

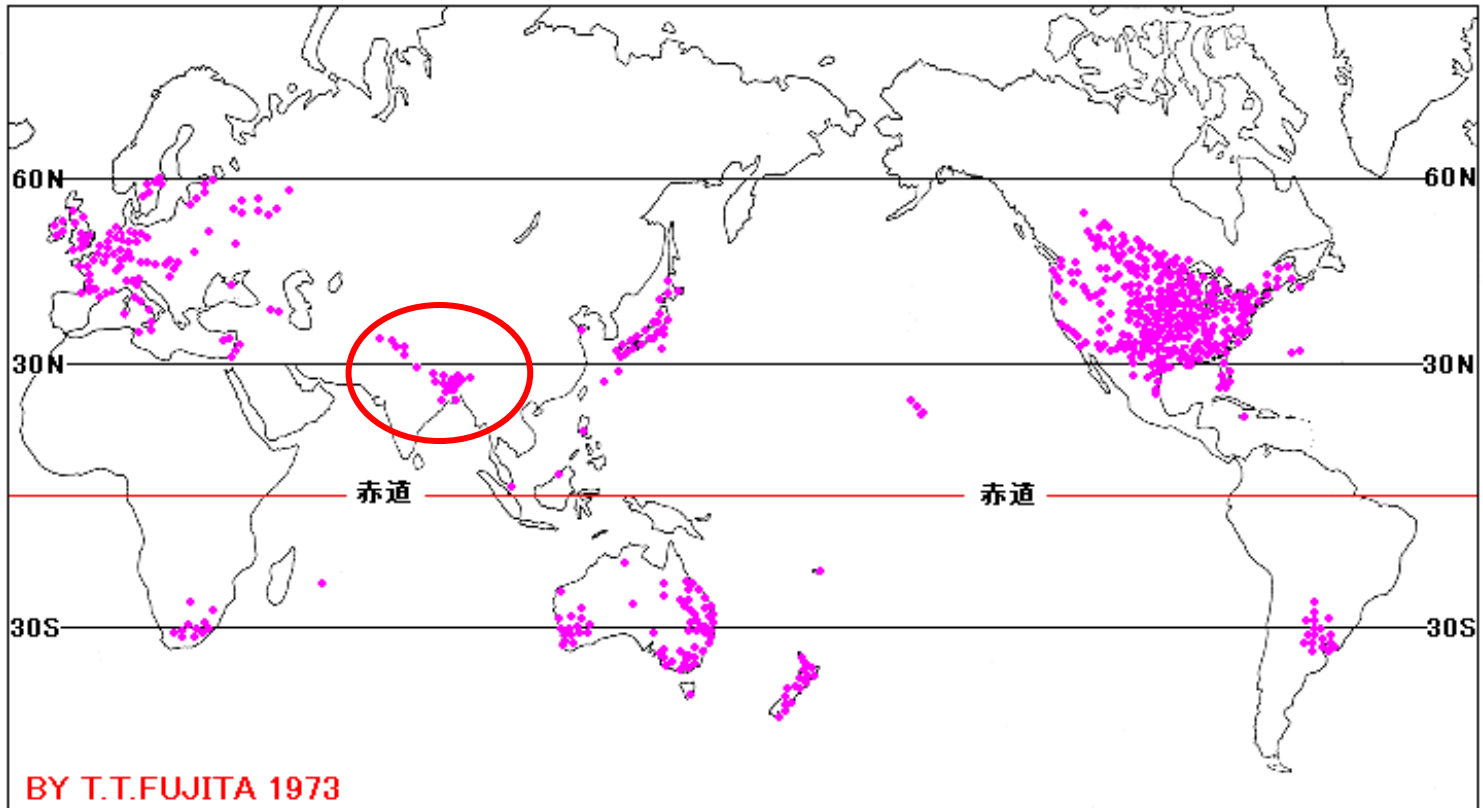
Severe Local Storms in Bangladesh

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History of our field research of Meteorological disaster in NE Indian subcontinent

- 1987 Flood (JSPS)**
- 1991 Cyclone (JSPS)**
- 1992-1994 Flood (JICA)**
- 1996 Tornado (Kyoto Univ.)**
- 1995-1997 Flood, Cyclone (JSPS)**
- 1999-2001 Flood (JSPS)**
- 2000-2002 Flood (JICA)**
- 2000-2002 Summer Monsoon (JSPS)**
- 2002-2007 Infectious Diseases (KAGI21)**
- 2003-2005 Infectious Diseases (DPRI)**
- 2005- Heavy rainfall monitoring (JEPP, GEOSS, MAHASRI)**
- 2006- Brahmaputra River and Rural development (JSPS)**
- 2006- Infectious diseases (RIHN)**

Distribution of Tornadoes in the world (Fujita, 1973)



Northeastern Indian Subcontinent is one of regions of frequent occurrence of tornadoes.

