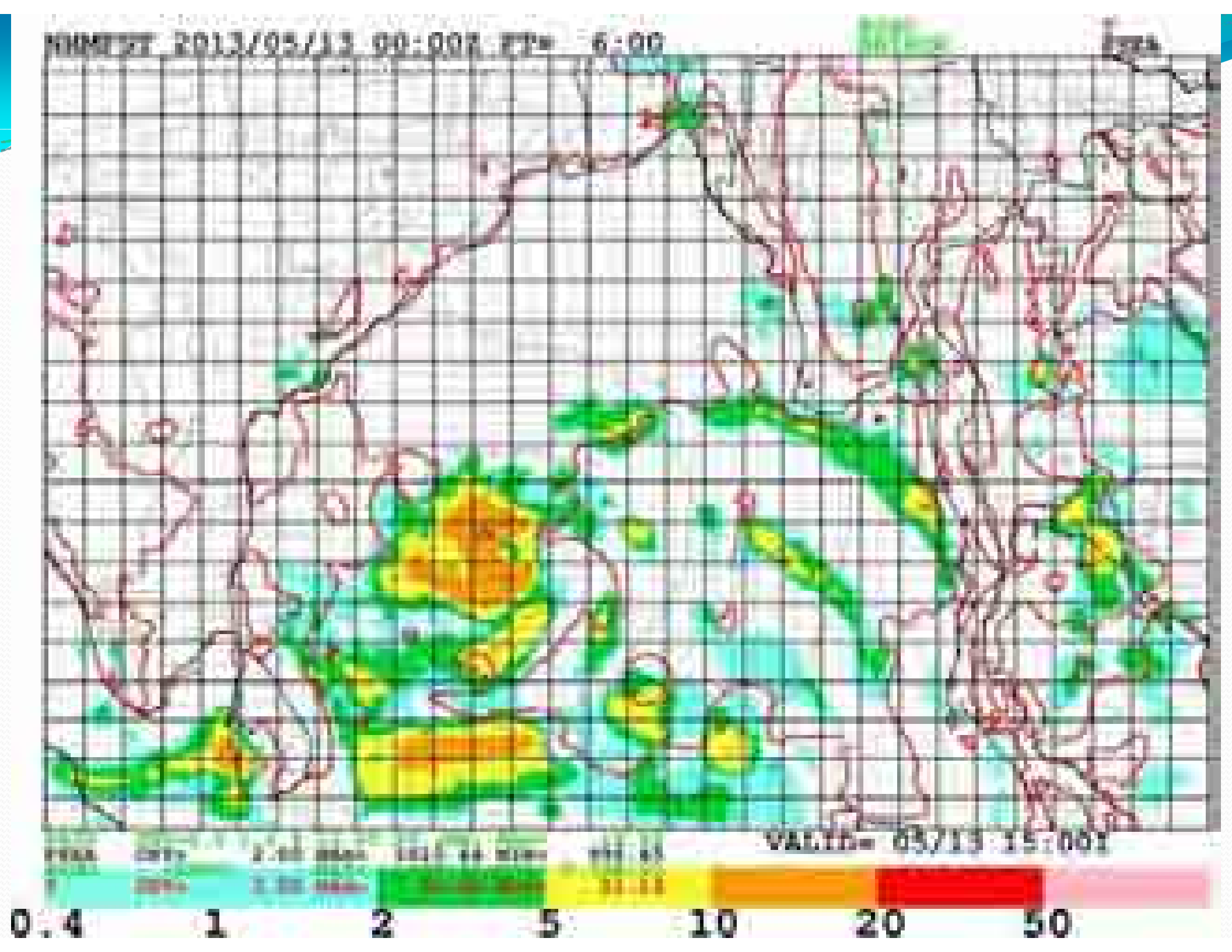

20130513 12 UTC
Probability that MAHASEN will pass within 120km radius during the next 120 hours
tracks: black=OPER, green=CTRL, blue=EPS numbers: observed positions at (+ ..h

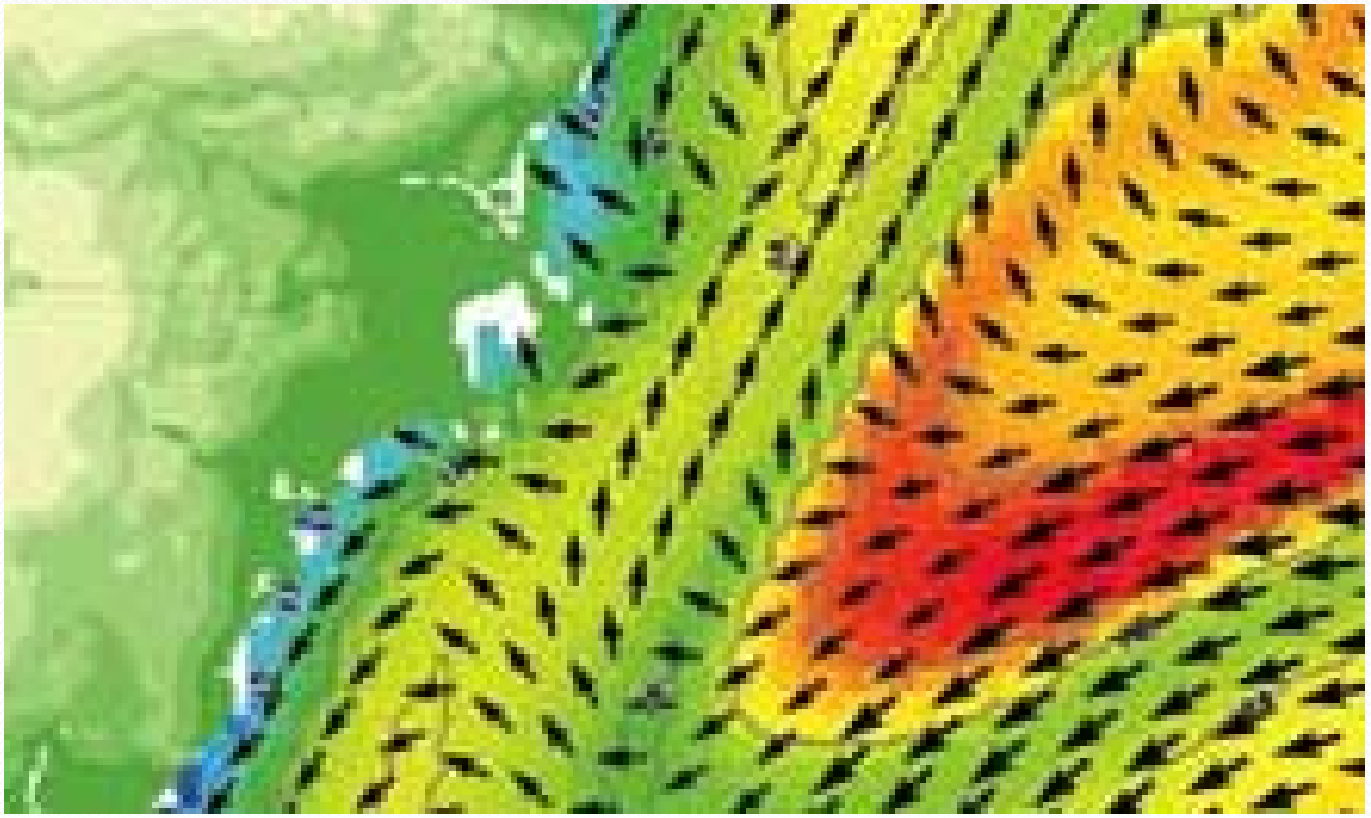


30N

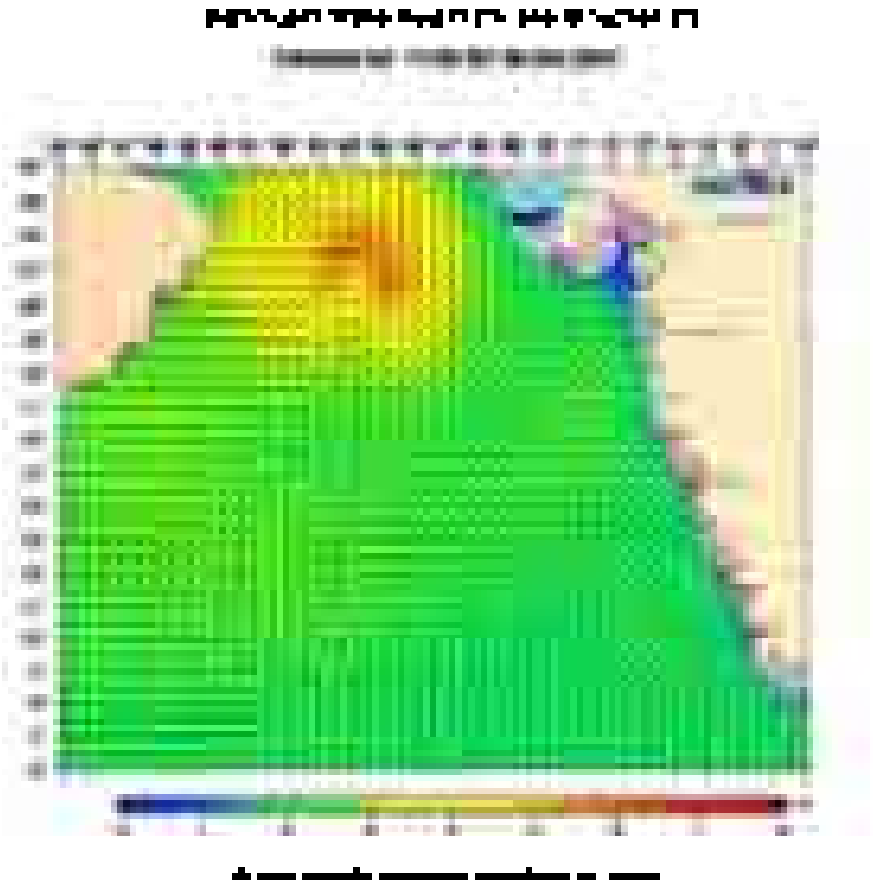
```
TROPICAL CYCLONE 01B (MAHASEN) WARNING #12
WTIO31 PGTW 130300
1300000Z POSIT: NEAR 11.5N 86.7E
MOVING 355 DEGREES TRUE AT 08 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 18 FEET
13/00Z, WINDS 050 KTS, GUSTS TO 065 KTS
13/12Z, WINDS 050 KTS, GUSTS TO 065 KTS
14/00Z, WINDS 055 KTS, GUSTS TO 070 KTS
14/12Z, WINDS 060 KTS, GUSTS TO 075 KTS
15/00Z, WINDS 065 KTS, GUSTS TO 080 KTS
16/00Z, WINDS 070 KTS, GUSTS TO 085 KTS
17/00Z, WINDS 050 KTS, GUSTS TO 065 KTS
18/00Z, WINDS 030 KTS, GUSTS TO 040 KTS
```


