



# DBNet Data usage at NCMRWF: Status and plans

**Srinivas Desamsetti, Indira Rani S, John P George, V.S. Prasad**

National Centre for Medium Range Weather Forecasting (NCMRWF), Ministry of Earth Sciences, Noida, India

**N. Srinivasa Rao, Uday Bhaskar, E. Pattabhi Rama Rao**

Indian National Center for Ocean Information Services (INCOIS), (MoES), Hyderabad, Telangana, India

**N. Aparna**

National Remote Sensing Centre (NRSC), Indian Space Research Organisation (ISRO), Dept. of Space, Govt. of India,  
Hyderabad, Telangana, India

**Shankar Nath**

India Meteorological Department (IMD), MoES, Govt. of India, New Delhi, India



The Director, with a forward-looking vision to contribute meaningfully to the global DBNet and NWP communities, initiated discussions with ISRO to enable the sharing of Level-0 data. Following his guidance and support, we began processing the data, taking a significant step toward strengthening collaborative efforts and advancing weather forecasting capabilities.



# Acknowledgements

## DBNet Data Partners



Mr. Pattabhi Rama Rao E., Scientist-G  
Dr. N. Srinivasa Rao, Scientist-E  
Dr. Uday Bhaskar, Scientists-F  
Indian National Center for Ocean  
Information Services (INCOIS)



Dr. N Aparna, Deputy Director,  
System Reliability & Quality Assurance (SRQA)  
National Remote Sensing Centre (NRSC), ISRO



Dr. Ashim Mitra, Sc-E  
Dr. Shankar Nath, Scientist-E  
India Meteorological  
Department (IMD)



Mr. Nigel Atkinson

Ms. Anna Booton

Dr. Liam Gumley

Dr. Simon

Dr. Ruth

Dr. Erdeem Erdi



# Satellites and instruments

| Data Provider | Satellites    | Sounders                |
|---------------|---------------|-------------------------|
| INCOIS        | NOAA-18/19    | AMSU-A, MHS, HIRS       |
|               | Metop-B       | AMSU-A, MHS, HIRS, IASI |
| NRSC          | SNPP, NOAA-20 | ATMS, CrIS              |
|               | NOAA-19       | AMSU-A, MHS, HIRS       |
|               | Metop-B       | AMSU-A, MHS, HIRS, IASI |

Upgraded the station recently

| Data Provider | Satellites                      | Sounders                |
|---------------|---------------------------------|-------------------------|
| INCOIS        | NOAA-18/19                      | AMSU-A, MHS, HIRS       |
|               | Metop-B, Metop-C                | AMSU-A, MHS, HIRS, IASI |
|               | SNPP, NOAA-20, NOAA-21          | ATMS, CrIS              |
|               | FY-3D/3E                        | MWTS, MWHS              |
|               | Near future METOP-SG satellites |                         |



INCOIS established a new 2.4m X/L band polar ground station at INCOIS Hyderabad

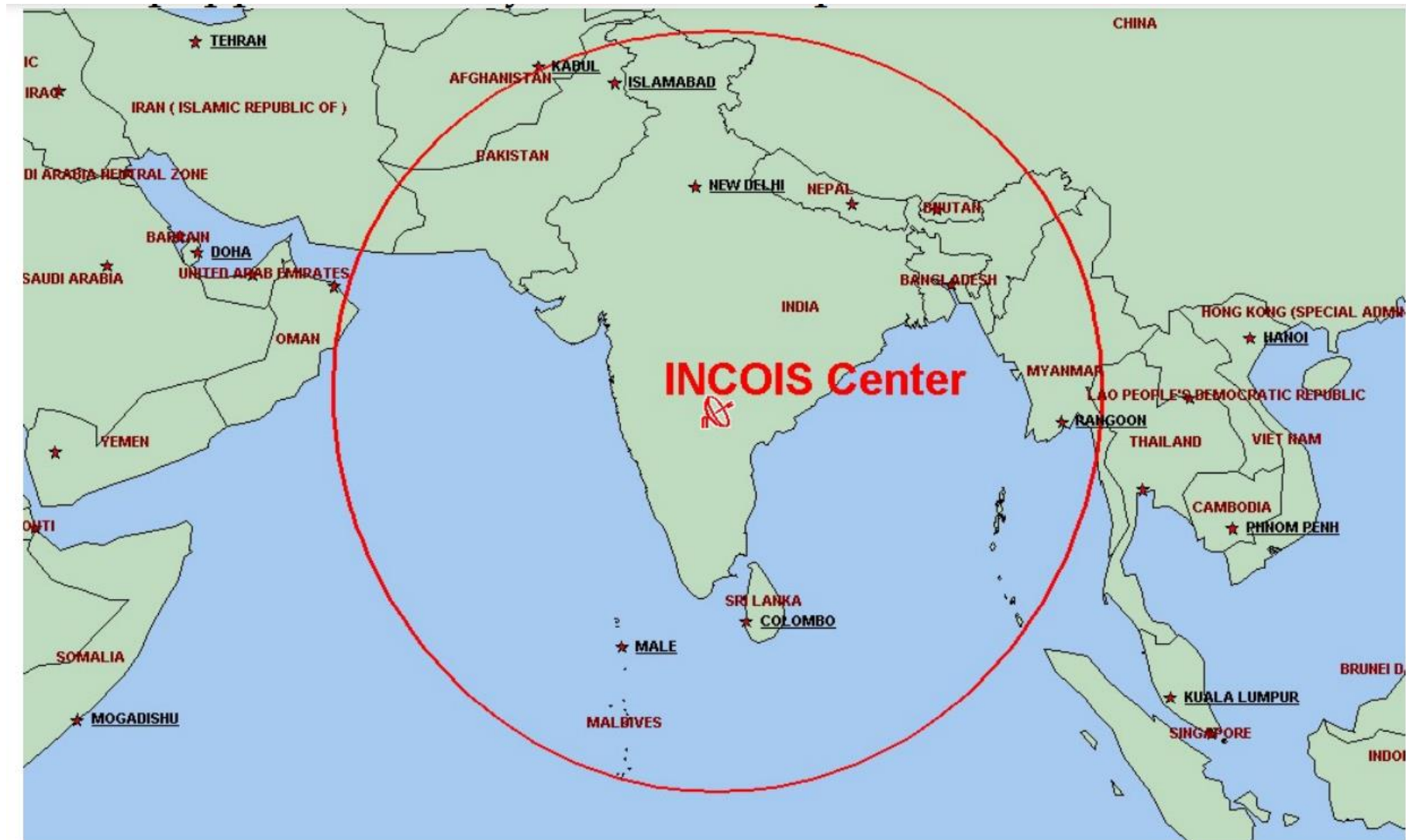


Fig.1 INCOIS location (78.38/17.52) and Antenna coverage



# GTS Data transmission naming convention

India  
↑  
W\_in-NCM-hyd,amsua,DBNet+noaa18+hyd\_C\_DEMS\_20231118063516\_amsua\_noaa18\_20231118\_0557\_95333\_bufr.bin  
↓  
NCMRWF  
**INC-INCOIS**

HYD

noaa18  
noaa19  
metopb  
noaa20  
snpp

Processing time

amsua, hirs,  
mhs, iasi,  
atms, cris

date of obs

time

orbit

DBNet data feeds

<https://nwp-saf.eumetsat.int/site/monitoring/dbnet/feeds-of-dbnet-data-from-gts/>

DBNet station status

[https://nwp-saf.eumetsat.int/monitoring/ears\\_mon/DBNet\\_station\\_status.html](https://nwp-saf.eumetsat.int/monitoring/ears_mon/DBNet_station_status.html)



## NCMRWF DBNet DATA Sample files

W\_in-NCM-hyd,AMSUA,DBNet+M01+hyd\_C\_DEMS\_20230404045500\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+M01+hyd\_C\_DEMS\_20230404160340\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+NOAA18+hyd\_C\_DEMS\_20230404035830\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+NOAA18+hyd\_C\_DEMS\_20230404053700\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+NOAA18+hyd\_C\_DEMS\_20230404164950\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+NOAA19+hyd\_C\_DEMS\_20230404030400\_bufr.bin

W\_in-NCM-hyd,AMSUA,DBNet+NOAA19+hyd\_C\_DEMS\_20230404141750\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+M01+hyd\_C\_DEMS\_20230404045500\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+M01+hyd\_C\_DEMS\_20230404160340\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+NOAA18+hyd\_C\_DEMS\_20230404035830\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+NOAA18+hyd\_C\_DEMS\_20230404053700\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+NOAA18+hyd\_C\_DEMS\_20230404164950\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+NOAA19+hyd\_C\_DEMS\_20230404030400\_bufr.bin

W\_in-NCM-hyd,HIRS,DBNet+NOAA19+hyd\_C\_DEMS\_20230404141750\_bufr.bin

W\_in-NCM-hyd,MHS,DBNet+M01+hyd\_C\_DEMS\_20230404045500\_bufr.bin

W\_in-NCM-hyd,MHS,DBNet+M01+hyd\_C\_DEMS\_20230404160340\_bufr.bin

W\_in-NCM-hyd,MHS,DBNet+NOAA19+hyd\_C\_DEMS\_20230404030400\_bufr.bin

W\_in-NCM-hyd,MHS,DBNet+NOAA19+hyd\_C\_DEMS\_20230404141750\_bufr.bin





## INCOIS DBNet DATA Sample files

**INCOIS** has been receiving the DBNet station data and processing for NOAA-20, NOAA-21 / Metop-B, Metop-C / FY-3D, FY-3E.