Three severe local storms

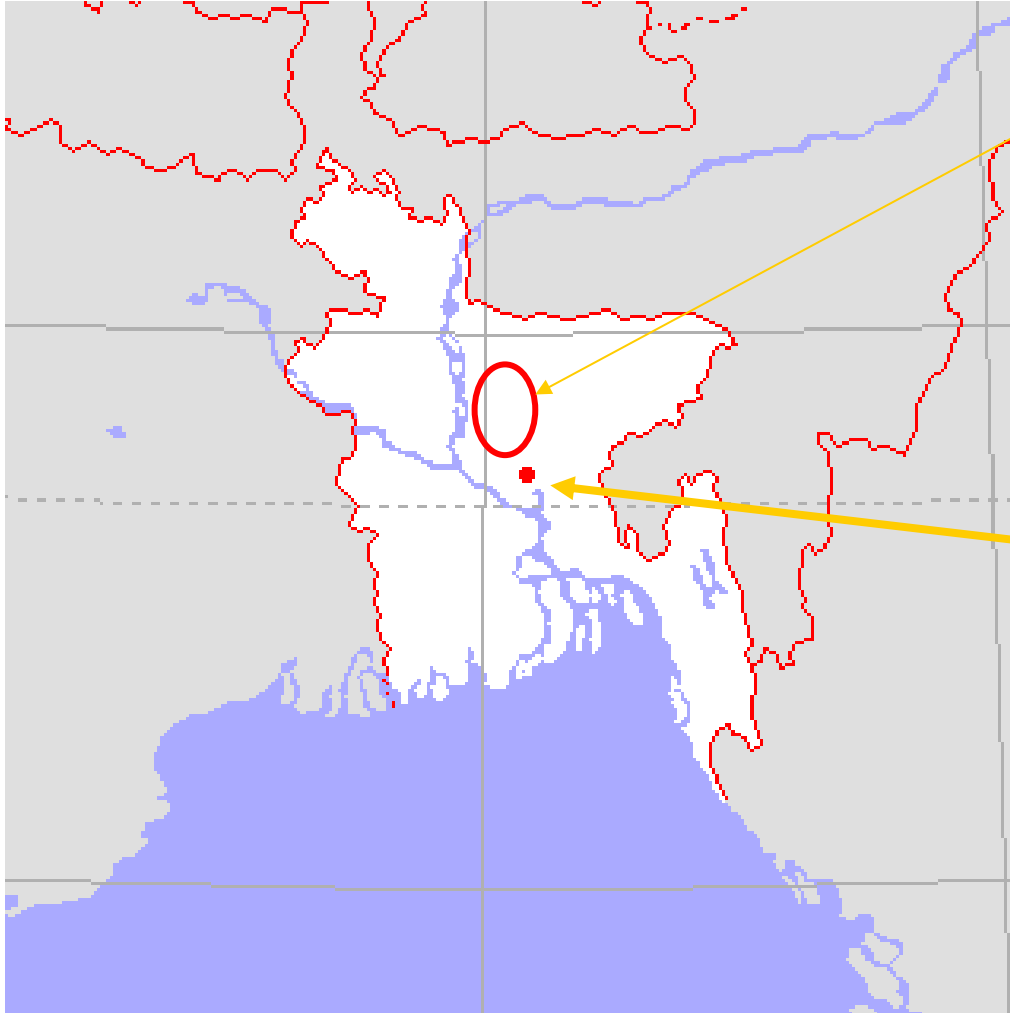
- Tangail tornado on May 13, 1996
- Mymensingh Tornado on 14 April 2004
- Chandpur Severe local storm on 23 May 2004

Damages



Tornado in Tangail on 13 May 1996 (Death:700 Injured: 34105)

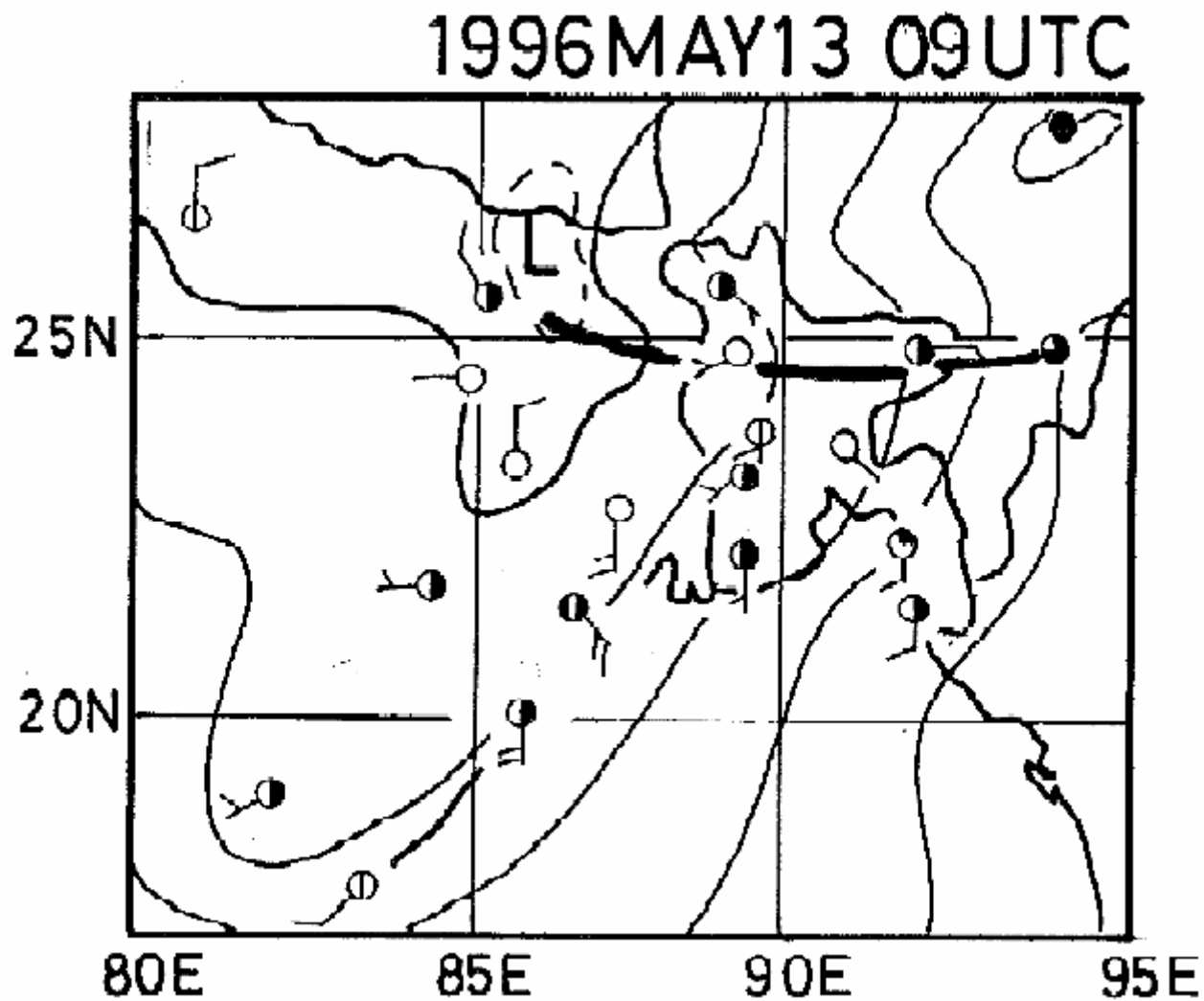
Cited by newspaper "The independent" published on 15 May 1996