JTWC
30N
28N
18/00Z
30N
28N
TROPICAL CYCLONE 01B (MAHASEN) WARNING #16
WTI031 PGTW 140300
140000Z POSIT: NEAR 13.7N 85.3E
MOVING 355 DEGREES TRUE AT 08 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 22 FEET
14/00Z, WINDS 050 KTS, GUSTS TO 065 KTS
14/12Z, WINDS 050 KTS, GUSTS TO 065 KTS
15/00Z, WINDS 055 KTS, GUSTS TO 070 KTS
15/12Z, WINDS 065 KTS, GUSTS TO 080 KTS
16/00Z, WINDS 070 KTS, GUSTS TO 085 KTS
17/00Z, WINDS 065 KTS, GUSTS TO 080 KTS
18/00Z, WINDS 030 KTS, GUSTS TO 040 KTS
CPA TO:
NM
DTG

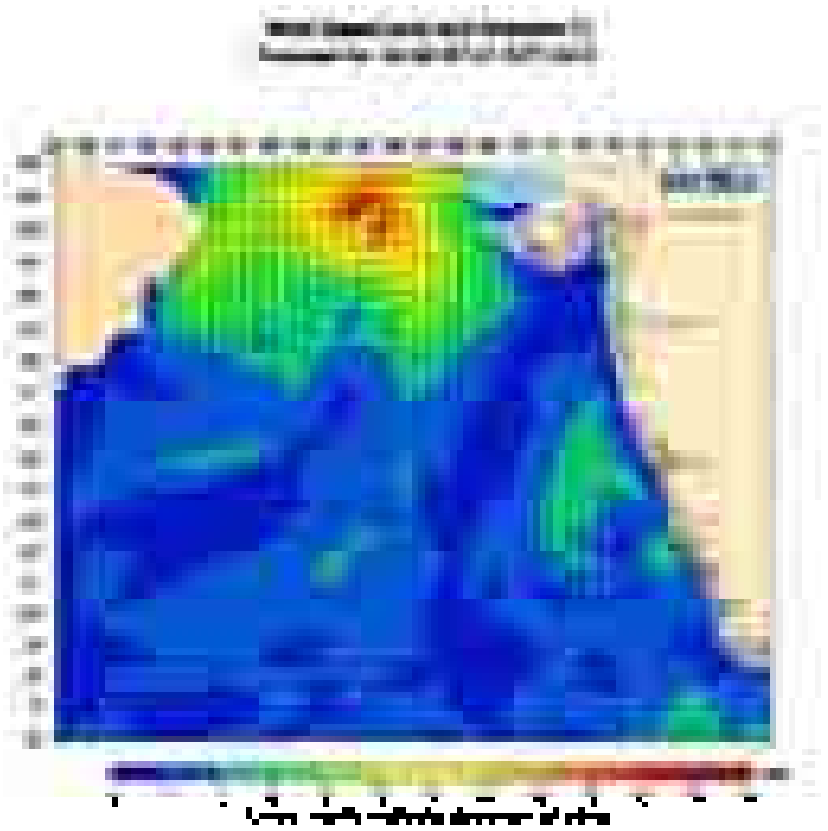

0.4
1
2
5
10
20
50



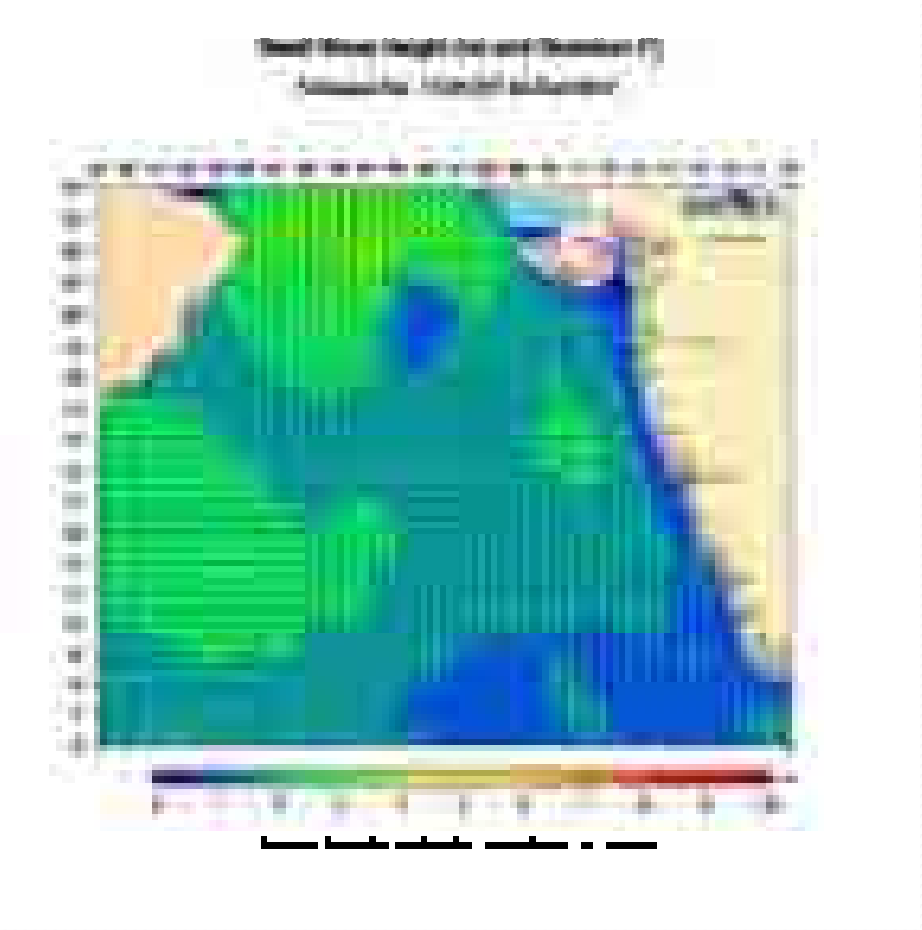
- Ocean State Forecast



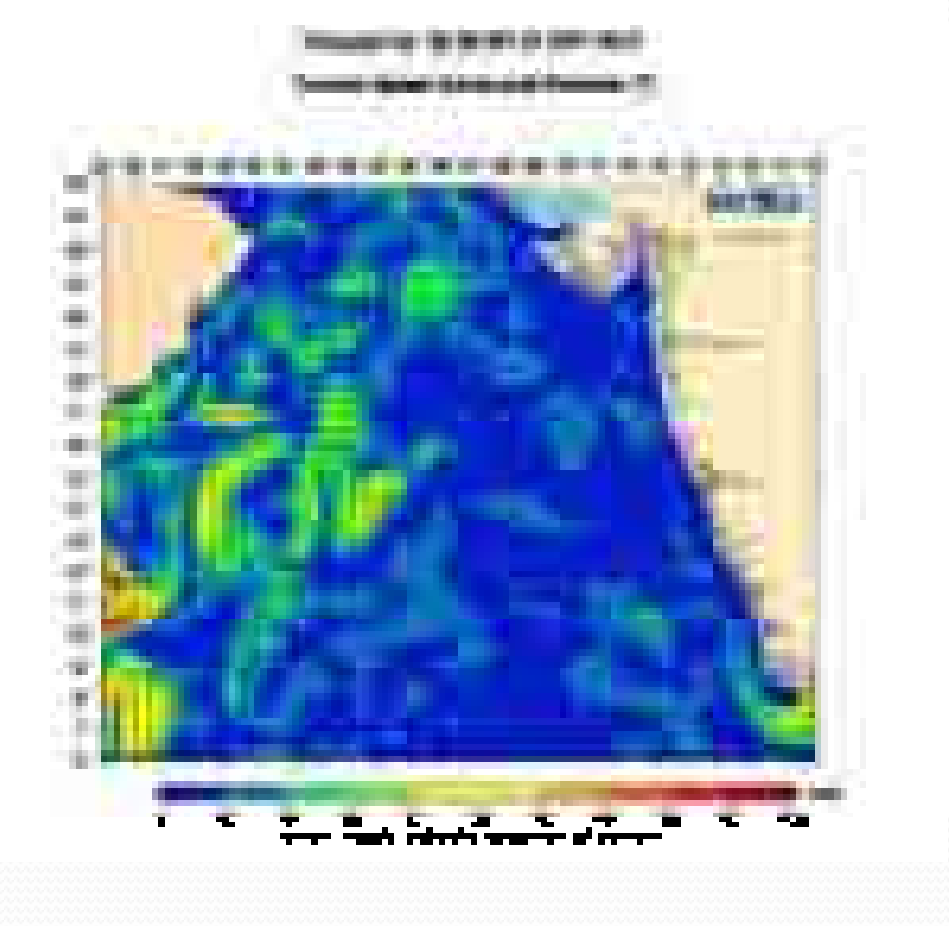
Wave Height



Wind Speed

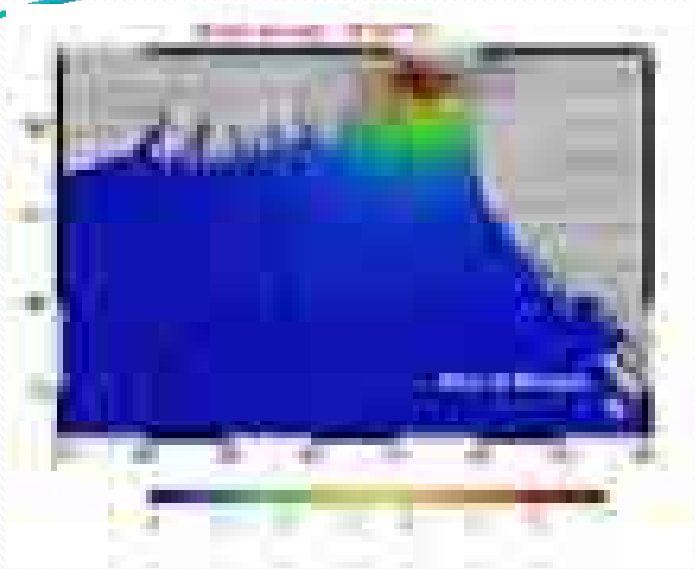


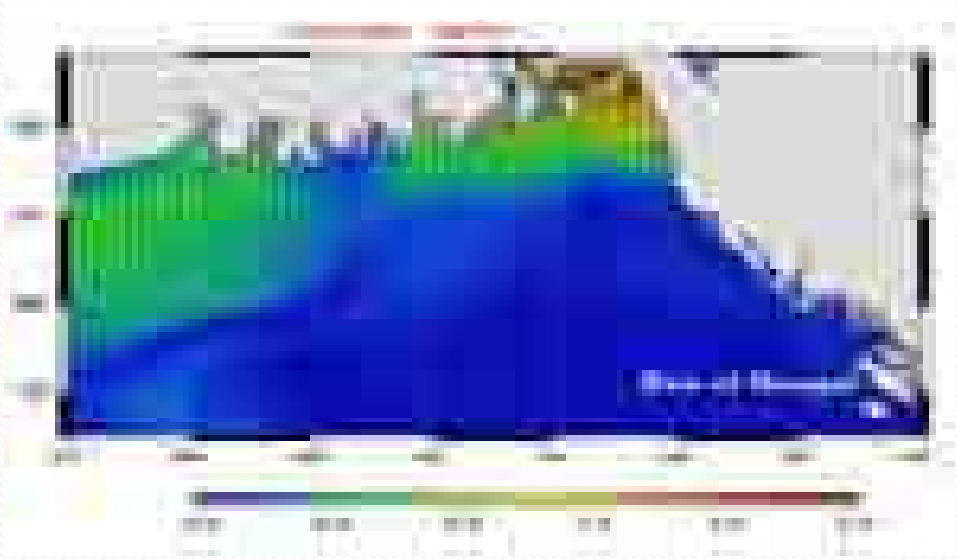
Swell Height

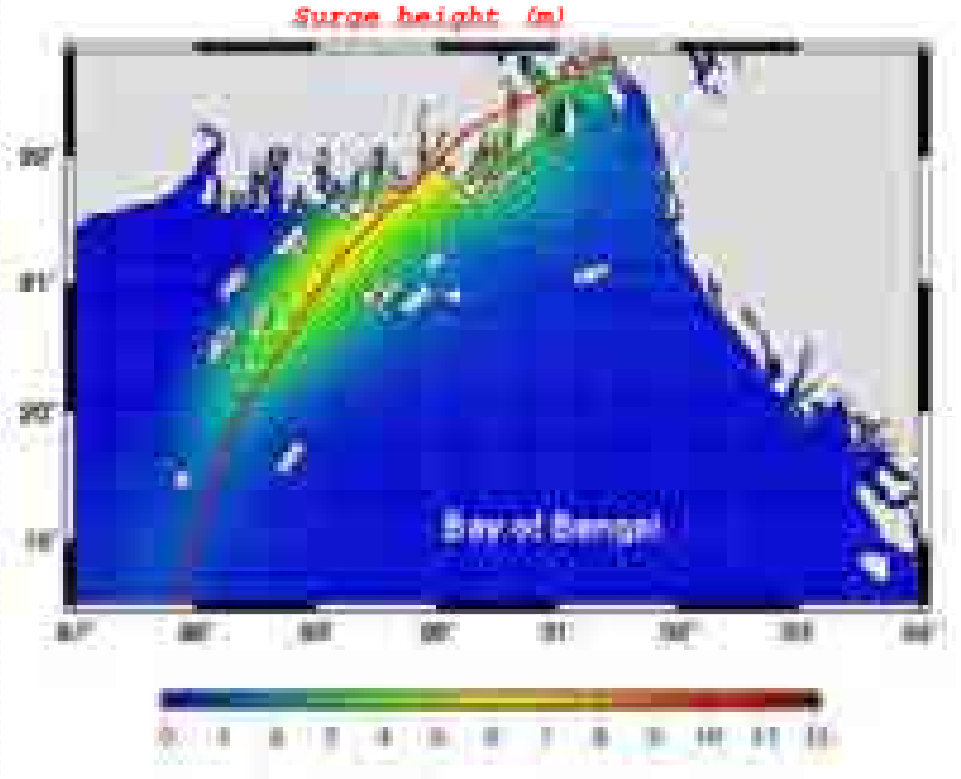


Current

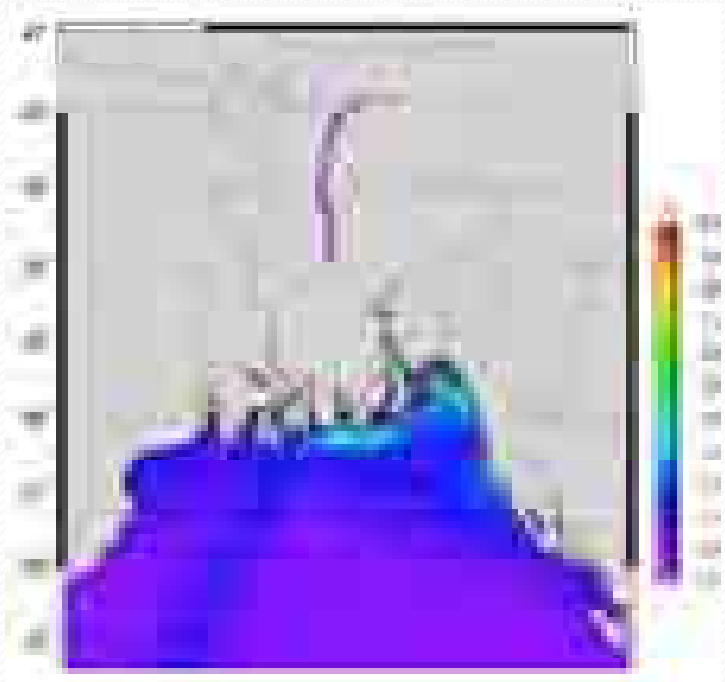
Simulation of Cyclone Bhola (1970) by using IIT-D Model