### **NOAA-20**

W\_in-INC-hyd,atms,DBNet+noaa20+hyd\_C\_DEMS\_20250302073614\_atms\_noaa20\_20250302\_0732\_37753\_bufr.bin

W\_in-INC-hyd,cris,DBNet+noaa20+hyd\_C\_DEMS\_20250302073839\_cris\_noaa20\_20250302\_0734\_37753\_bufr.bin

### **NOAA-21**

W\_in-INC-hyd,atms,DBNet+noaa21+hyd\_C\_DEMS\_20250302065651\_atms\_noaa21\_20250302\_0646\_11960\_bufr.bin

W\_in-INC-hyd,cris,DBNet+noaa21+hyd\_C\_DEMS\_20250302070105\_cris\_noaa21\_20250302\_0647\_11960\_bufr.bin





## INCOIS DBNet DATA Sample files

### **5-1NPP**

W\_in-INC-hyd,atms,DBNet+snpp+hyd\_C\_DEMS\_20250302072244\_atms\_snpp\_20250302\_0710\_69149\_bufr.bin

W\_in-INC-hyd,cris,DBNet+snpp+hyd\_C\_DEMS\_20250302072547\_cris\_snpp\_20250302\_0712\_69149\_bufr.bin

### **MetOp-B**

W\_in-INC-

hyd,amsua,DBNet+metopb+hyd\_C\_DEMS\_20250302024449\_amsua\_metopb\_20250302\_0235\_64619\_bufr.bin

W\_in-INC-hyd,iasi,DBNet+metopb+hyd\_C\_DEMS\_20250302024453\_iasi\_M01\_20250302\_0236\_64619\_bufr.bin

W\_in-INC-

hyd,mhs,DBNet+metopb+hyd\_C\_DEMS\_20250302024453\_mhs\_metopb\_20250302\_0235\_64619\_bufr.bin

### **MetOp-C**

W\_in-INC-

hyd,amsua,DBNet+metopc+hyd\_C\_DEMS\_20250302034209\_amsua\_metopc\_20250302\_0326\_32777\_bufr.bin

W\_in-INC-hyd,iasi,DBNet+metopc+hyd\_C\_DEMS\_20250302034214\_iasi\_M03\_20250302\_0326\_32777\_bufr.bin

W\_in-INC-hyd,mhs,DBNet+metopc+hyd\_C\_DEMS\_20250302034216\_mhs\_metopc\_20250302\_0326\_32777\_bufr.bin



## **FY-3D**

W\_in-INC-hyd,mwhts,DBNet+fy3d+hyd\_C\_DEMS\_20250302085030\_mwhts\_fy3d\_20250302\_0842\_o\_bufr.bin

W\_in-INC-hyd,mwhts,DBNet+fy3d+hyd\_C\_DEMS\_20250209104829\_mwhts\_fy3d\_20290601\_1017\_27341\_bufr.bin

## **FY-3E**

W\_in-INC-hyd,mwhts,DBNet+fy3e+hyd\_C\_DEMS\_20250302004601\_mwhts\_fy3e\_20250302\_0040\_o\_bufr.bin

W\_in-INC-hyd,mwhts,DBNet+fy3e+hyd\_C\_DEMS\_20250302004601\_mwhts\_fy3e\_20250302\_0040\_o\_bufr.bin



**The Headers are as follows:**

INAX[01-02] DEMS W\_in-INC-???,amsua,\*\_C\_DEMS\_\*.bin  
INMX[01-05] DEMS W\_in-INC-???,mhs,\*\_C\_DEMS\_\*.bin  
INHX[01-02] DEMS W\_in-INC-???,hirs,\*\_C\_DEMS\_\*.bin  
INQX[01-08] DEMS W\_in-INC-???,iasi,\*\_C\_DEMS\_\*.bin  
INSX[01-08] DEMS W\_in-INC-???,atms,\*\_C\_DEMS\_\*.bin  
INCX[01-08] DEMS W\_in-INC-???,cris,\*\_C\_DEMS\_\*.bin  
INKX[01-05] DEMS W\_in-INC-???,mwhs,\*\_C\_DEMS\_\*.bin  
INTX[01-03] DEMS W\_in-INC-???,mwts,\*\_C\_DEMS\_\*.bin



# Feeds of DBNet data from GTS

## Table of station codes

This table links centre/subcentre codes to station identifier. Taken from the AAPP script *prepare\_dbnet\_bufnr\_for\_gts*. It includes some planned stations and some that are not currently active.

| Centre_subcentre | Originator | CCCC | station abbreviation |
|------------------|------------|------|----------------------|
| 28_10            | in-IMD-del | DEMS | del                  |
| 28_20            | in-IMD-guw | DEMS | guw                  |
| 28_30            | in-IMD-che | DEMS | che                  |
| 28_40            | in-IMD-hyd | DEMS | hyd                  |
| 28_41            | in-INC-hyd | DEMS | hyd                  |

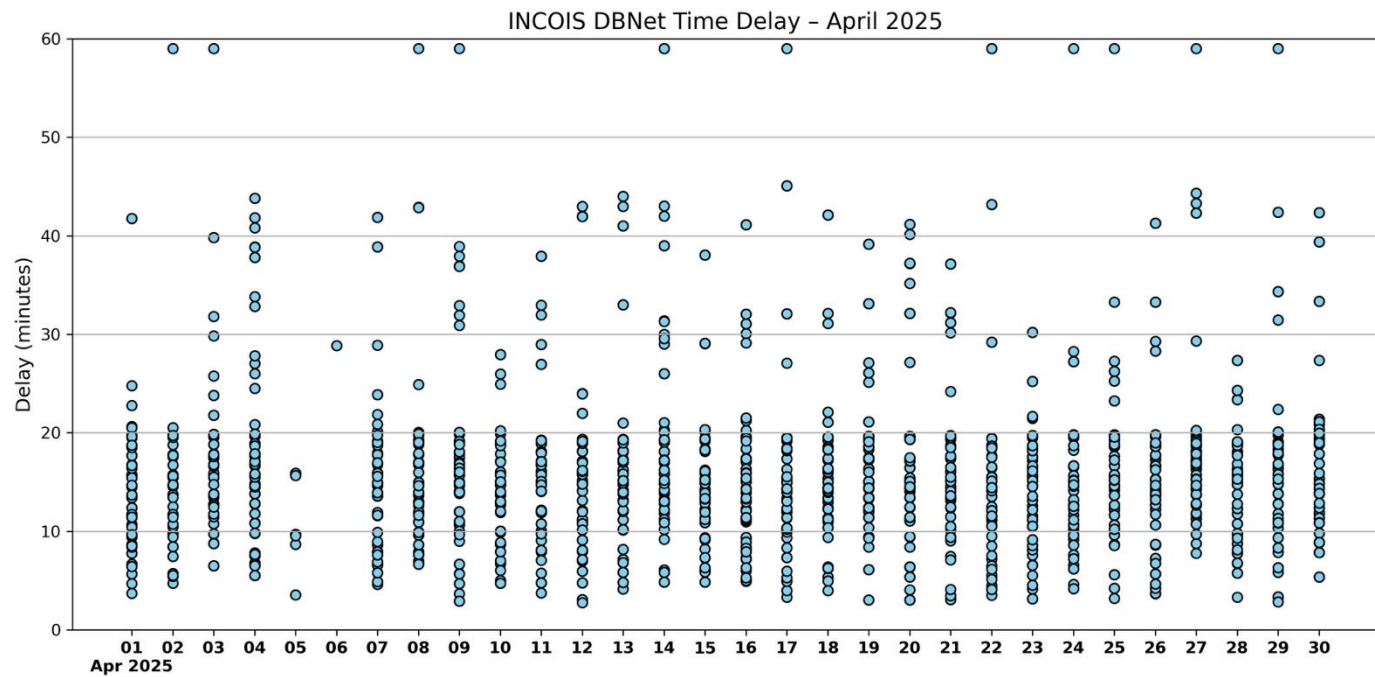
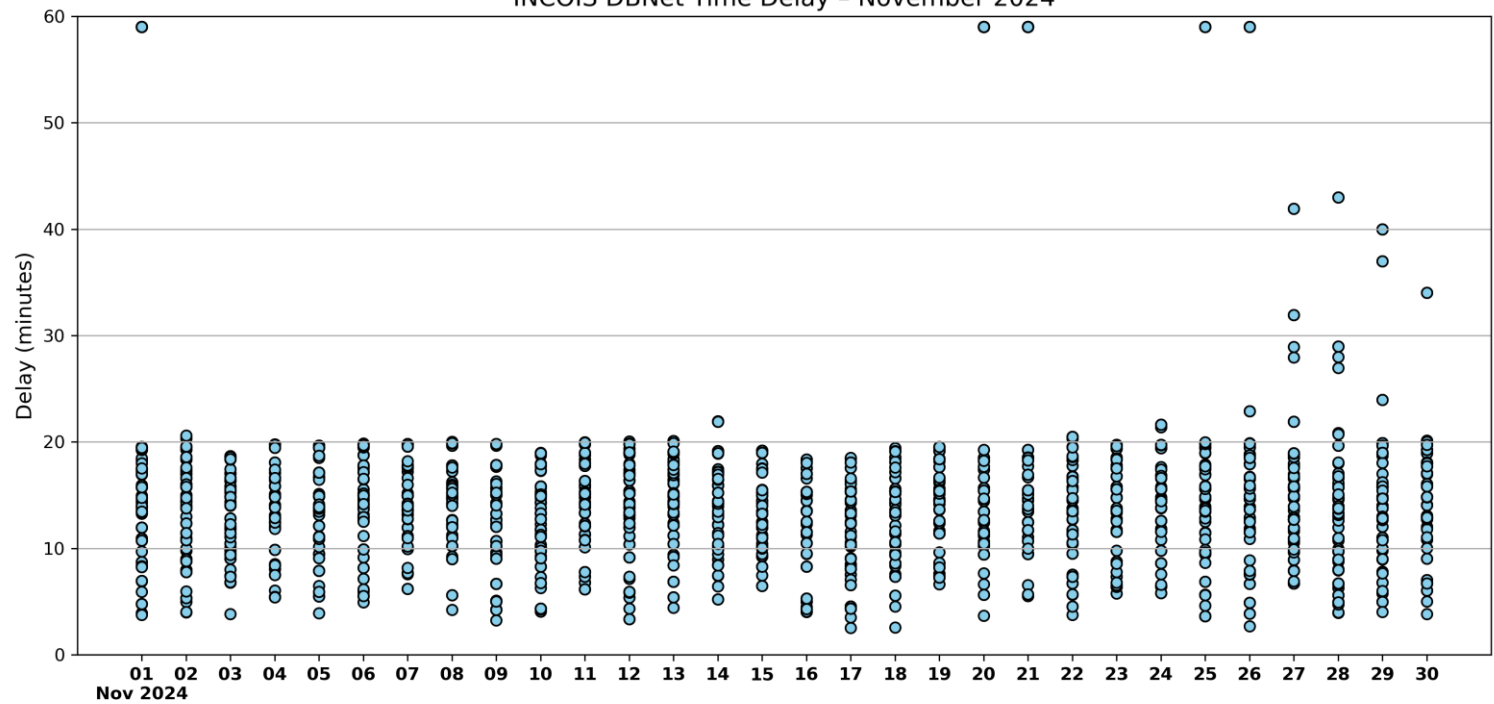
## India