Affected region
In Tangail District

Dhaka

Surface weather chart at 06LST on May 13, 1996



Satellite image at tornado occurrence on May 13 1996

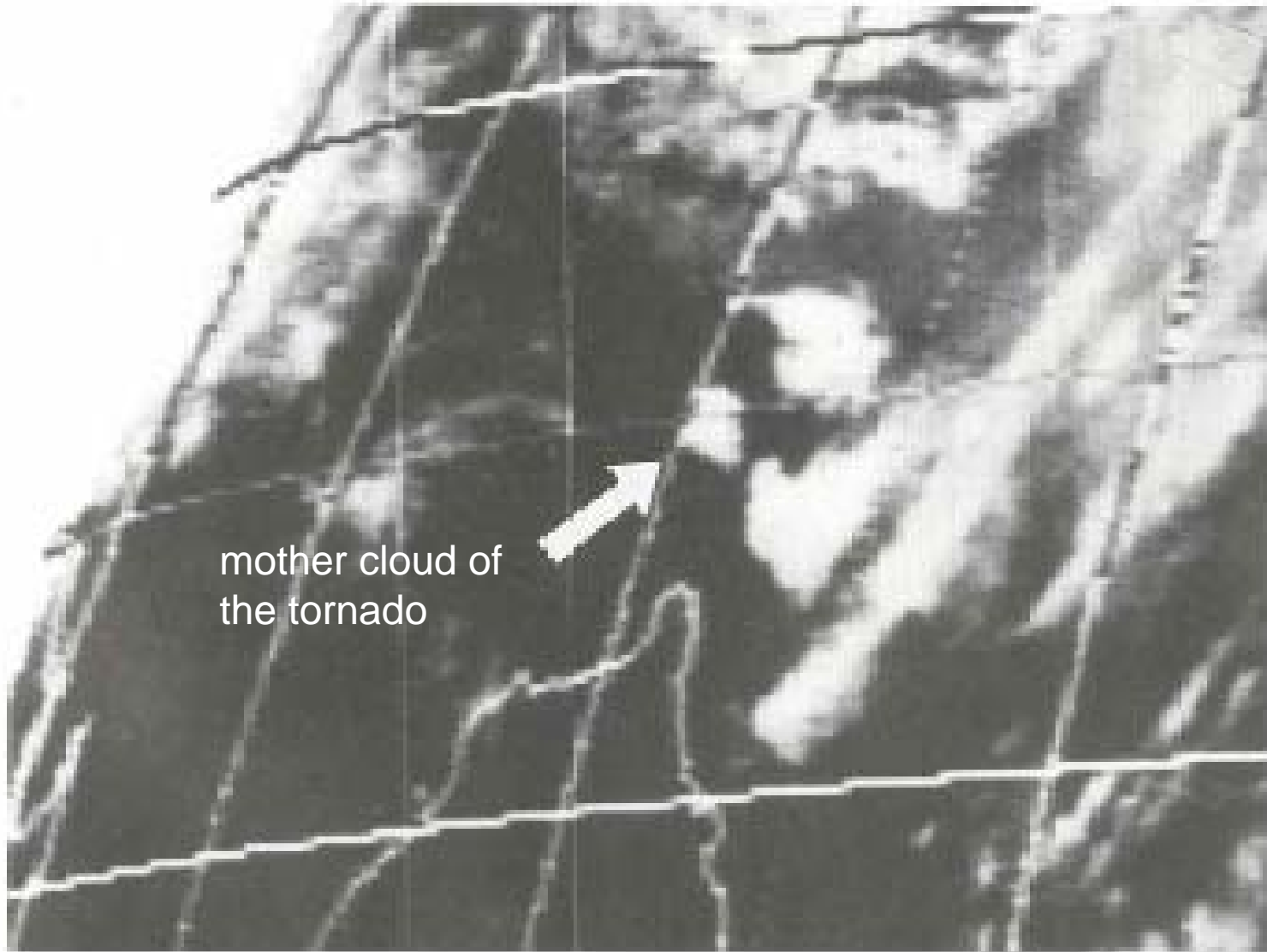