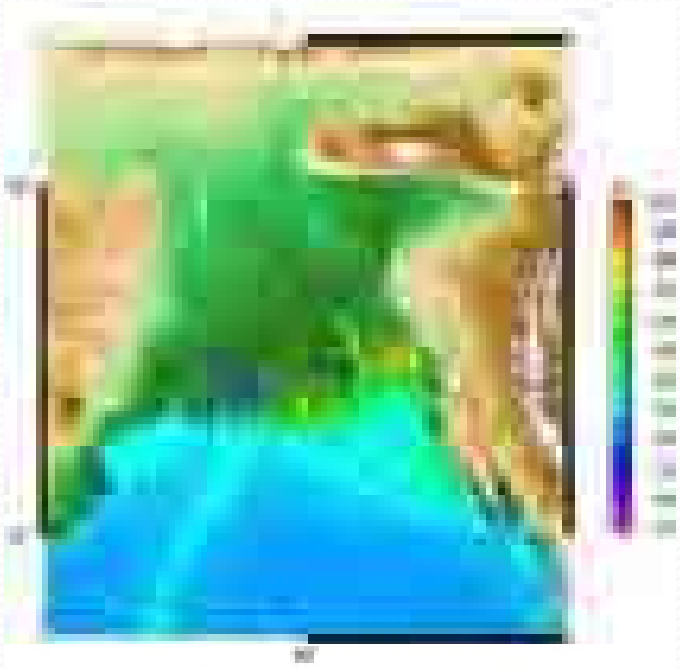




Simulation of Cyclone Bhola (1970) by using MRI Model

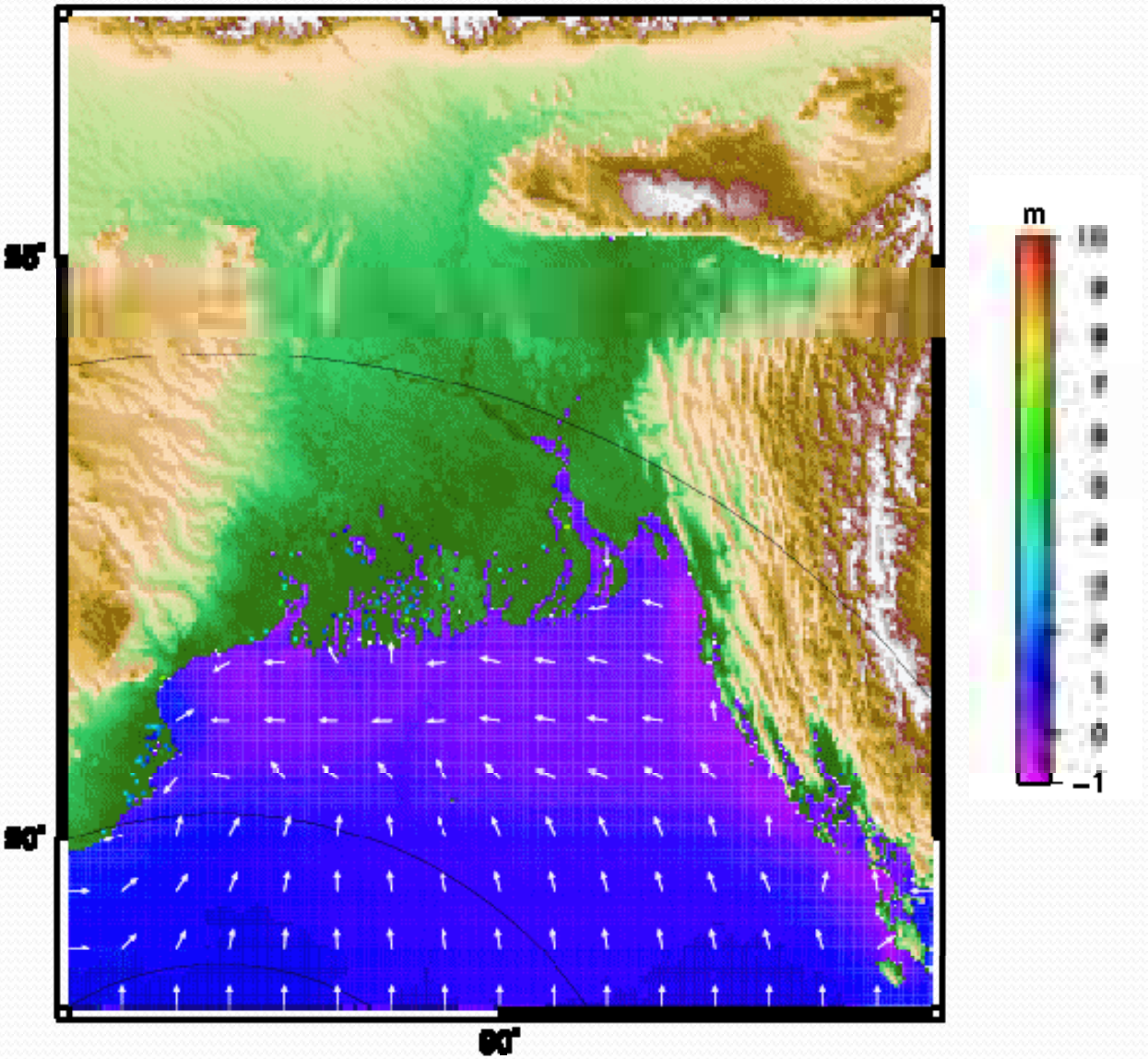


Surge height distribution (m) during landfall

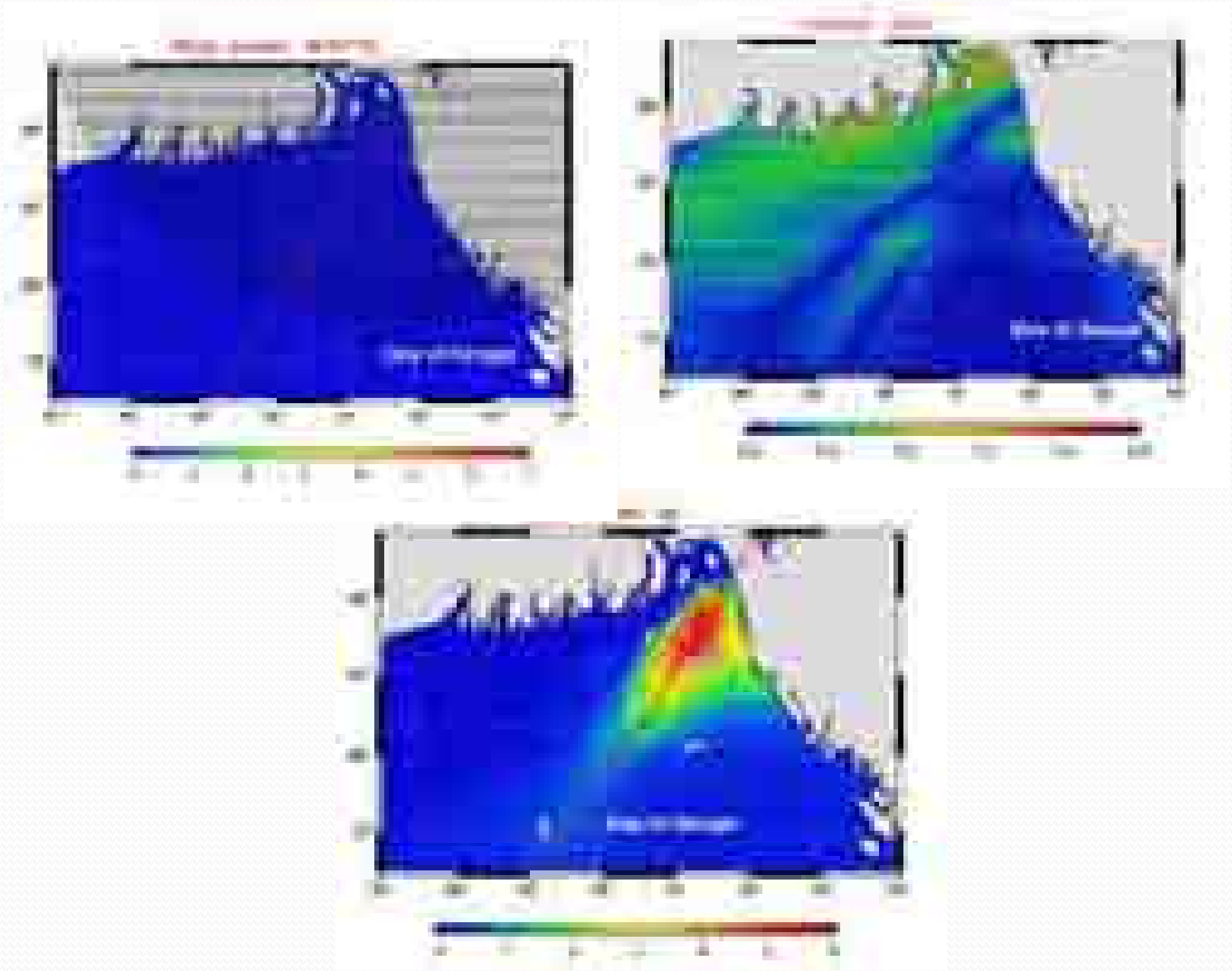


Distribution of height of tide (m) during landfall

Maximum tide distribution over North Bay (animation) associated with Cyclone Bhola (1970) using MRI Model

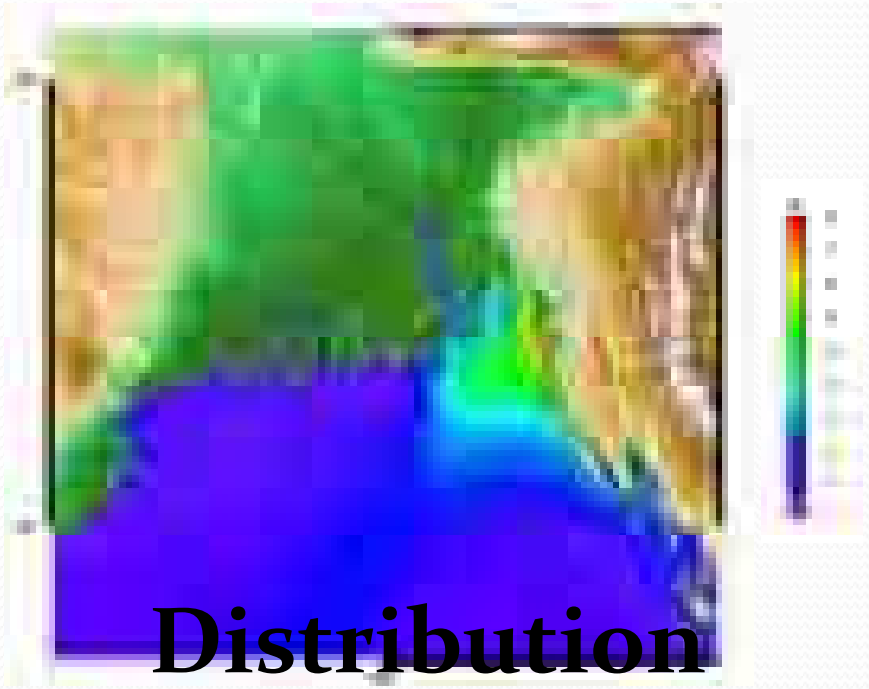


Simulation of Chittagong Cyclone 1991 by using IIT-D Model



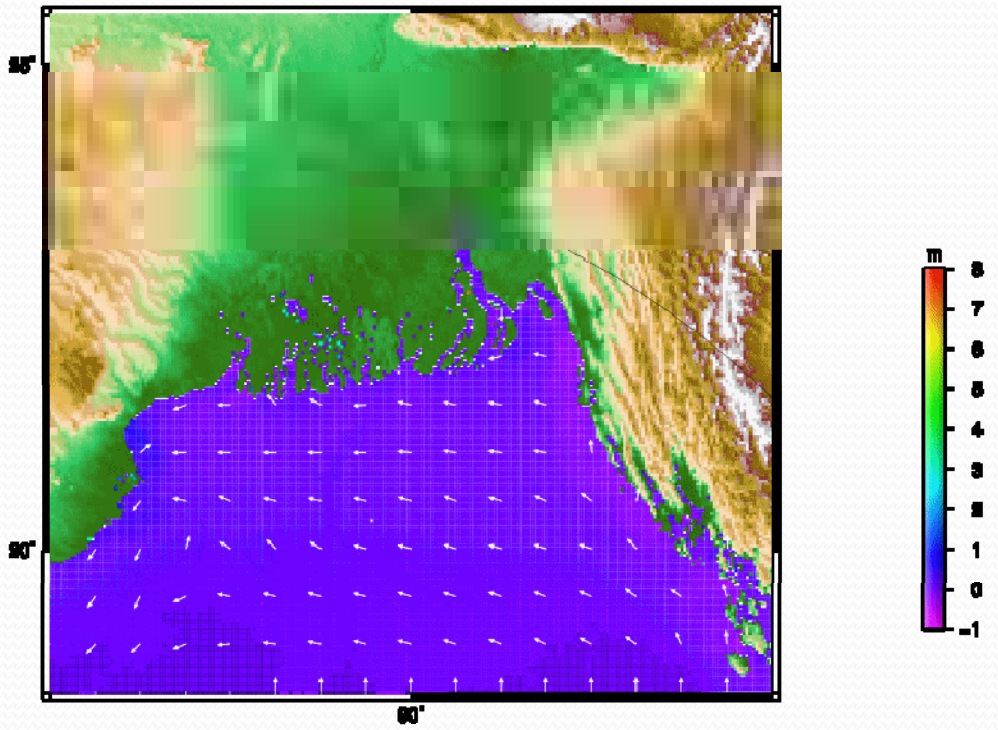
Simulation of Chittagong cyclone 1991 by using MRI Model