| Bulletin         | File names                              |
|------------------|-----------------------------------------|
| INAX[01-02] DEMS | W_in-[NCM,INC]-???,amsua,*_C_DEMS_*.bin |
| INMX[01-05] DEMS | W_in-[NCM,INC]-???,mhs,*_C_DEMS_*.bin   |
| INHX[01-02] DEMS | W_in-[NCM,INC]-???,hirs,*_C_DEMS_*.bin  |
| INQX[01-08] DEMS | W_in-[NCM,INC]-???,iasi,*_C_DEMS_*.bin  |
| INSX[01-08] DEMS | W_in-[NCM,INC]-???,atms,*_C_DEMS_*.bin  |
| INCX[01-08] DEMS | W_in-[NCM,INC]-???,cris,*_C_DEMS_*.bin  |

Stations: hyd (Hyderabad). Planned: del, guw, che.

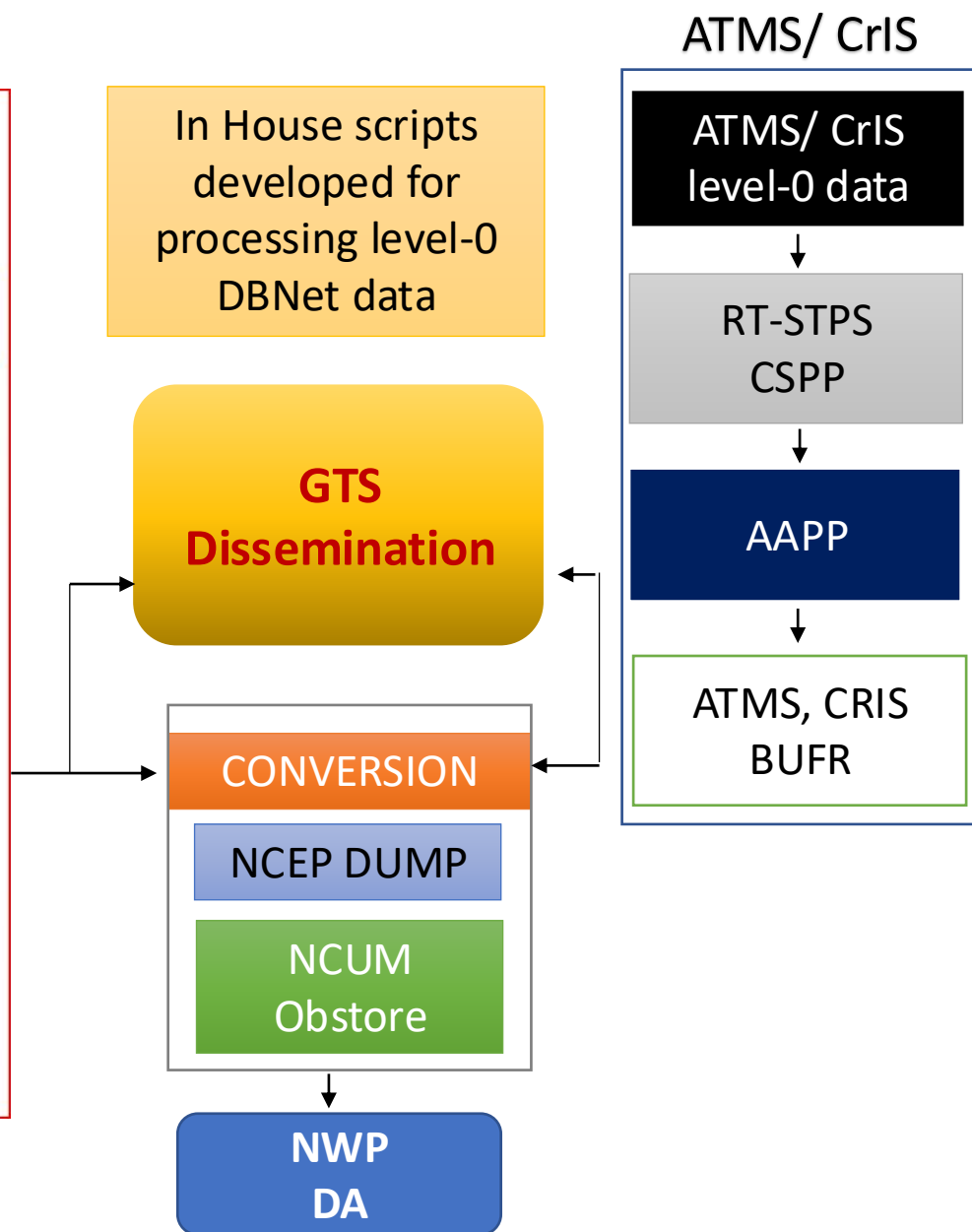
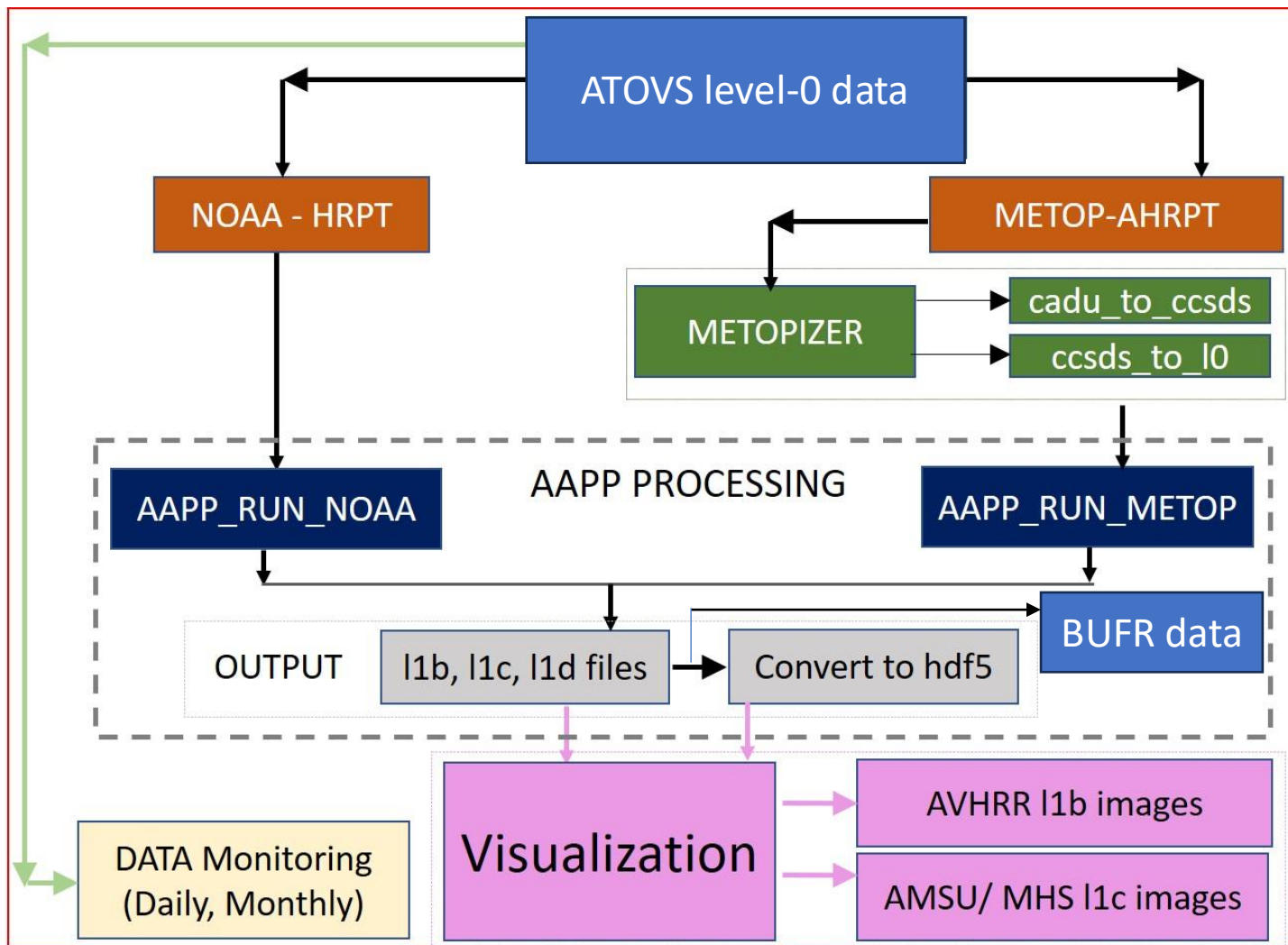
Note that Hyderabad has two station codes: 40 for NRSC (National Remote Sensing Centre) data processed by NCMRWF and 41 for INCOIS (Indian National Centre for Ocean Information Services) data processed at the site (from March 2025).