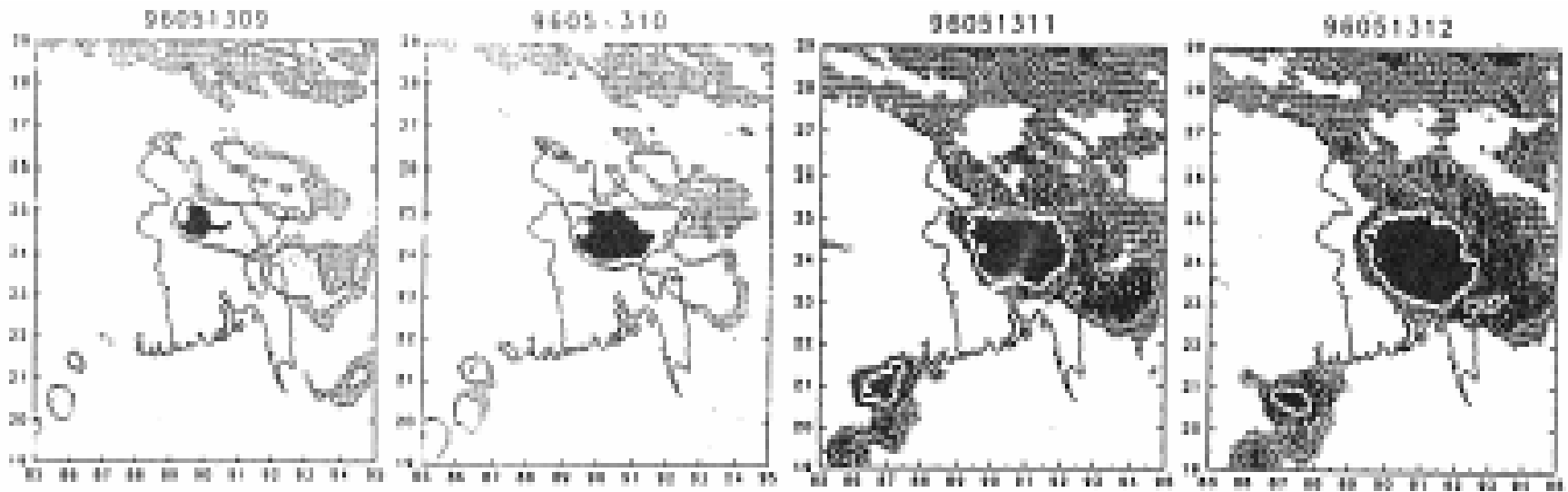
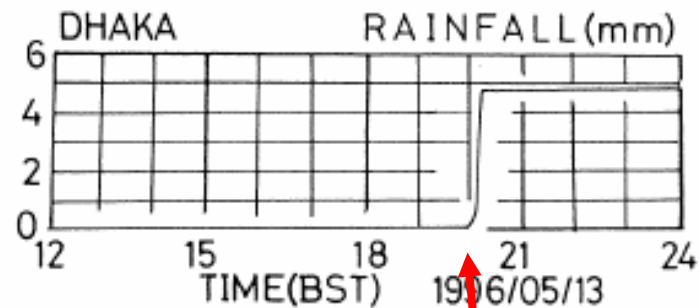
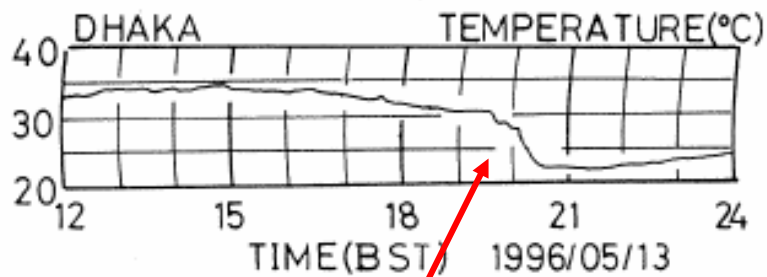
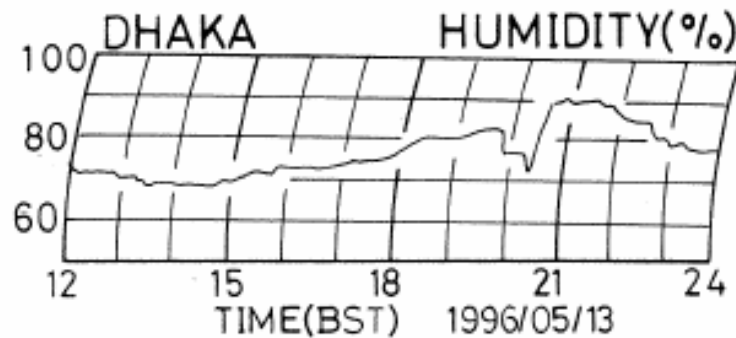
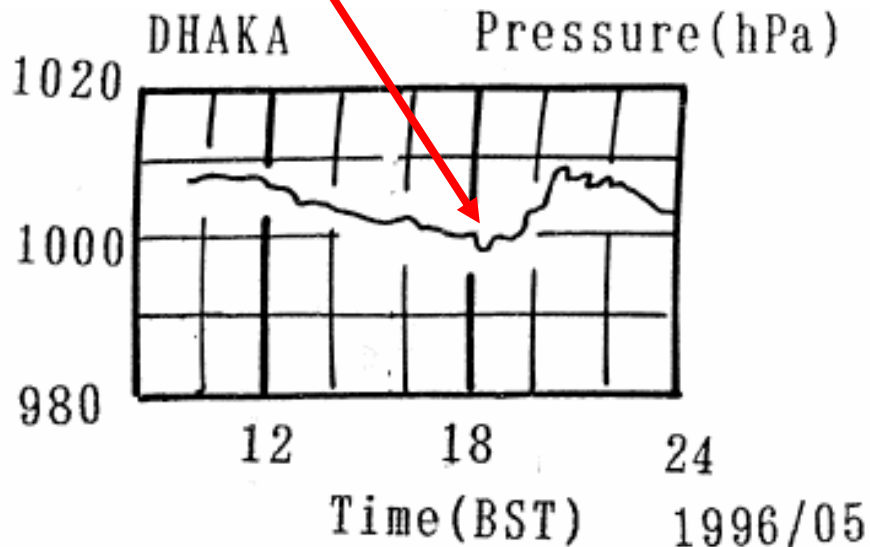