Surge height (m) during landfall distribution

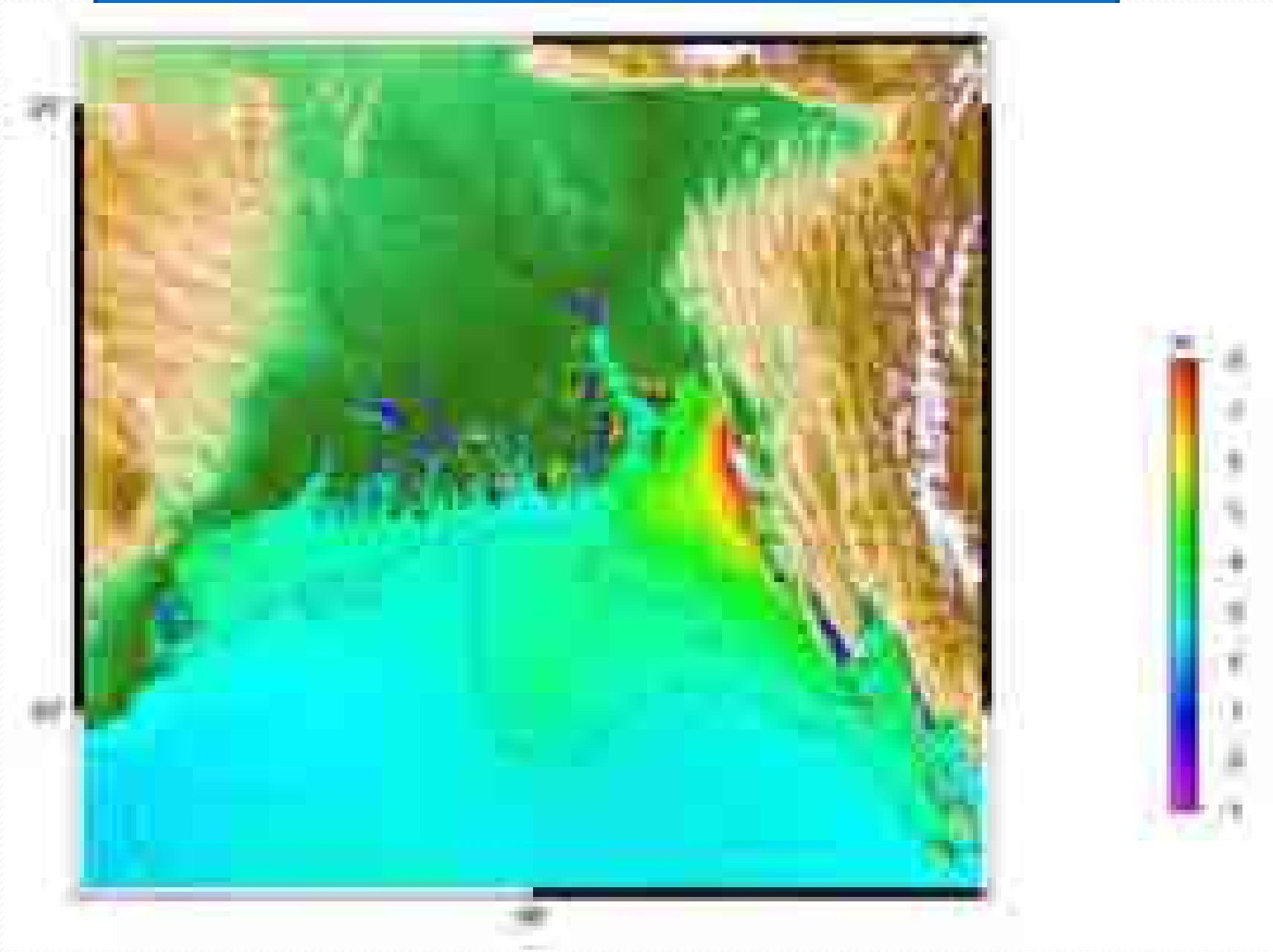


Distribution of height of tide (m) during landfall

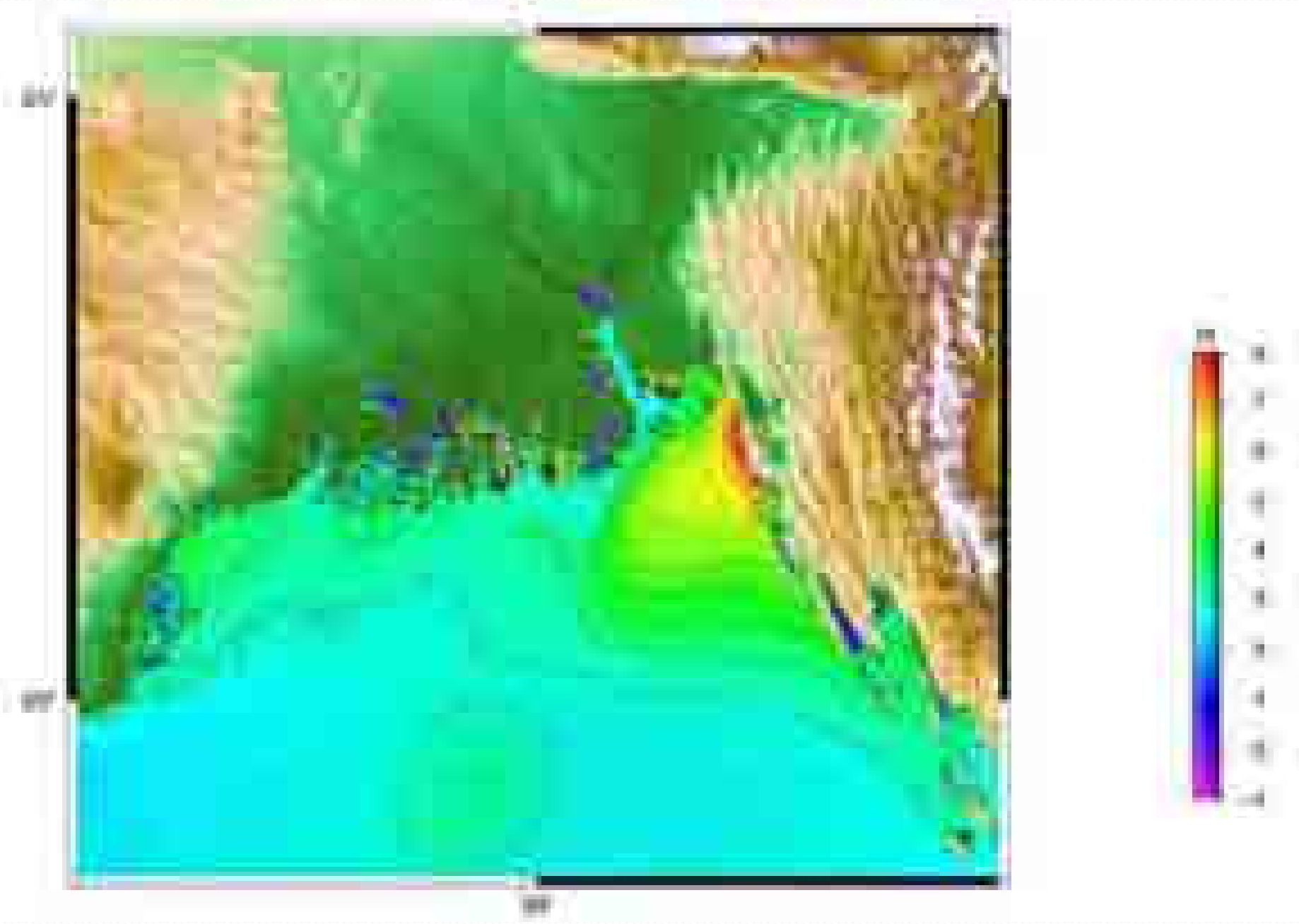
Maximum tide distribution over North Bay (animation) associated with Chittagong cyclone (1991) using MRI Model



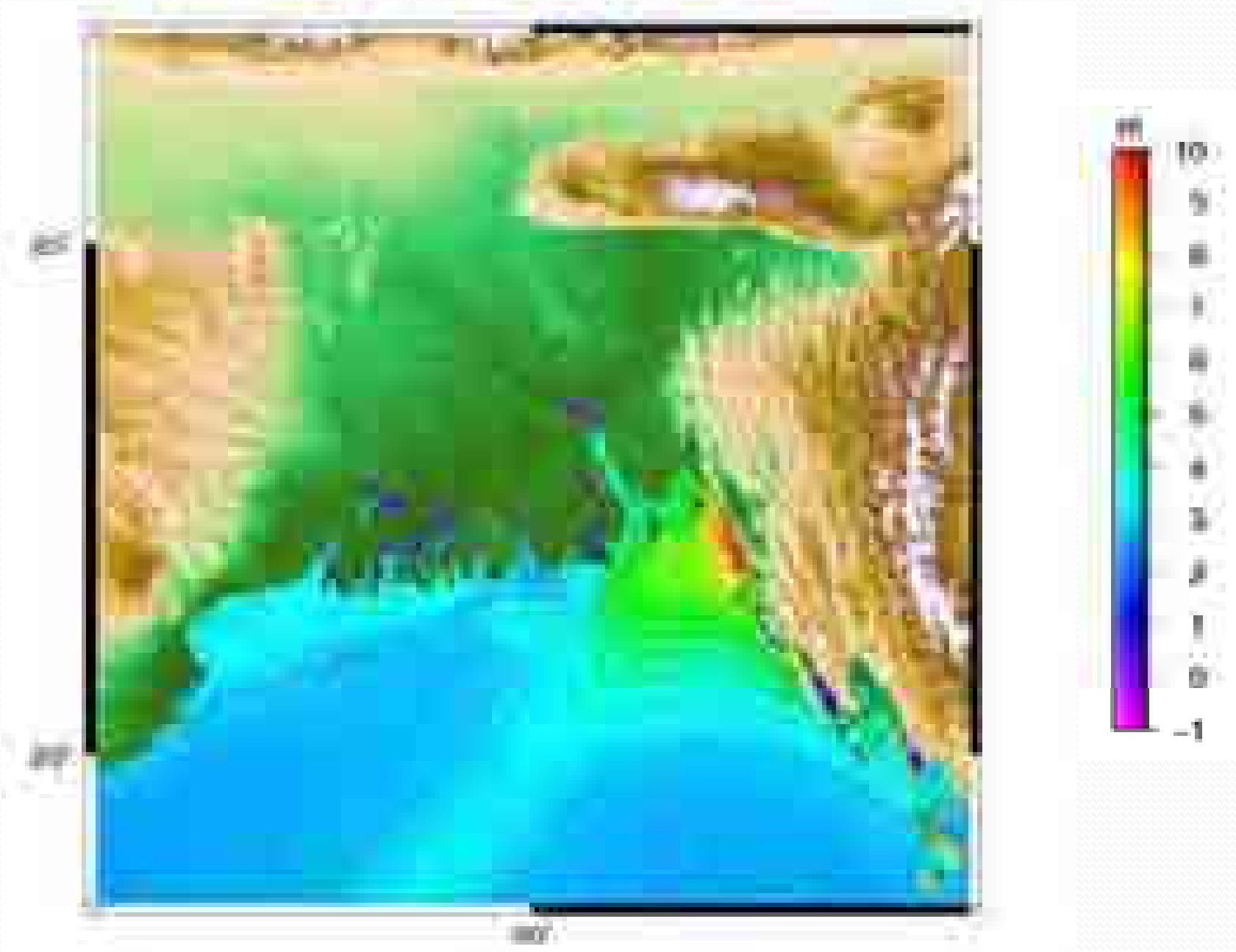
Initial tide data considered as a low tide at MRI model



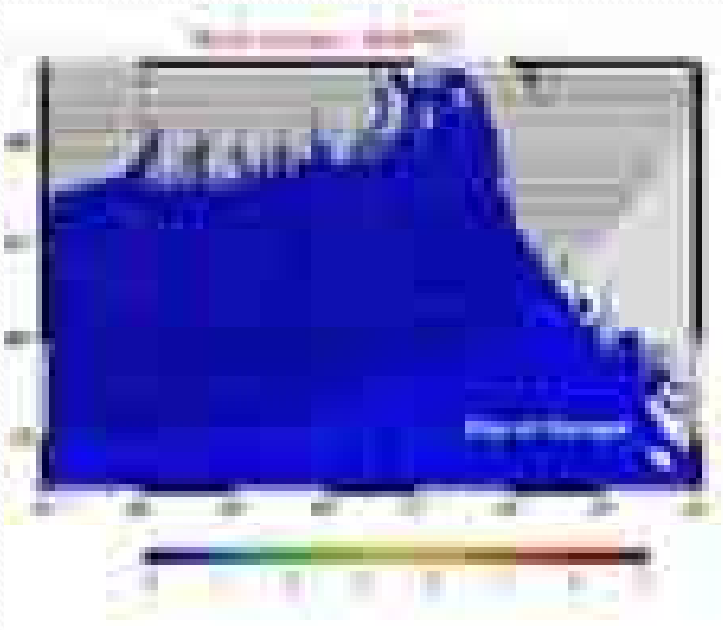
Initial tide data considered as a high tide at MRI model