<https://nwp-saf.eumetsat.int/site/monitoring/dbnet/feeds-of-dbnet-data-from-gts/>





# ATOVS DBNet Data Processing at NCMRWF





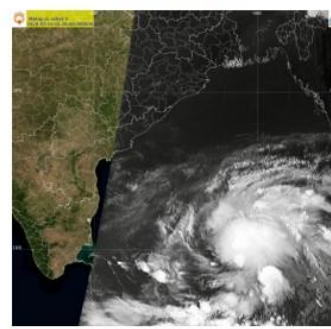
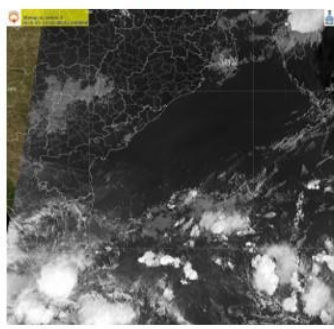
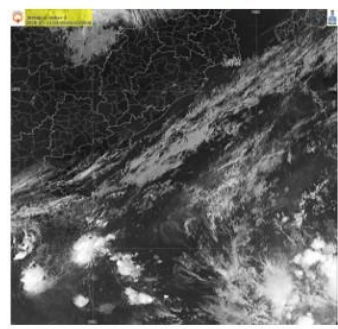
20200512

20200513

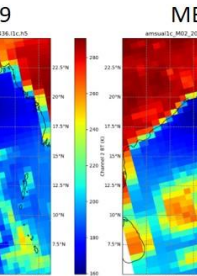
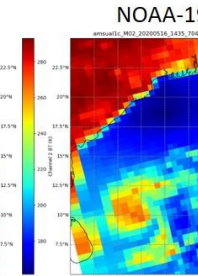
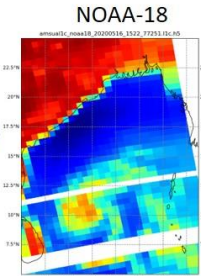
20200514

AMSU-A channel-2

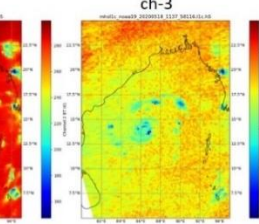
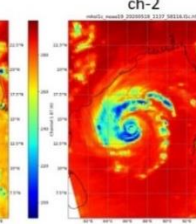
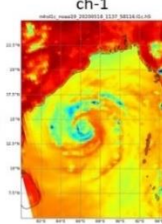
MHS NOAA-19



16 May



18 May

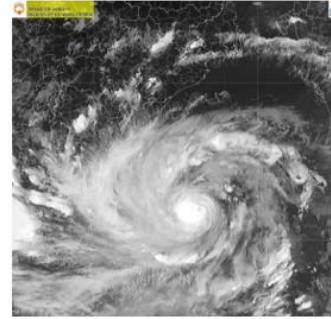
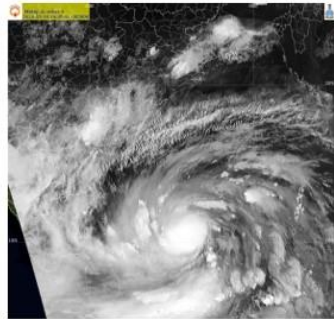
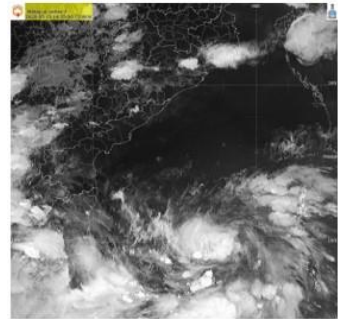


20200515

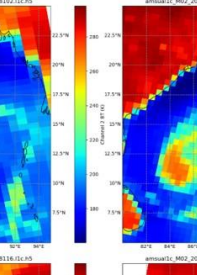
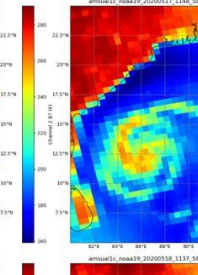
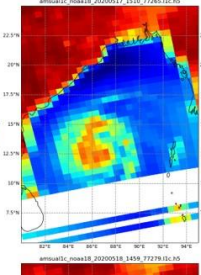
20200516

20200517

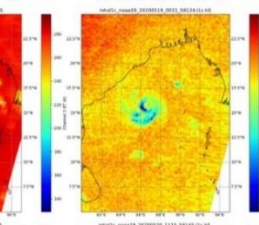
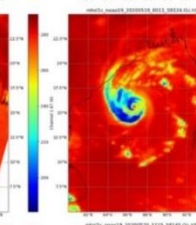
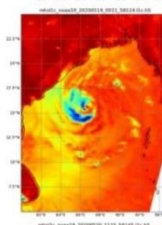
17 May



18 May



19 May

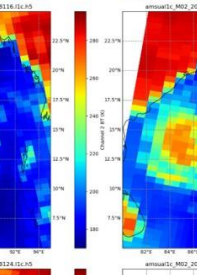
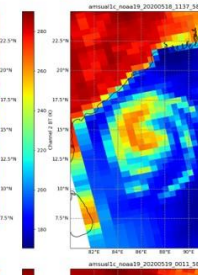
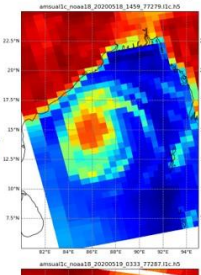
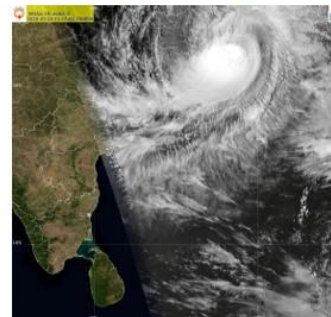
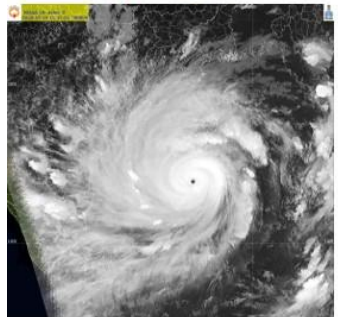


20200518

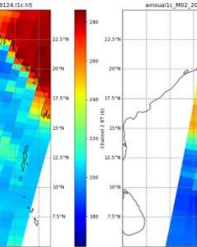
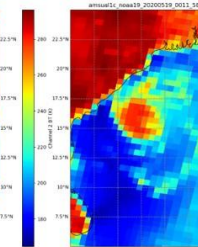
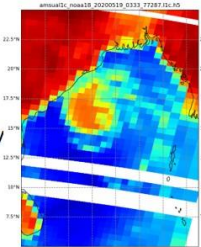
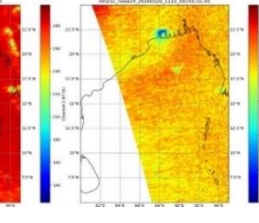
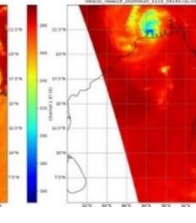
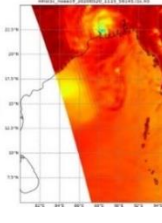
20200519

20200520

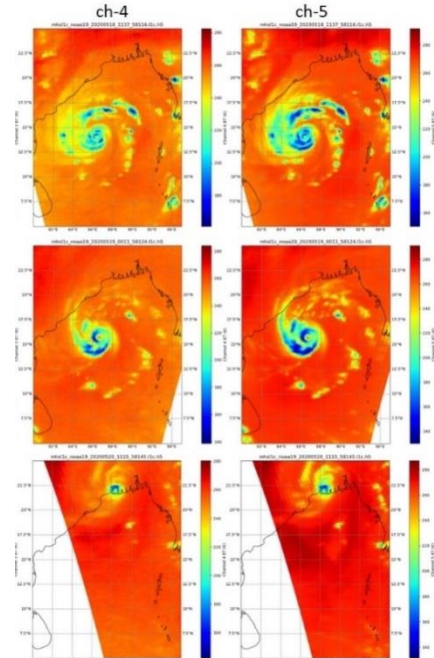
19 May



20 May



MHS from  
May 18<sup>th</sup>  
through  
20<sup>th</sup>, 2020  
MHS.



The cyclogenesis of TC AMPHAN as observed by AVHRR (Channel-5) onboard NOAA and METOP series of satellites, valid from 12-20 May 2020.

<https://www.ncmrwf.gov.in/Reports-php/Data-Processing-and-Visualisation-of-NOAA-and-MetOp-Satellite-Data.php>

AMSU-A channel-2 imagery from NOAA-18, NOAA-19 and METOP-A valid on 16, 17, 18 and 19 May 2020.