Fig.5 Time series of visible images of **GMS-5** From 15LST to 18LST on May 13, 1996



Surface Observation in Dhaka

Pressure drop



Temperature decrease

Heavy rainfall



Severest damage of the school building in Milkpur



Fig.10 Tin roof and wall house



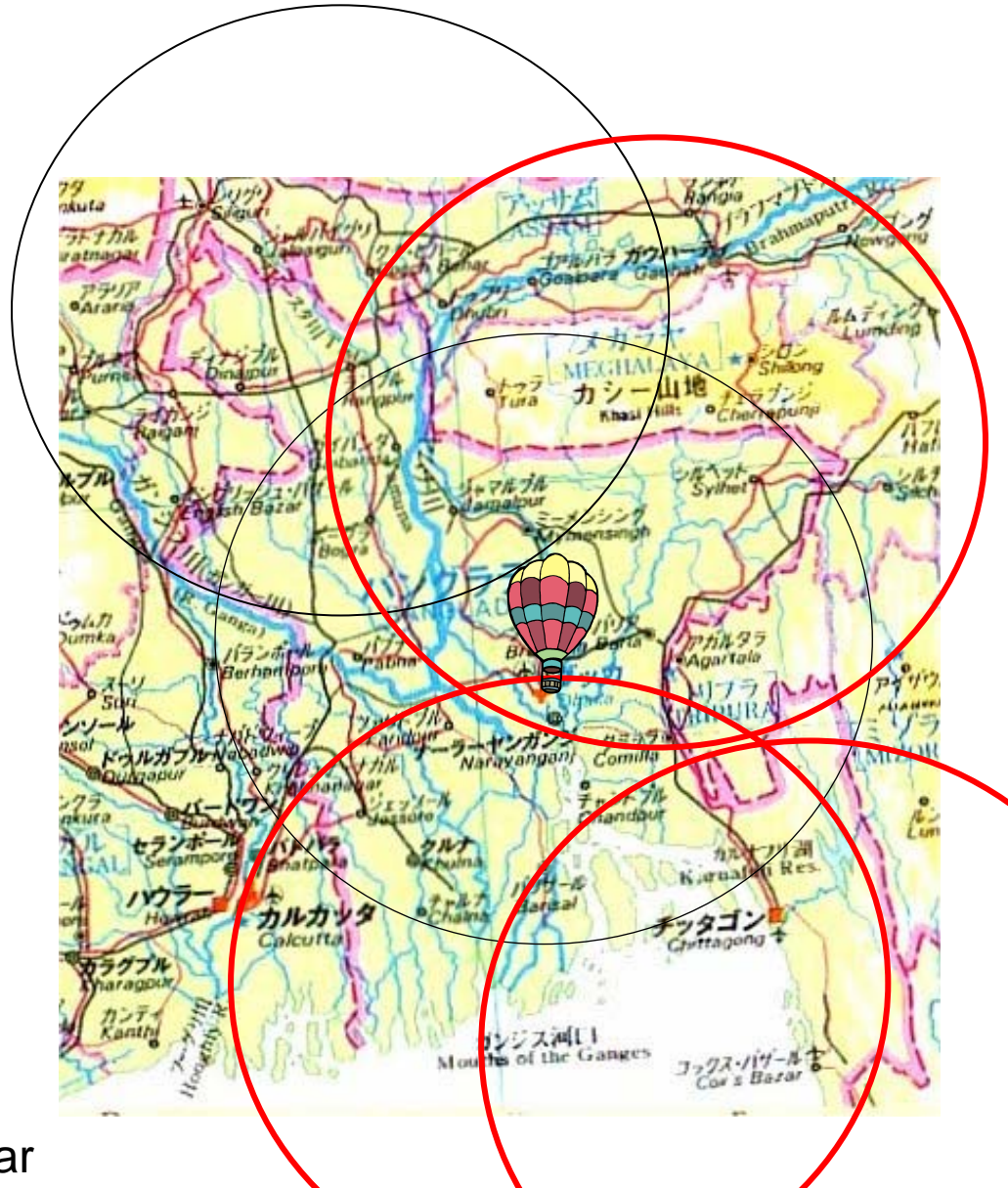
Radar Network in Bangladesh

Five Radars cover whole county



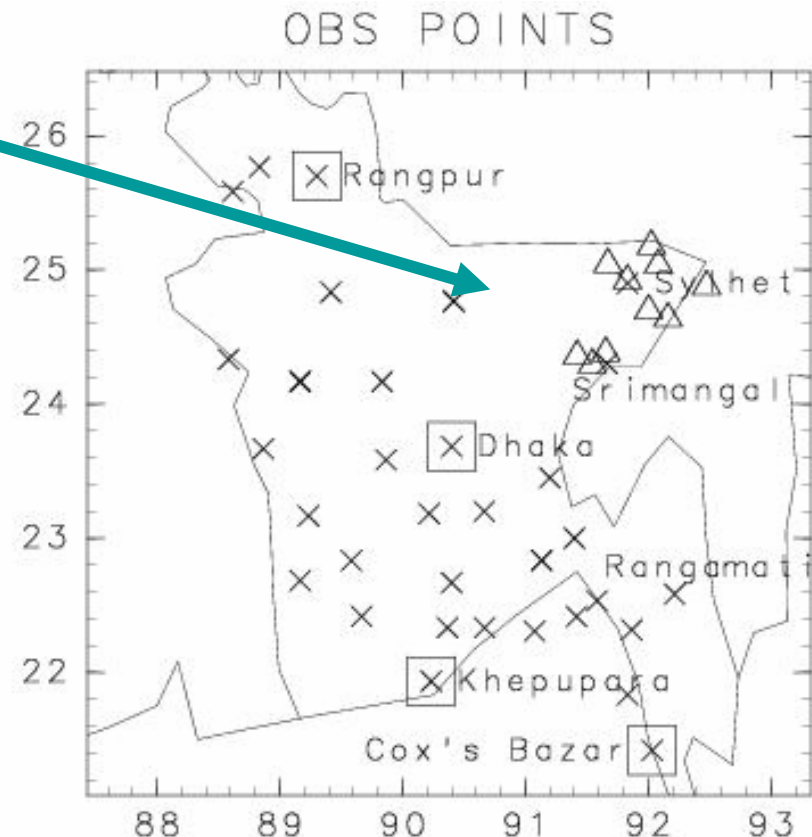
Newly completed Doppler Radar in Moulvi Bazar supported by JAPAN

Red:Doppler radar



Tornado on 14 April 2004

- Northern region near Mymensingh
 - evening on 14 April
 - 66 dead, 700 injured
- Observations
 - Systems are observed by Dhaka Radar