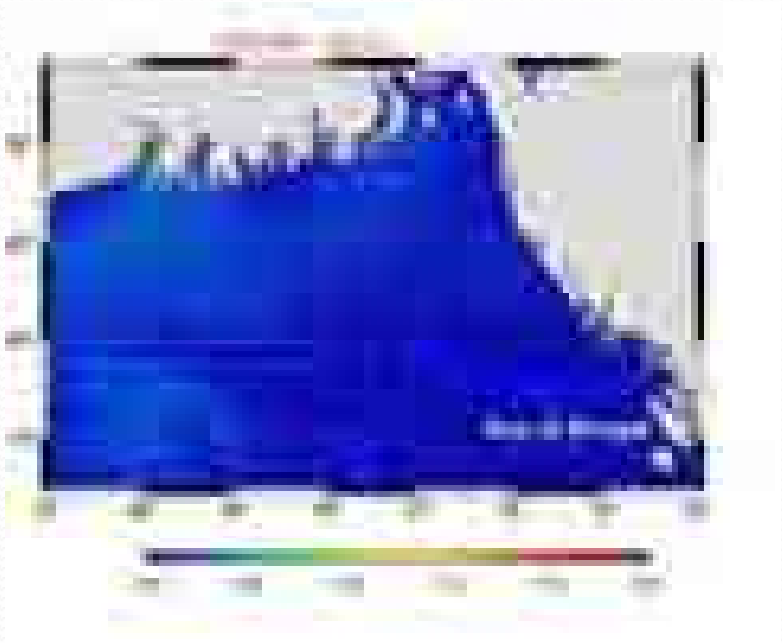


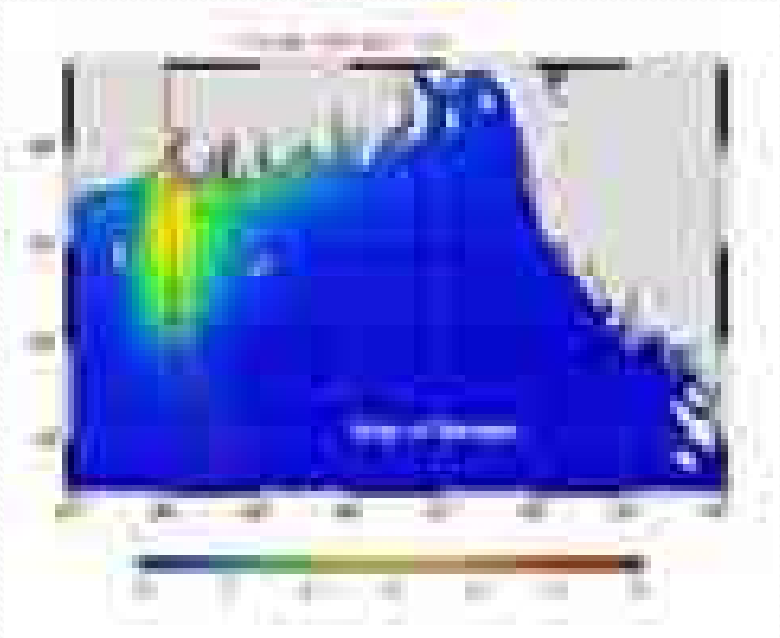
Central pressure reduced 5 hpa each step from actual central pressure at MRI model



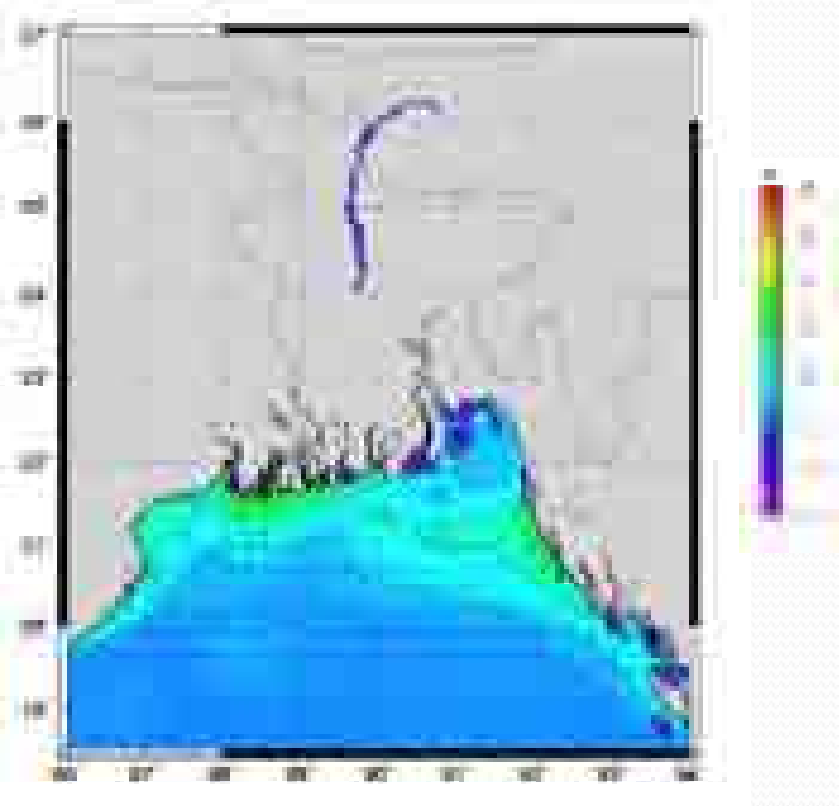
Simulation of Cyclone Aila by using IIT-D Model



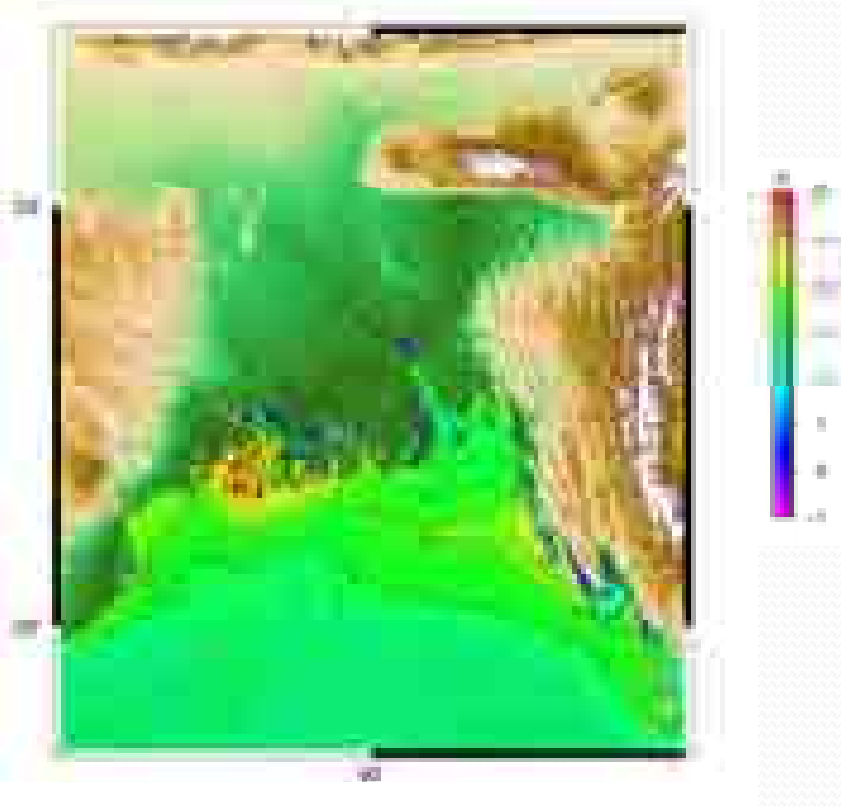




Simulation of Cyclone Aila by using MRI Model

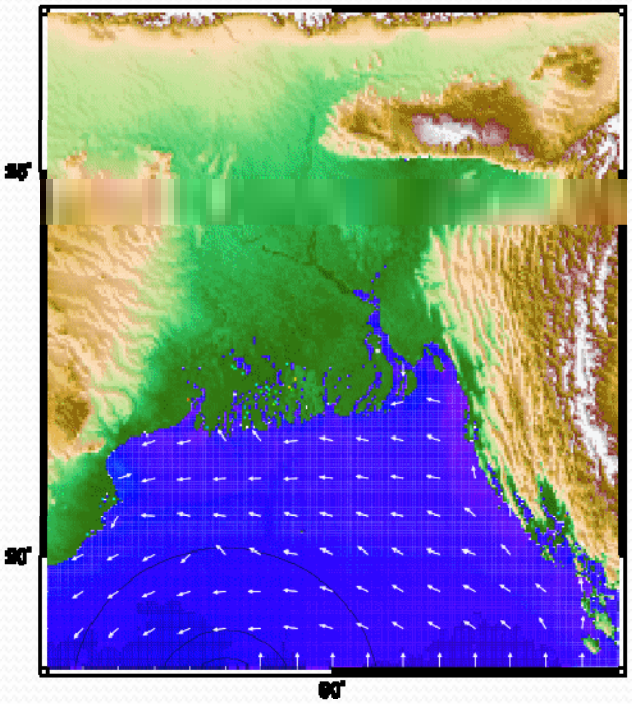


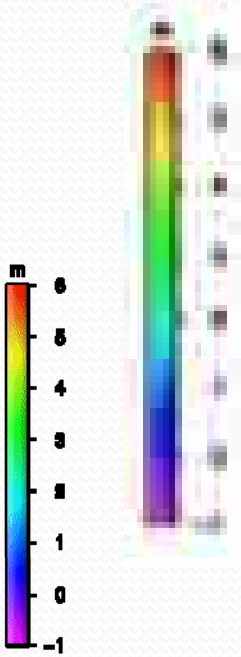
Surge height (m) during landfall distribution



Distribution of height of tide (m) during landfall

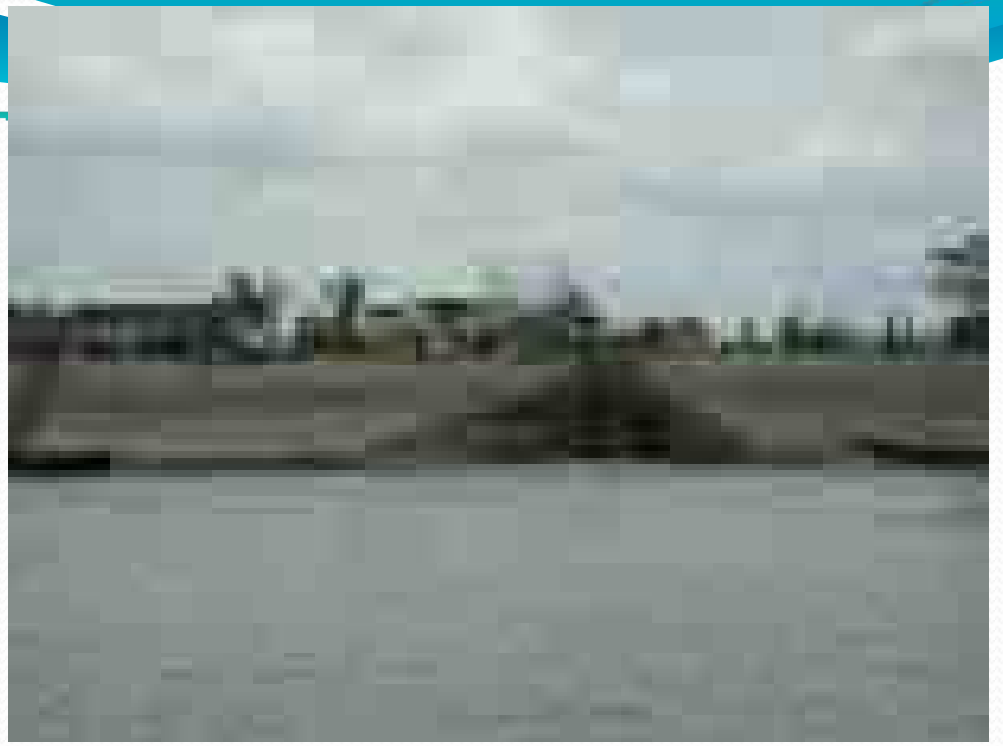
Maximum tide distribution over North Bay (animation) associated with Cyclone Aila using MRI Model