# Data Availability

Key for table icons:

|  |                                                      |
|--|------------------------------------------------------|
|  | No data received over past week                      |
|  | No data received over past three days                |
|  | Data received during past three days                 |
|  | Data failing consistency comparison with global feed |

## Network Status

All ATOVS/IASI data ▾

NCMRWF ▾ country ▾ station ▾

| Regional Centre | Country | Station         | AMSU-A      |       |             |             | MHS         |       |             |             | HIRS        |             |             | IASI |  |
|-----------------|---------|-----------------|-------------|-------|-------------|-------------|-------------|-------|-------------|-------------|-------------|-------------|-------------|------|--|
|                 |         |                 | MET-B       | MET-C | N18         | N19         | MET-B       | MET-C | N19         | N18         | N19         | MET-B       | MET-C       |      |  |
| NCMRWF          | India   | Hyderabad (hyd) | <div></div> |       | <div></div> | <div></div> | <div></div> |       | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |      |  |

All CrIS/ATMS data ▾

NCMRWF ▾ country ▾ station ▾

| Regional Centre | Country | Station         | CrIS  |     |     | ATMS  |     |     |
|-----------------|---------|-----------------|-------|-----|-----|-------|-----|-----|
|                 |         |                 | S.NPP | N20 | N21 | S.NPP | N20 | N21 |
| NCMRWF          | India   | Hyderabad (hyd) |       |     |     |       |     |     |



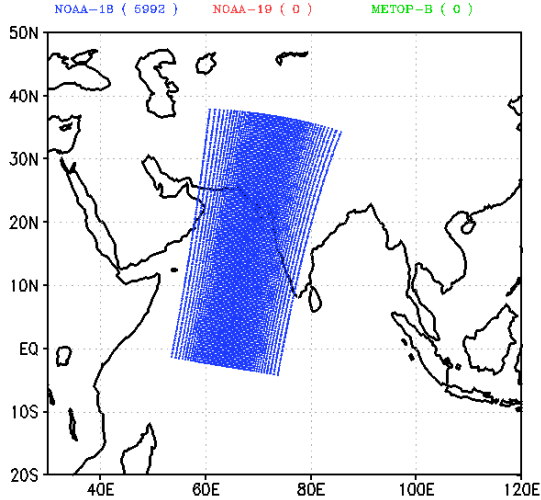
# ATMS/CrIS from NOAA-20 & S-NPP

| Show      | 10      | entries | Satellite               | [AP] Hyderabad (India) - hyd | Day                     | View overpasses with warnings: All Overpasses |                                | Search:                  |                           |                             |                           |                           |                                  |                                   |                                   |                                    |                                    |
|-----------|---------|---------|-------------------------|------------------------------|-------------------------|-----------------------------------------------|--------------------------------|--------------------------|---------------------------|-----------------------------|---------------------------|---------------------------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|
| Satellite | Station | Day     | Overpass Time           | No. of Local scanlines       | No. of Common scanlines | Mean Timestamp Difference/s                   | Mean Navigational Difference/m | Percentage of valid BTDs | Mean BTD                  | Min BTD                     | Max BTD                   | STD of BTD                | No. of spurious local timestamps | No. of spurious global timestamps | No. of spurious local coordinates | No. of spurious global coordinates | No. of common spurious coordinates |
| noaa20    | hyd     | Monday  | 2024-03-18 08:44:50.983 | 60                           | 60                      | 0                                             | 0                              | 100<br>100<br>100        | 4.3e-06<br>4.52e-07<br>0  | -7.08e-05<br>-0.000188<br>0 | 7.08e-05<br>0.000188<br>0 | 1.84e-05<br>1.36e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| S,NPP     | hyd     | Monday  | 2024-03-18 07:54:46.984 | 68                           | 68                      | 0                                             | 0                              | 77.8<br>77.8<br>77.8     | 3.07e-06<br>2.45e-07<br>0 | -0.000112<br>-0.000188<br>0 | 0.000112<br>0.000188<br>0 | 2.37e-05<br>1.98e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| noaa20    | hyd     | Monday  | 2024-03-18 07:05:06.983 | 56                           | 56                      | 0                                             | 0                              | 100<br>100<br>100        | 3.88e-06<br>2.6e-07<br>0  | -7.08e-05<br>-0.000188<br>0 | 7.08e-05<br>0.000188<br>0 | 1.71e-05<br>1.47e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| noaa20    | hyd     | Sunday  | 2024-03-17 21:36:10.983 | 40                           | 40                      | 0                                             | 0                              | 100<br>100<br>100        | 4.05e-06<br>1.02e-06<br>0 | -7.08e-05<br>-0.000188<br>0 | 7.08e-05<br>0.000188<br>0 | 1.72e-05<br>1.45e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| S,NPP     | hyd     | Sunday  | 2024-03-17 20:44:54.984 | 64                           | 64                      | 0                                             | 0                              | 77.8<br>77.8<br>77.8     | 1.8e-06<br>5.43e-07<br>0  | -0.000108<br>-0.000188<br>0 | 0.000108<br>0.000188<br>0 | 1.96e-05<br>1.73e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| noaa20    | hyd     | Sunday  | 2024-03-17 19:54:18.983 | 68                           | 68                      | 0                                             | 0                              | 100<br>100<br>100        | 4.47e-06<br>7.25e-07<br>0 | -7.08e-05<br>-0.000188<br>0 | 7.08e-05<br>0.000188<br>0 | 1.79e-05<br>1.63e-05<br>0 | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |
| S,NPP     | hyd     | Sunday  | 2024-03-17 19:06:14.984 | 40                           | 40                      | 0                                             | 0                              | 77.8<br>77.8<br>77.8     | 1.62e-06<br>7.64e-07<br>0 | -0.000108<br>-0.000188<br>0 | 0.000108<br>0.000188<br>0 | 2.03e-05<br>2e-05<br>0    | 0                                | 0                                 | 0                                 | 0                                  | 0                                  |

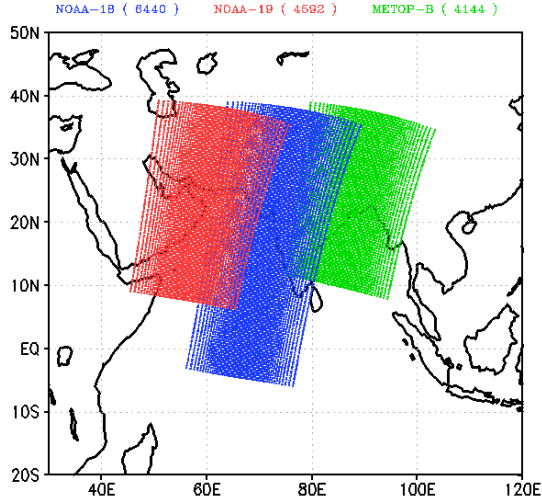


# Satellite passes (06 UTC)

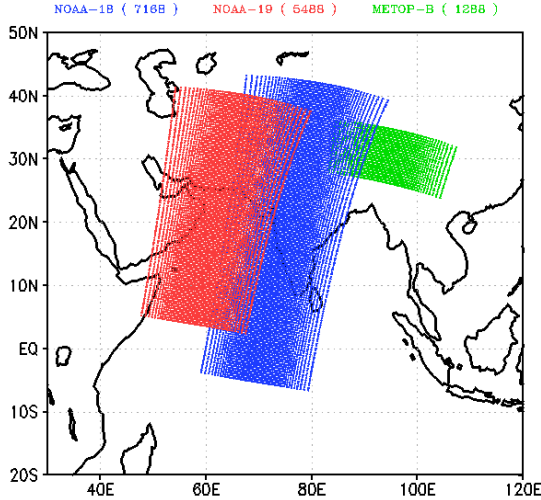
Data Coverage: INCOIS DBNet Data (20221019 0600UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 5992



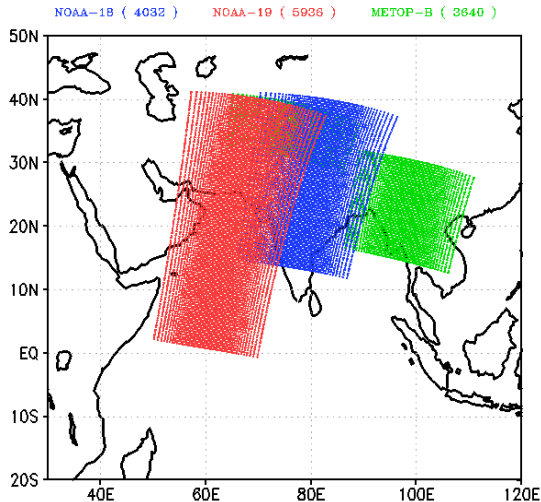
Data Coverage: INCOIS DBNet Data (20221020 0600UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 15176



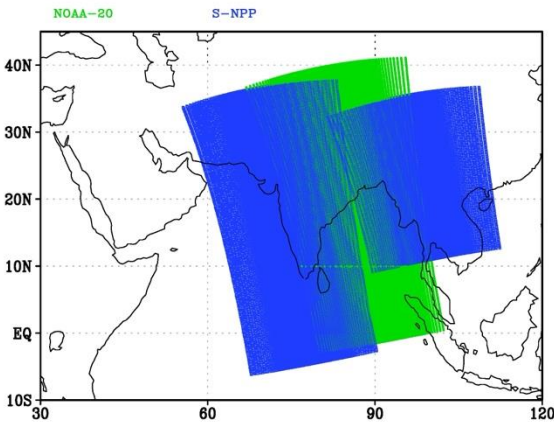
Data Coverage: INCOIS DBNet Data (20221021 0600UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 13944



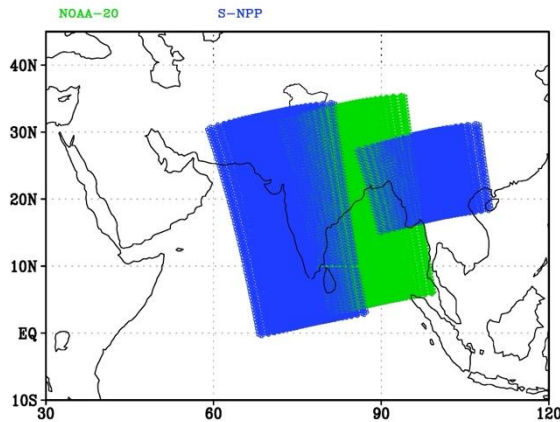
Data Coverage: INCOIS DBNet Data (20221022 0600UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 13608