Tornado on 14 April 2004

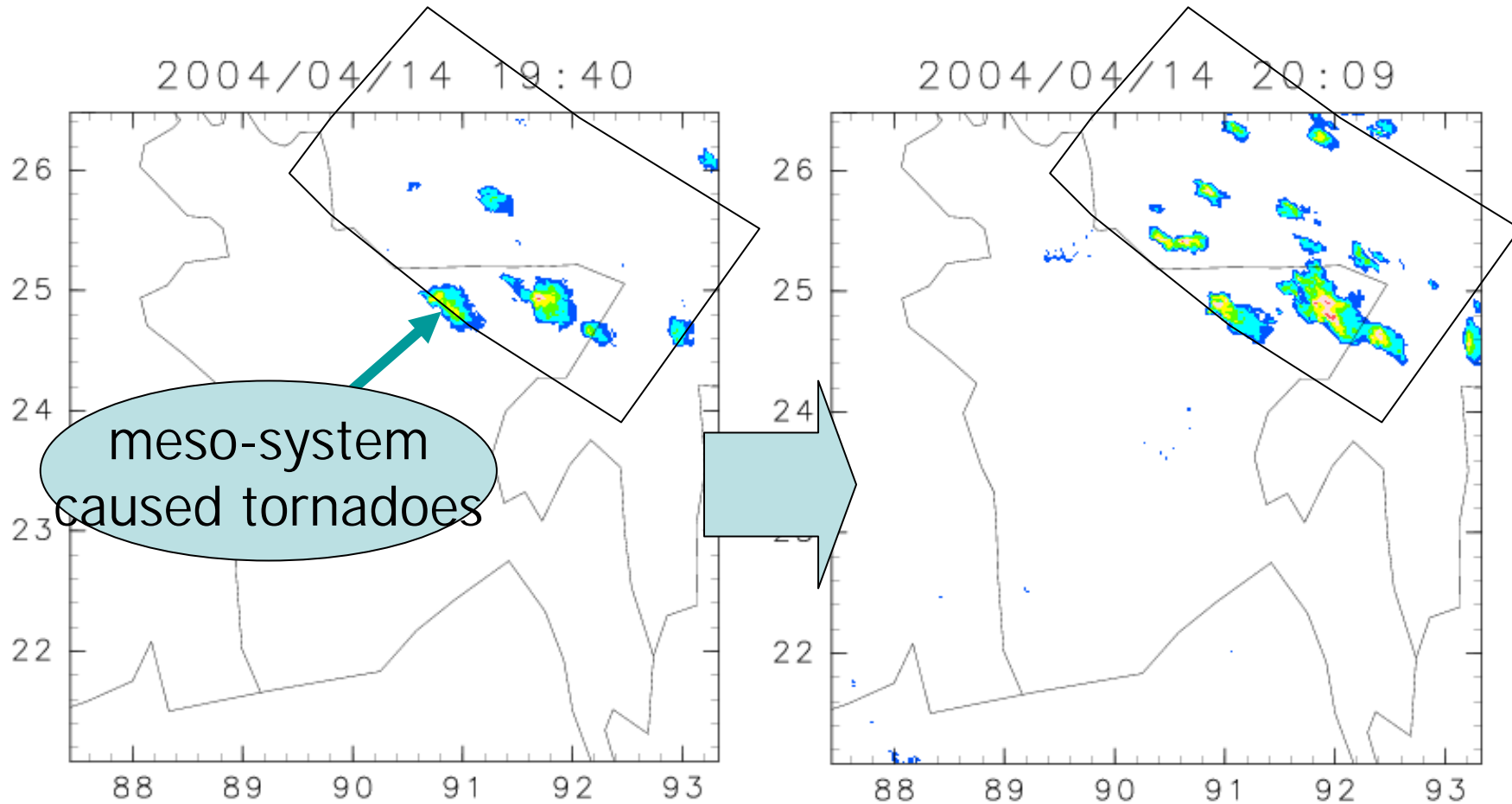
Damages

- Tornado in Mymensingh (a city in the northern part of Bangladesh) on 14 April 2004
- The tornado caused 66 death

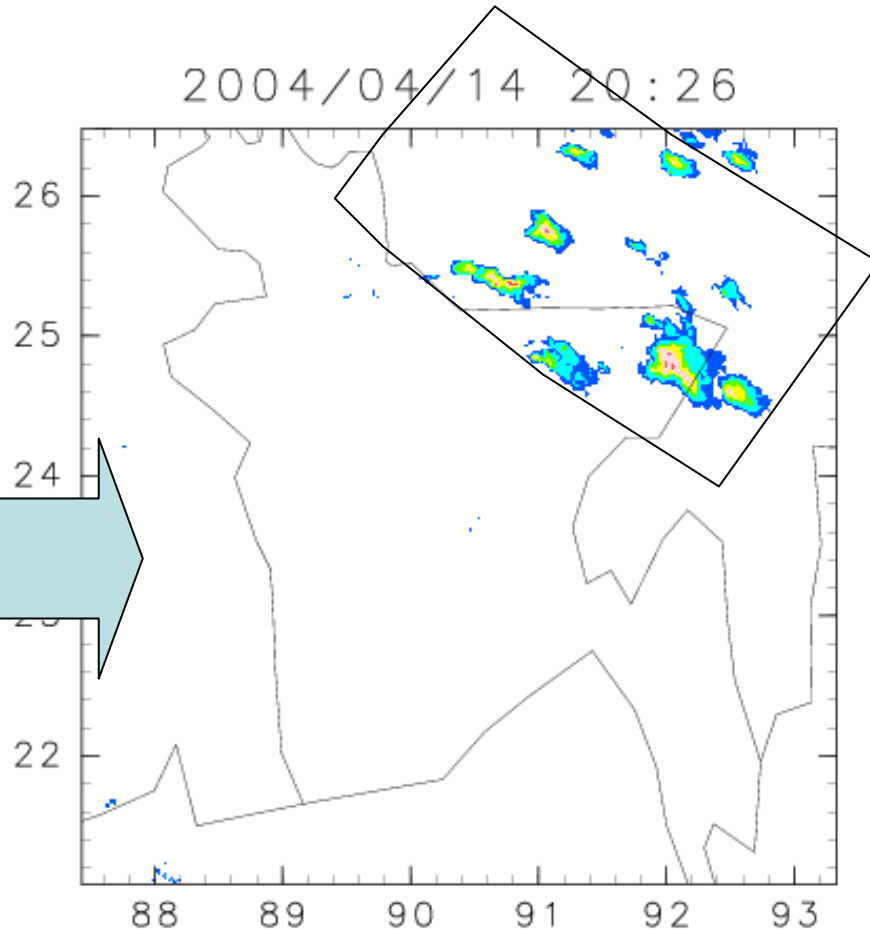
newspaper report (the Daily Star on 16 April 2004)