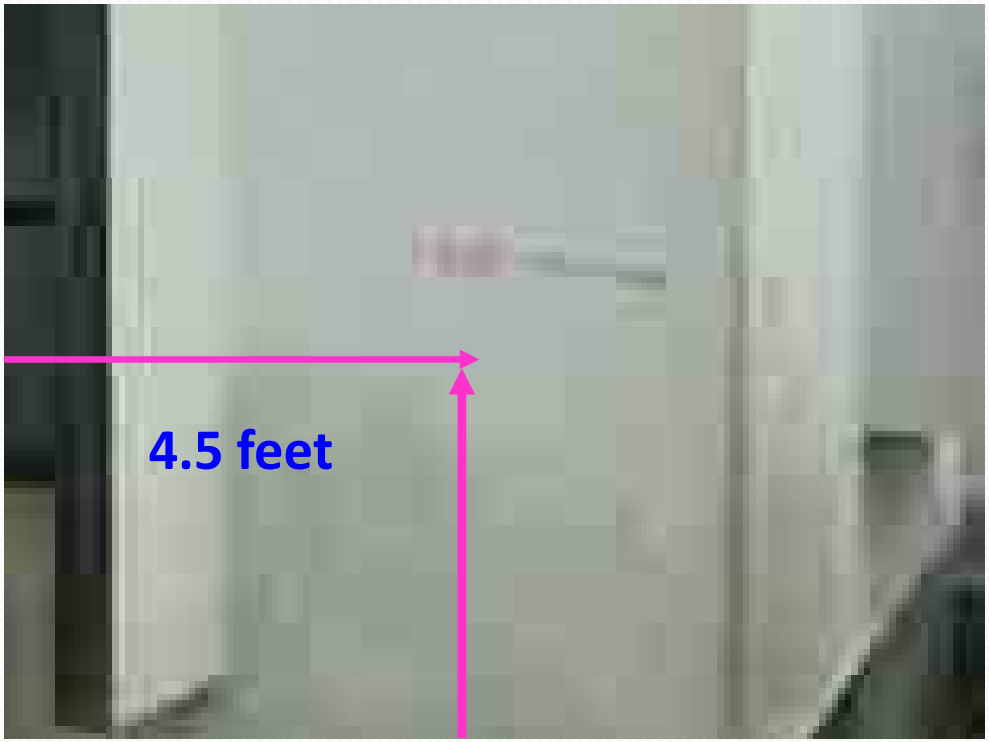


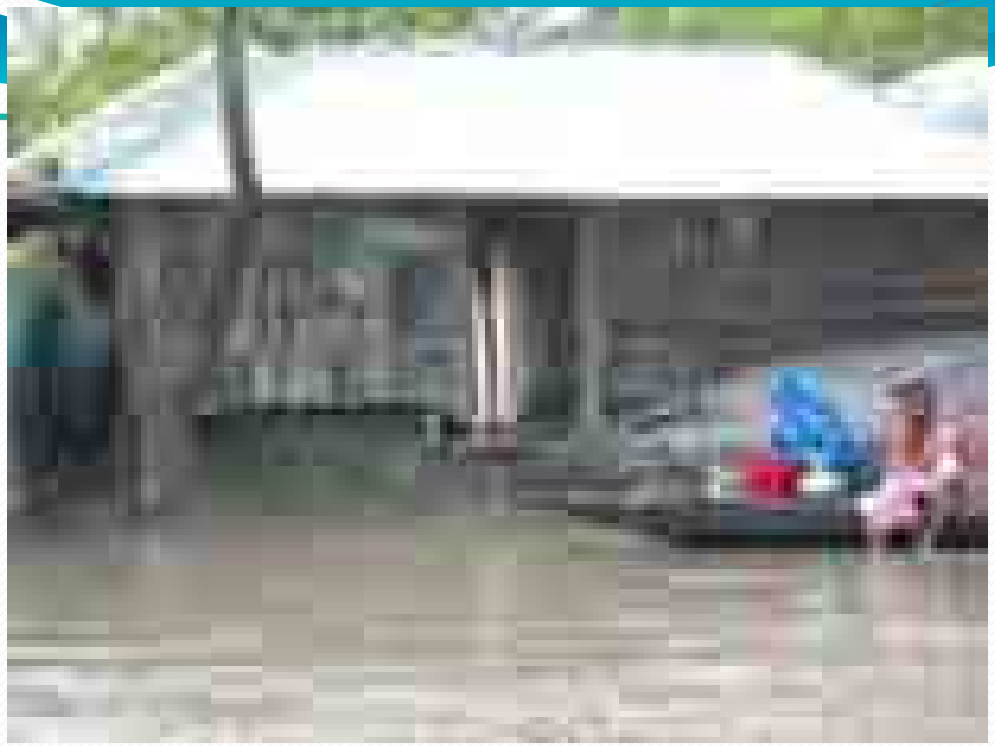


Model validation with the observed result

Cyclone name	IIT-D Model simulation height (meter)	MRI Model simulation height (meter)	Observed surge(including astronomical tide) height (meter)
Bhola Cylone, 1970	11.5	4-10	3-10
Chittagong Cyclone 1991	5.5	7-8	6-7.6
Cyclone Aila, 2009	4.5	4-5	4-5