Indian DBNet Coverage: ATMS (20240317 0600 UTC +/- 3 Hrs)



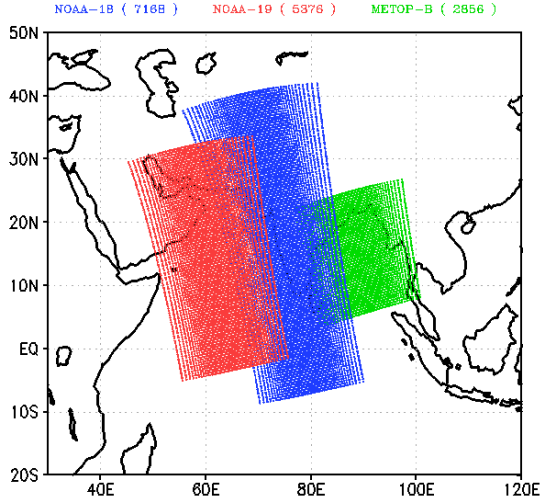
Indian DBNet Coverage: CrIS (20240317 0600 UTC +/- 3 Hrs)



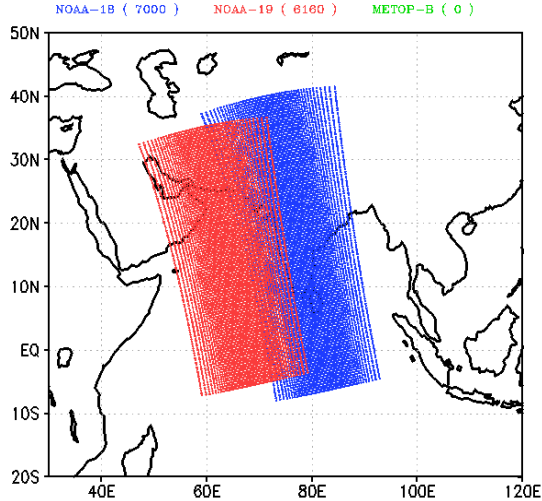


# Satellite passes (18 UTC)

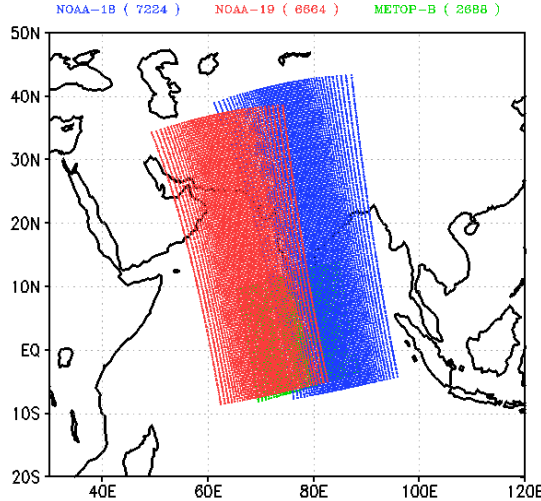
Data Coverage: INCOIS DBNet Data (20221019 1800UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 15400



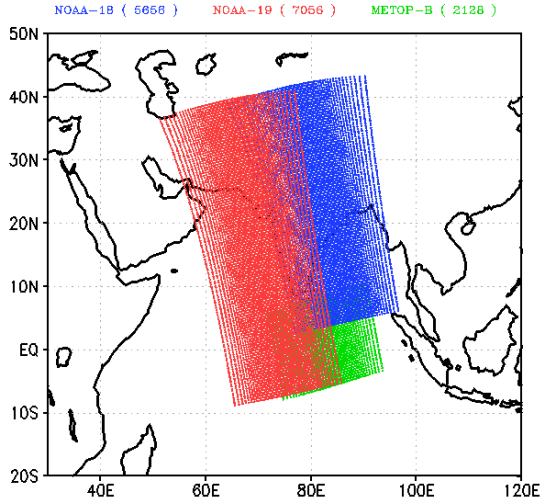
Data Coverage: INCOIS DBNet Data (20221020 1800UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 13160



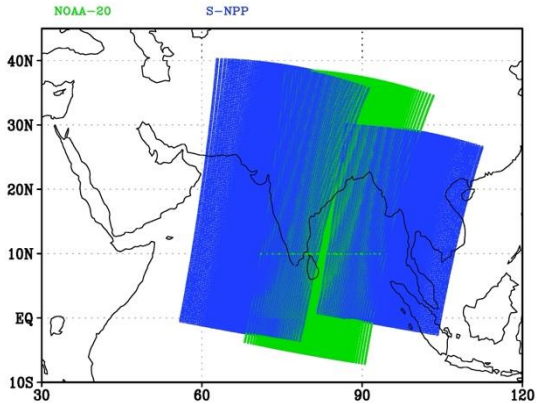
Data Coverage: INCOIS DBNet Data (20221021 1800UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 16576



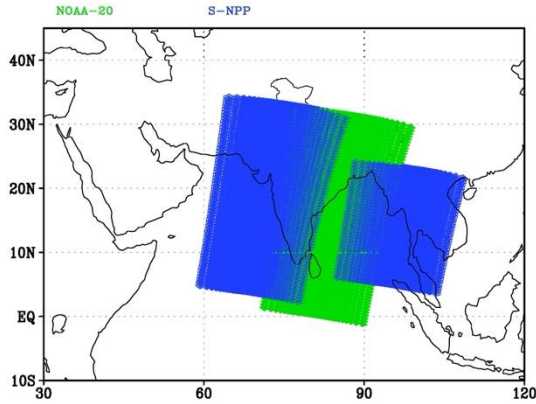
Data Coverage: INCOIS DBNet Data (20221022 1800UTC +/- 03Hrs)  
Total Number of Observations Received at NCMRWF: 14840



Indian DBNet Coverage: ATMS (20240317 1800 UTC +/- 3 Hrs)



Indian DBNet Coverage: CrIS (20240317 1800 UTC +/- 3 Hrs)

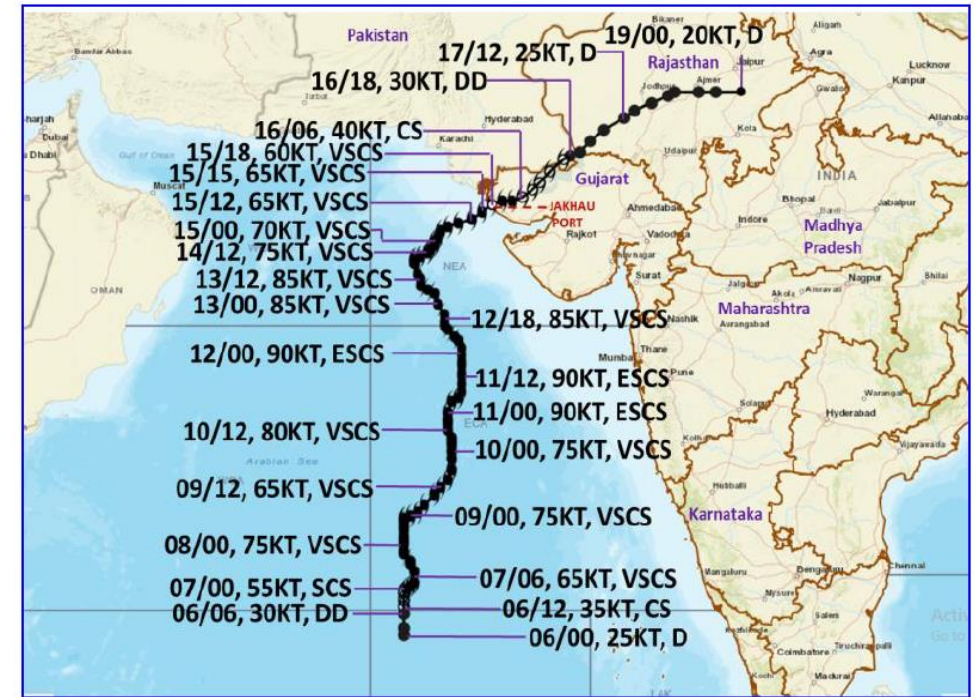






## Extremely Severe Cyclonic Storm “BIPARJOY” over the ARABIAN Sea (6th-19th June, 2023)

- Upper air Cyclonic Circulation formed over Southeast Arabian Sea on June 5, 2023 and led to Low Pressure Area and Well Marked Low Pressure Area.
- Developed as Depression, then Cyclonic Storm "BIPARJOY" by June 6. Became Very Severe Cyclonic Storm by June 7, following a recurving path. Crossed coasts on June 15 as VSCS, weakened to SCS afterward. Transitioned to Cyclonic Storm on June 16 over Saurashtra & Kutch. Moved northeast, weakening into Deep Depression by June 16 midnight.
- On June 15, it crossed Saurashtra & Kutch and adjoining Pakistan coasts as a VSCS near Jakhau Port with sustained winds of 115-125 kmph, gusting to 140 kmph.
- Post-landfall, it weakened to an SCS over Saurashtra & Kutch.
- Moving east-northeastwards, weakened to a Cyclonic Storm (CS) on June 16 over Saurashtra & Kutch, then to a Deep Depression (DD) over Southeast Pakistan and adjoining Southwest Rajasthan and Kutch by midnight on the same day.