RADAR echoes assoc. with tornadoes



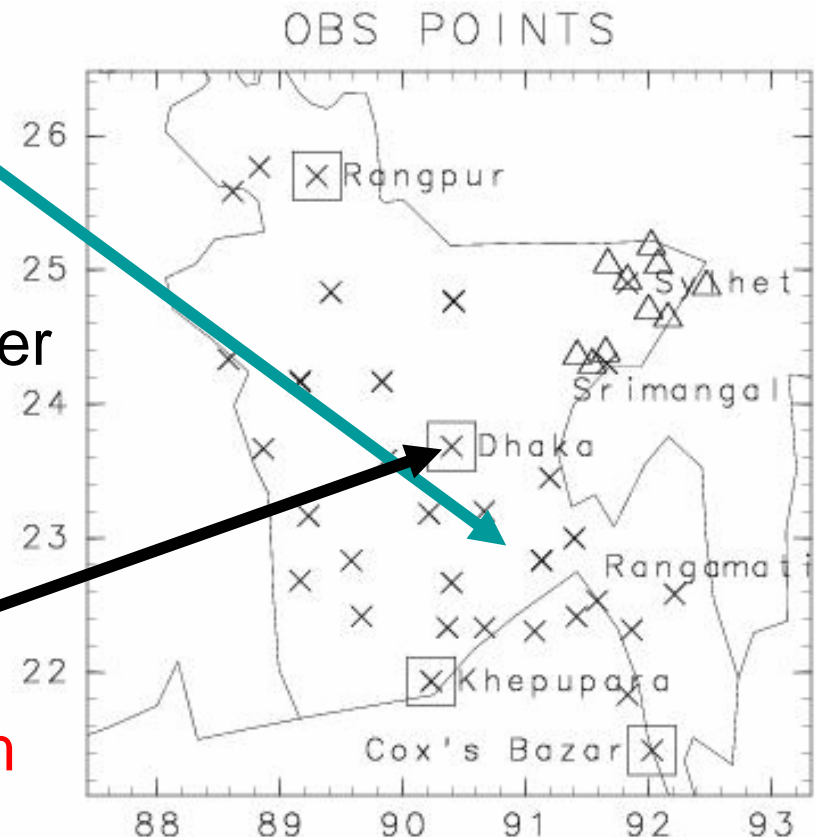
RADAR echoes assoc. with tornadoes



- many meso-systems passed over NE part of country
 - scale: several tens of kilometers
 - moves toward south-east
 - tornadoes occurred at southern edge of rain band.

Severe Local Storm on 23 May 2004

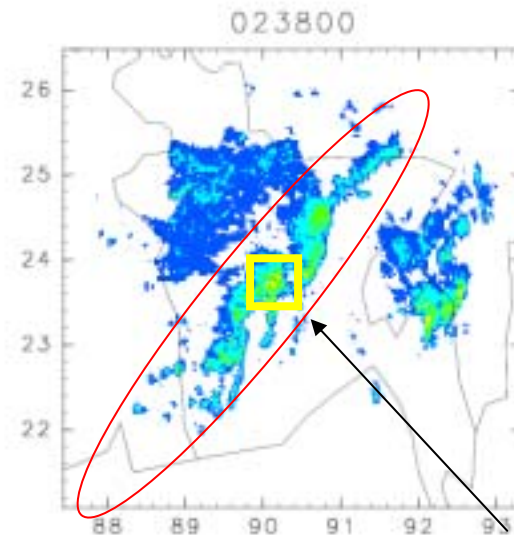
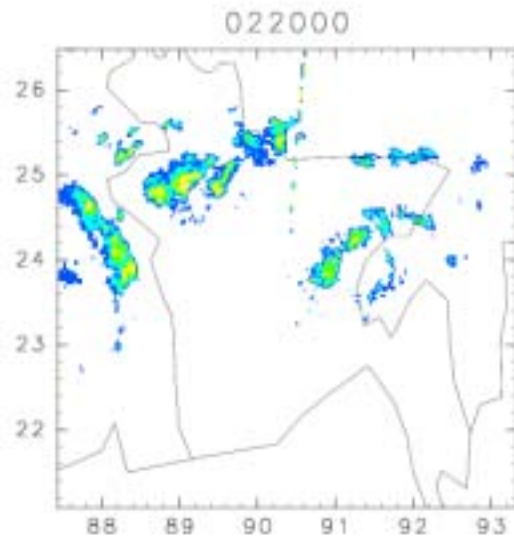
- Meso-system caused gust near Chandpur
 - Early morning on 23 May
 - Two Ferry boat turnover
- Observations
 - Echoes are observed by Dhaka RADAR
 - Dhaka AWS captured the structure of system



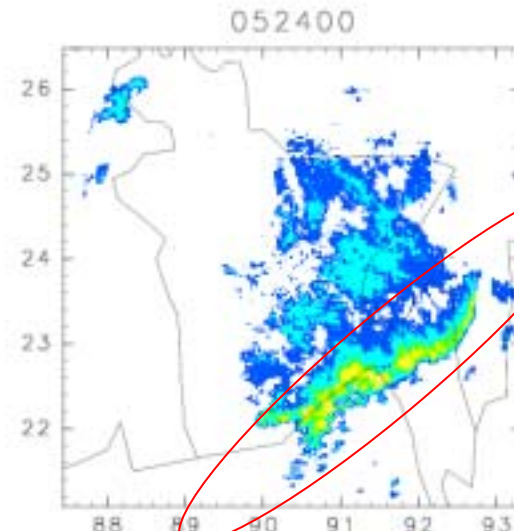
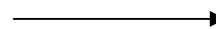
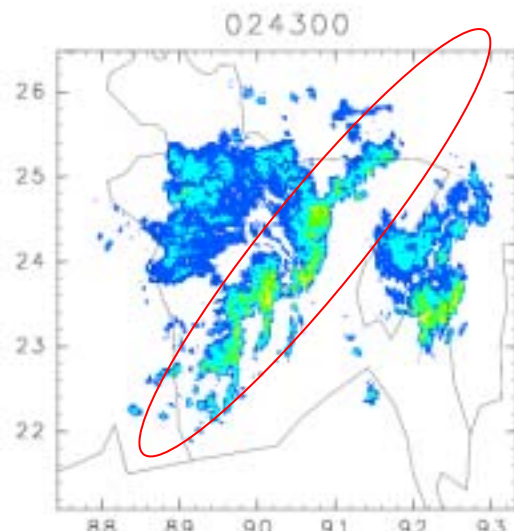
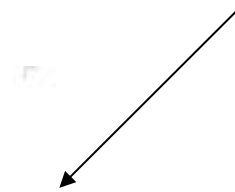
Turnover of two ferry boat on May 3,2004 16 died, more than 240 missing



Movement of system observed by Dhaka RADAR



AWS Obs.