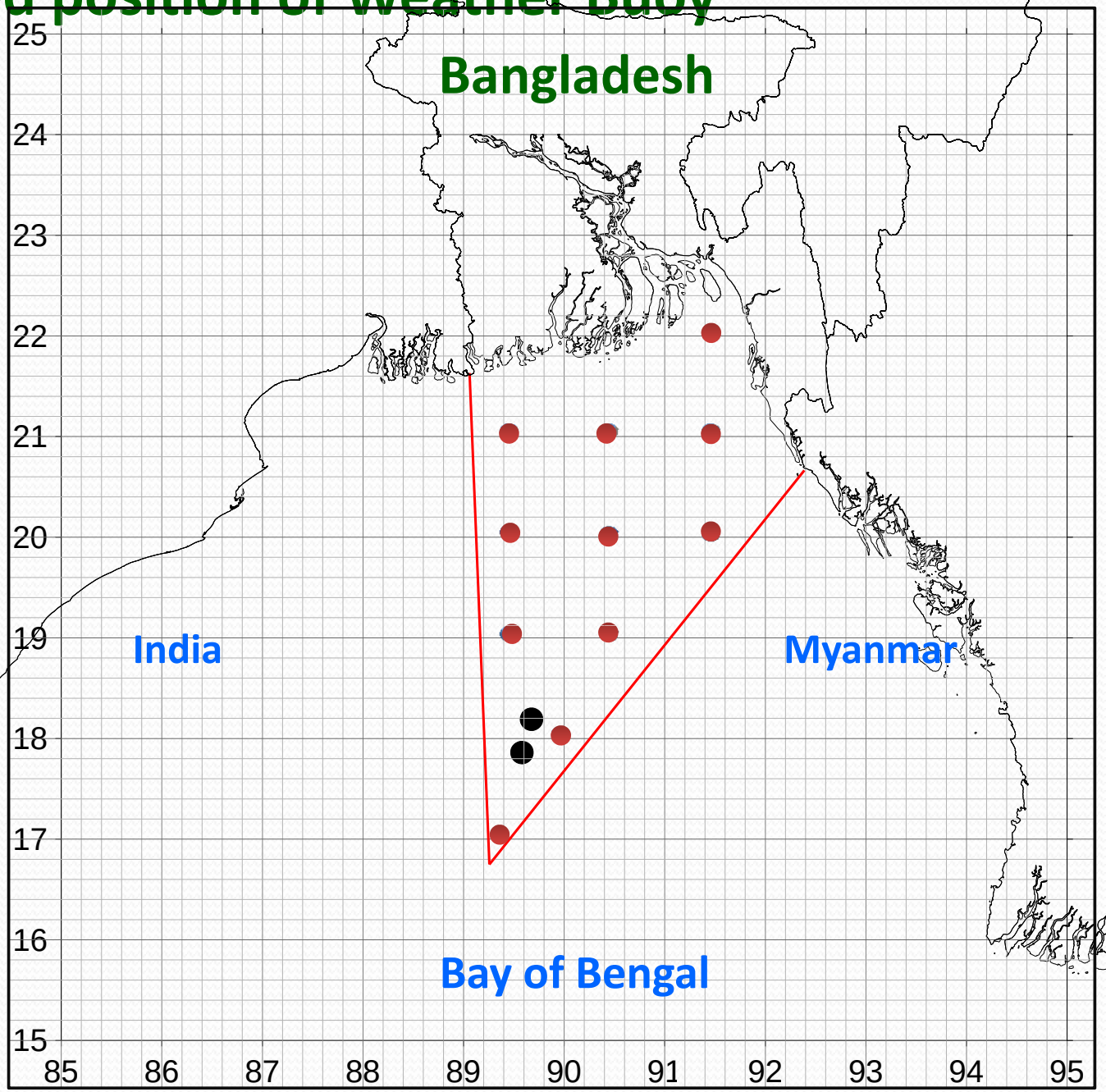

4.5 feet



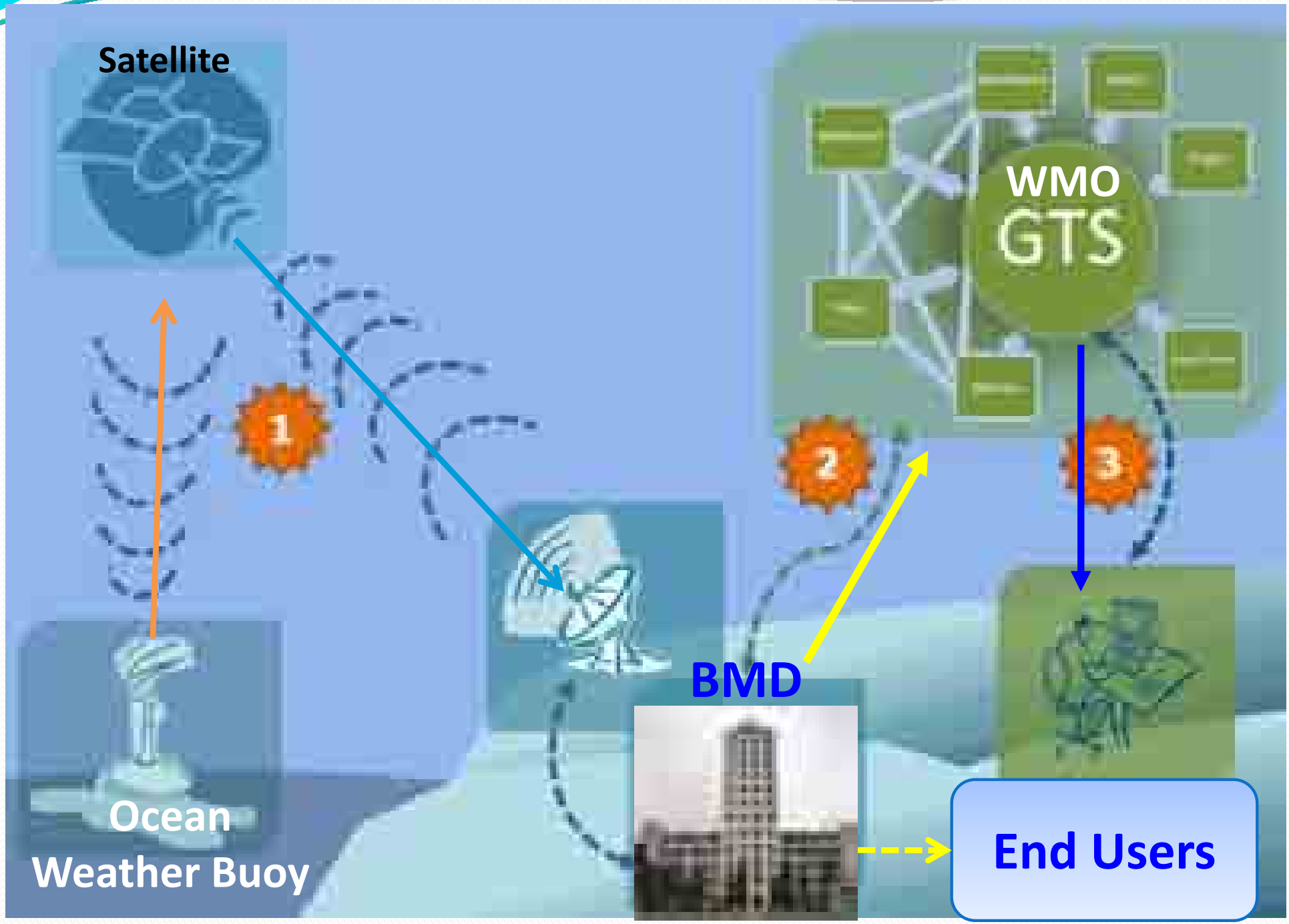

4.0 feet

AILA Affected Areas of Bangladesh

Proposed position of Weather Buoy



Data Communication



Information Dissemination

BMD

- Prime Minister's Office
- Ministry of Shipping
- Bangladesh Navy
- Bangladesh Coast Guard
- Department of Disaster Management
- Department of Agriculture Extension
- Ministry of Power, Energy and Mineral Resources
- Ministry of Fisheries
- CPP
- Others...

Conclusion