- : LESS THAN 34 KT
- 6 : 34-47 KT
- 9 : ≥ 48 KT

D: Depression  
DD: Deep Depression  
CS: Cyclonic Storm  
SCS: Severe Cyclonic Storm  
VSCS: Very SCS  
ESCS: Extremely SCS  
■ : Observed Track

Observed track of extremely severe cyclonic storm ‘BIPARJOY’ over the AS during 6-19 June, 2023 (IMD Report, 2023).





# Design of experiments

Four types of numerical experiments were Designed (1) CNTL; (2) ATOVS ; (3) ATMS and (4) ATOVS & ATMS

| CNTL                                                | ATOVS                      | ATMS                      | ATOVSATMS                            |
|-----------------------------------------------------|----------------------------|---------------------------|--------------------------------------|
| Surface<br>Sonde<br>Satwind<br>Scatwind<br>Aircraft | CNTL +<br>ATOVS<br>(DBNet) | CNTL +<br>ATMS<br>(DBNet) | CNTL +<br>ATOVS &<br>ATMS<br>(DBNet) |

ATOVS (AMSU-A, MHS), ATMS DBNet data reception at NCMRWF at 06 and 18 UTC



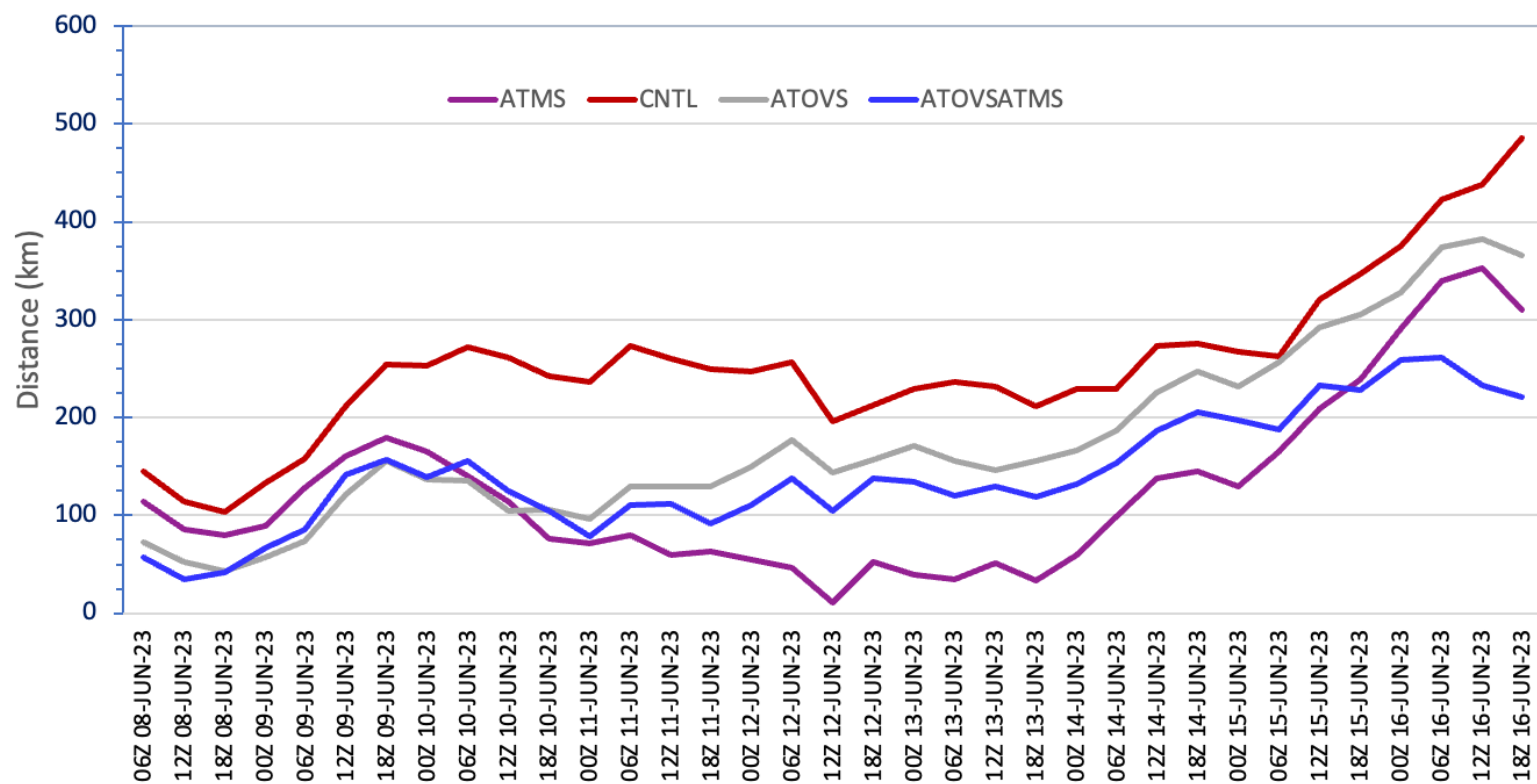
# Model setup

- NCUM Operational DA system with 4DVAR DA at 12 km horizontal resolution (PS44).
- The DA suite initiated at 00 UTC of 3 June 2023 and continued up to 00 UTC of 10 June 2022.
- Long forecasts (up to 10 days) are made from all 4 experiments to study the impact of Indian DBNet (ATOVS, ATMS) data.