Installation of AWS in Dhaka as a high resolution instrument

MOU between DPRI and ICDDR, B (Cholera Hospital)



Automatic Weather Station in Dhaka

Pressure

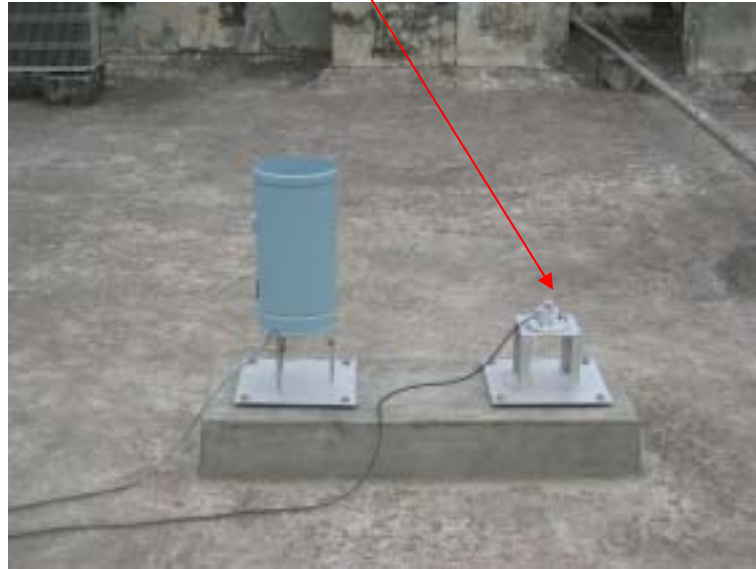
Wind direction and speed

Air temperature

Relative humidity

Rainfall

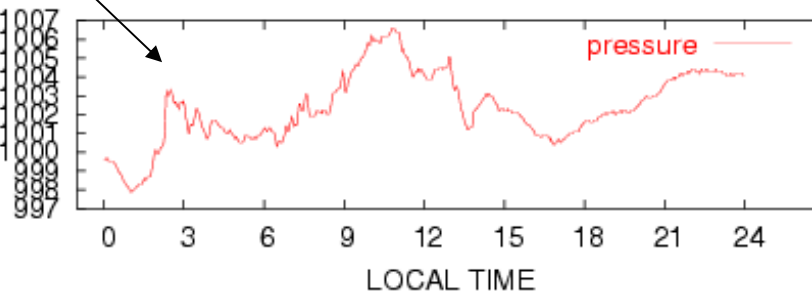
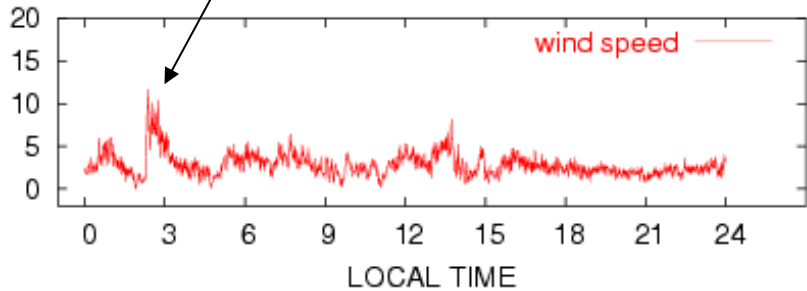
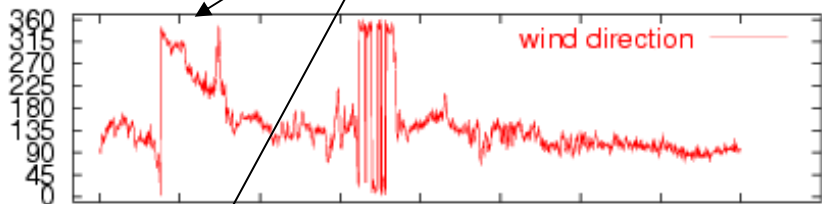
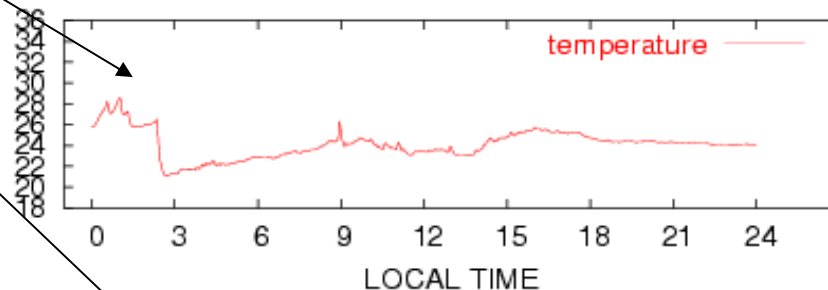
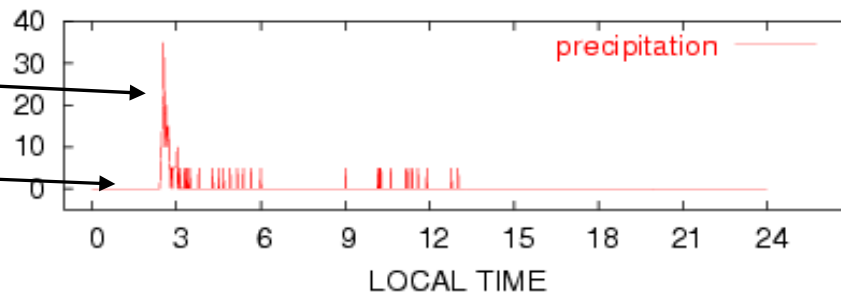
Sunshine



This AWS can observe the weather components every minutes. The time resolution is 1 minute, very high compared with

AWS Observation on May 23, 2004

- Rainfall : 3.5mm/min
- Long term rainfall
- Sudden Drop of Temp
- Meso high
- Gust & Sudden Change of WD



Summary

- Northeastern region of Indian Subcontinent is one of the seriously damaged area of severe local storms. More than 500 persons are died and missing every year.
- BMD Radar can detect the movement of severe local system and is very effective for the early warning.
- AWS captures the severe local storm (Kalbaisaki) and succeeded the detail feature of the weather components variation.

SAARC STORM PROJECT will be very effective for clarifying the phenomena.