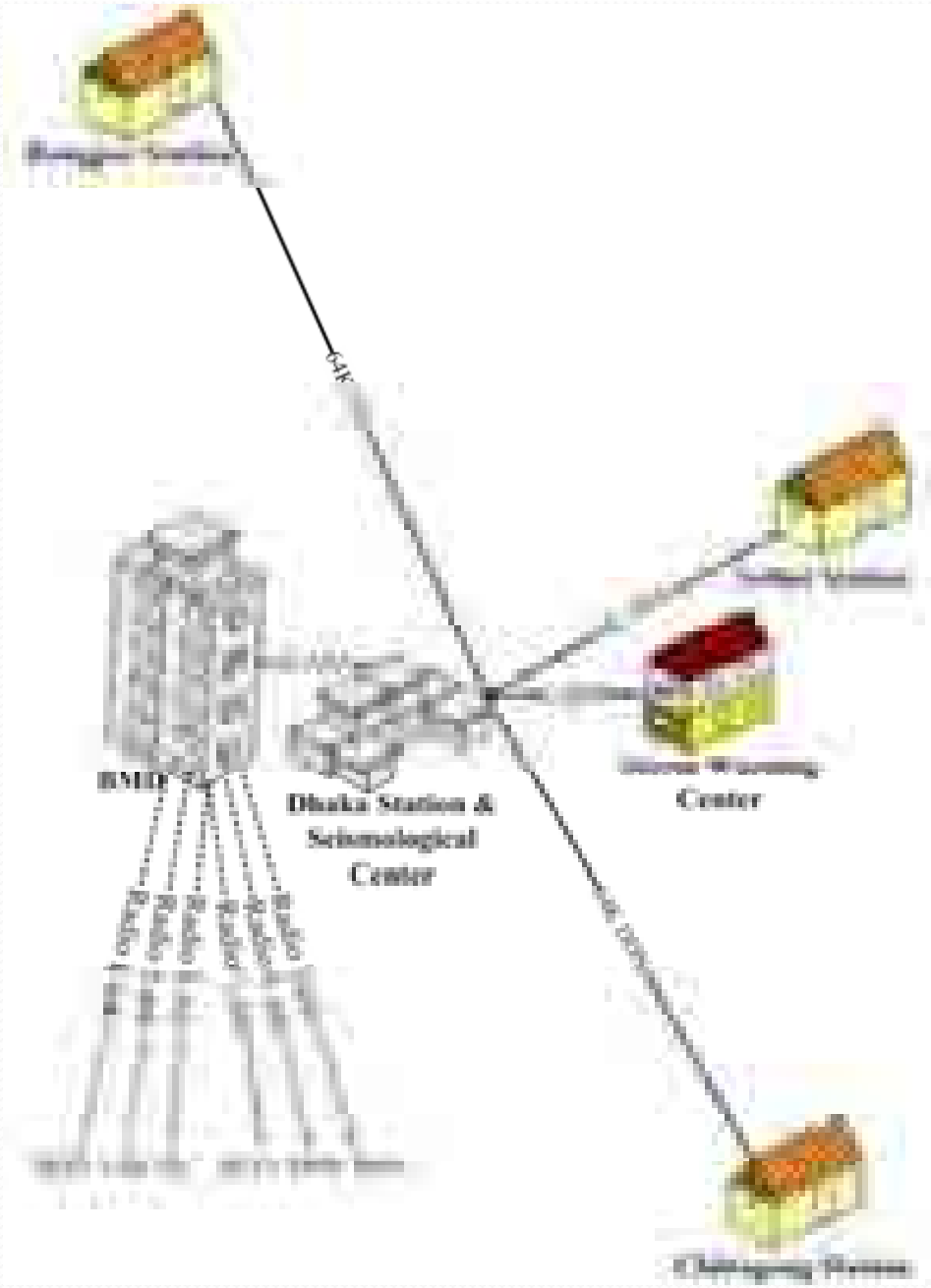
Challenges for Operational Storm Surge forecasting :

*** Appropriate survey for preparation of slandard data set useful for Storm surge forecasting over North Bay (e.g. bathymetric, topographic data and DEM)**

*** Development of Location specific model**

*** Real time actual observational data**

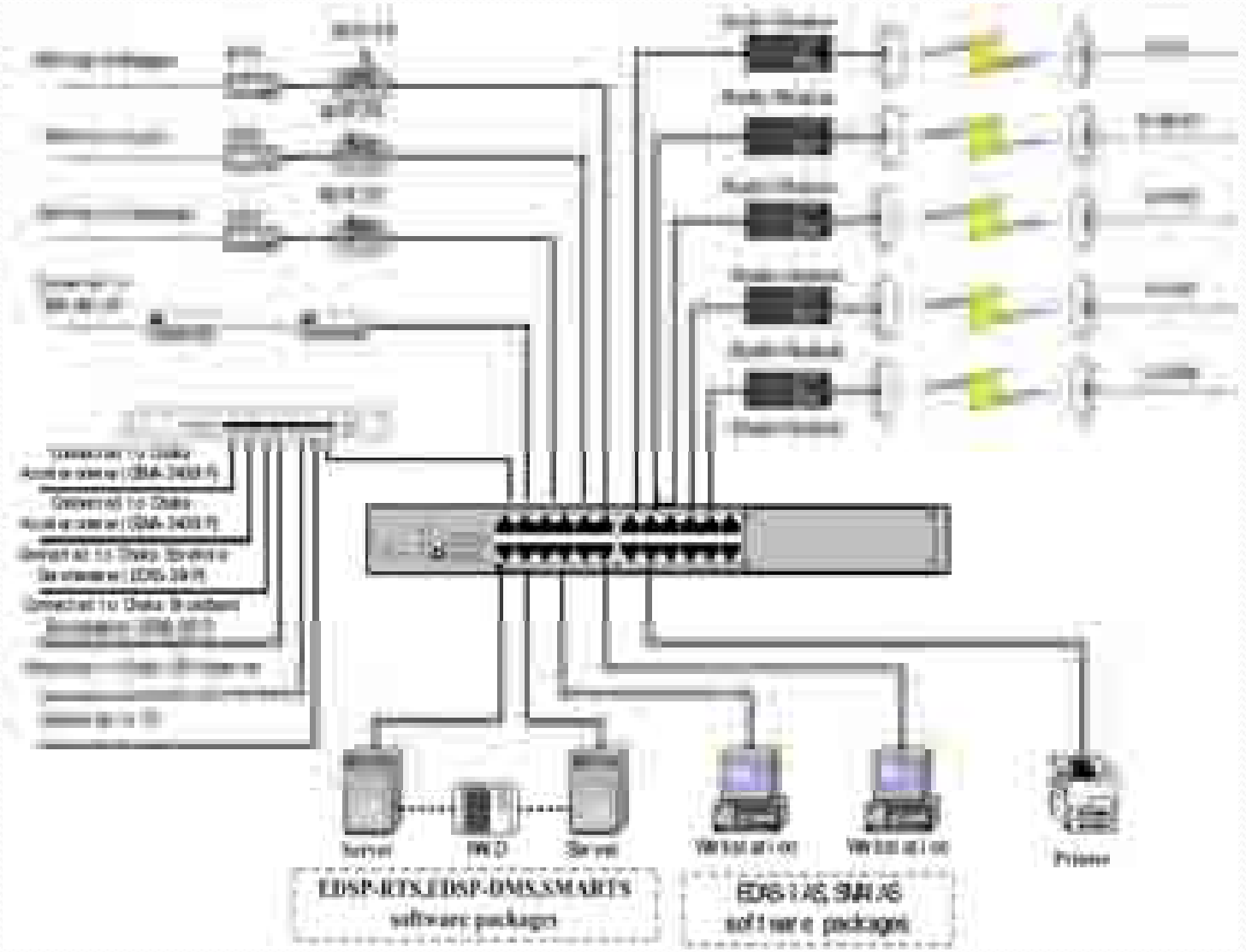
সিসমিক ডিজিটাল ডেটা (Data) নেটওয়ার্ক



Short-period Seismometer

Broardband Seismometer

সিসমিক ডেটা (Data) কমিউনেকশন লিংক



Questions


Thank you