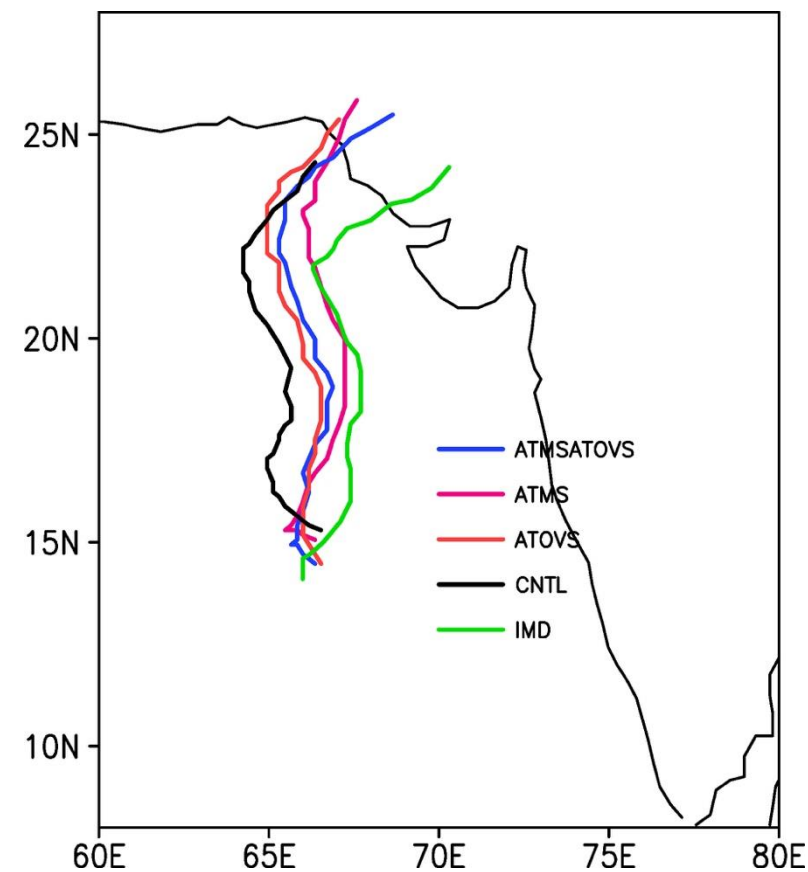


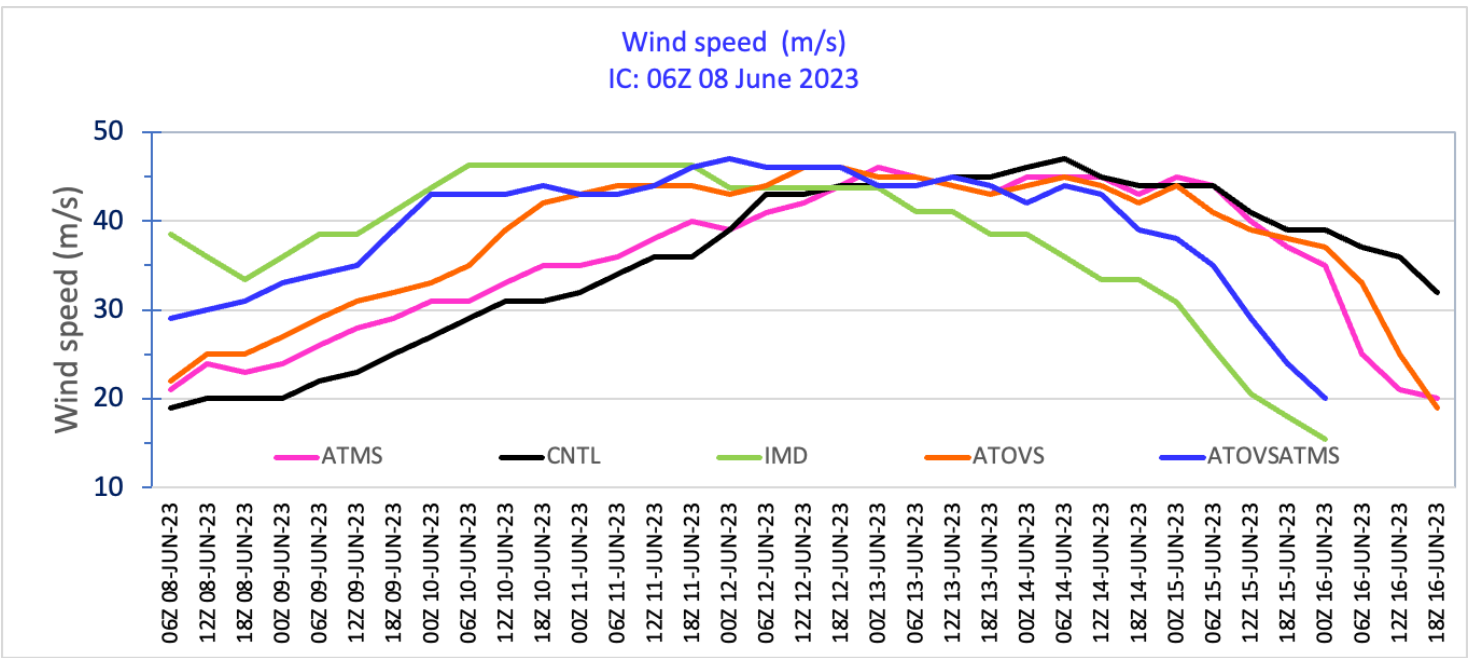
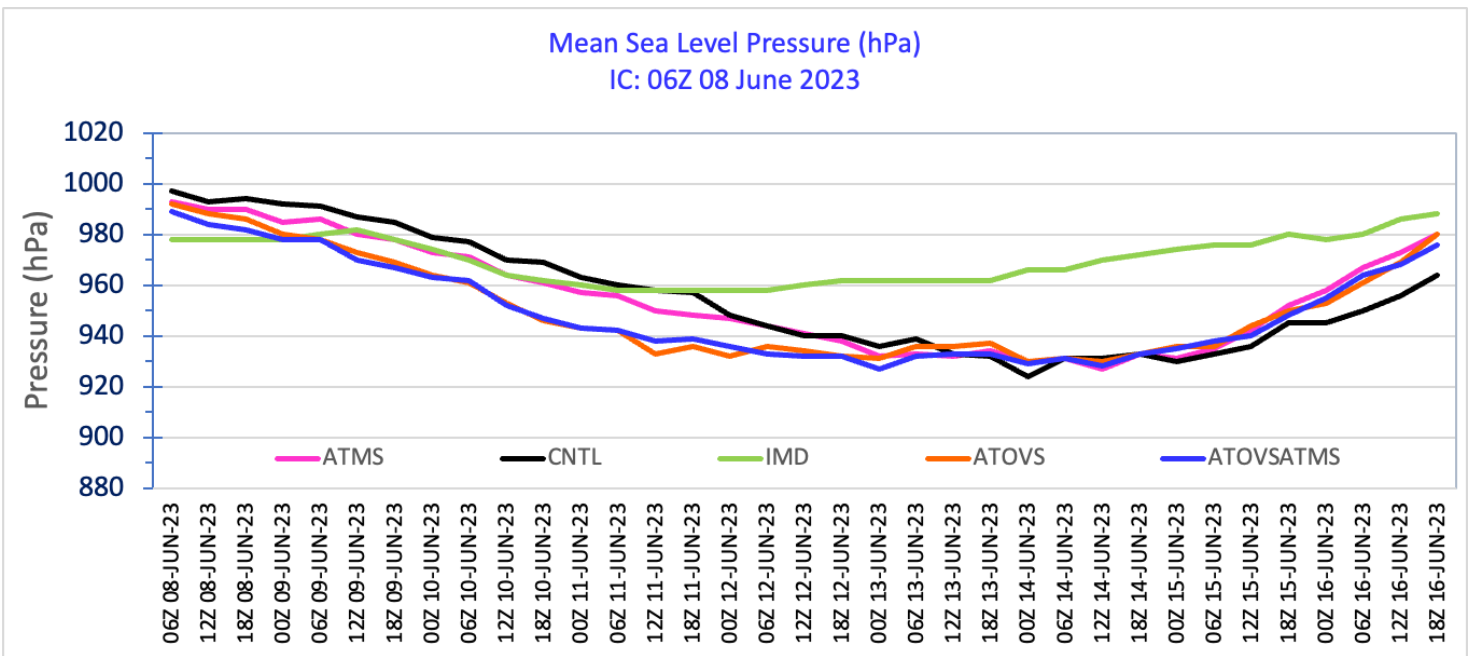
# Results

Track Errors (km)  
IC: 00Z 08 June 2023



INIT: 8 June 2023 – 06 UTC

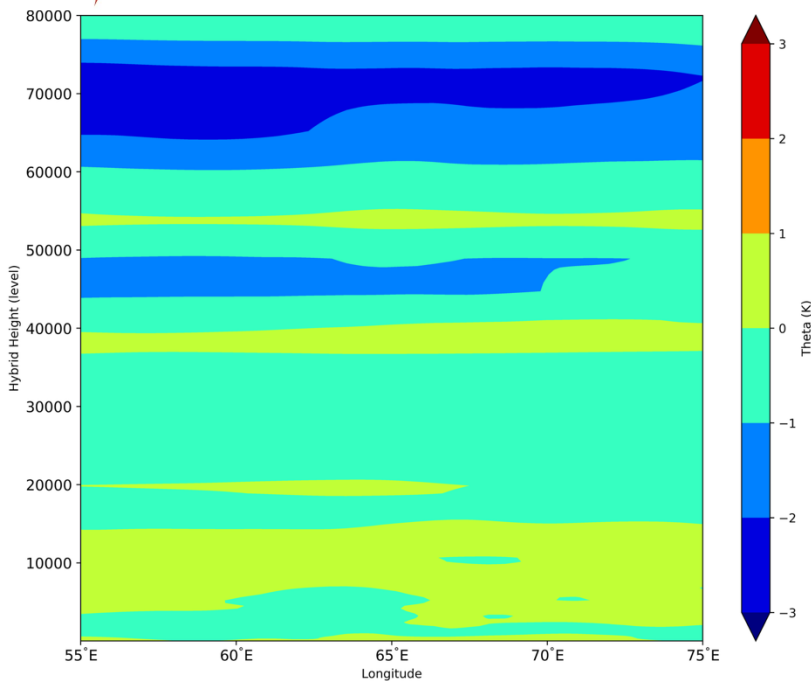




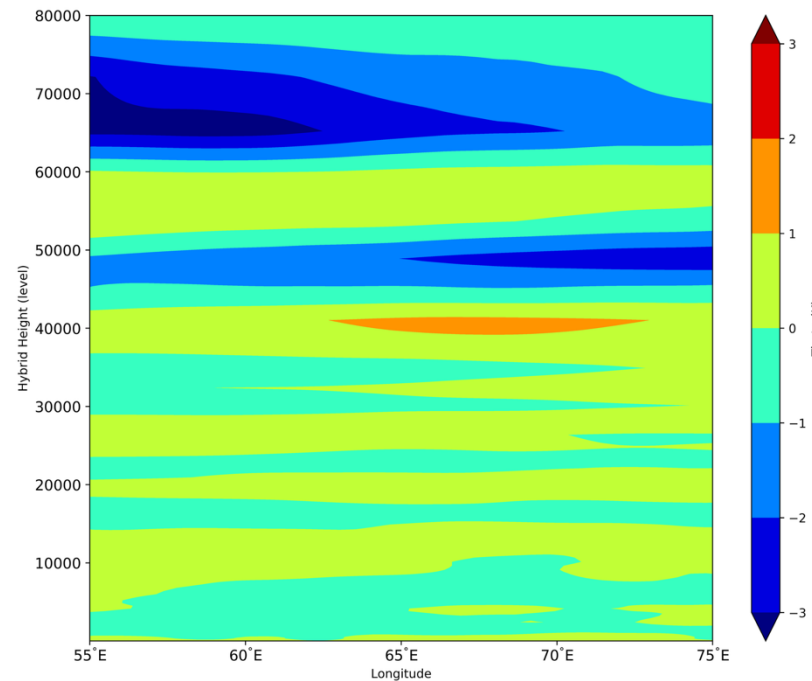


# Temperature (Analysis) Increments (after Assimilation) – 08 June 2023 – 06 UTC

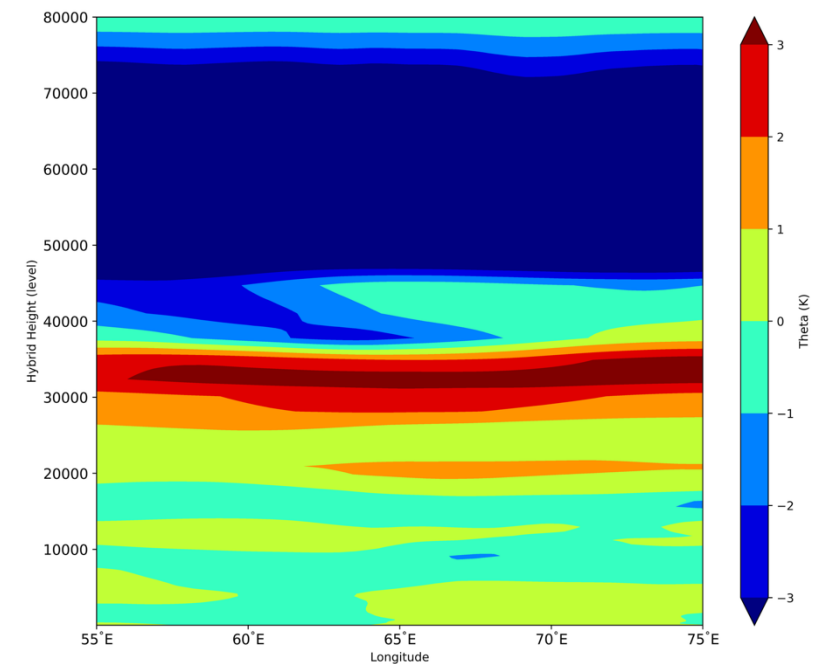
CNTL



ATMS

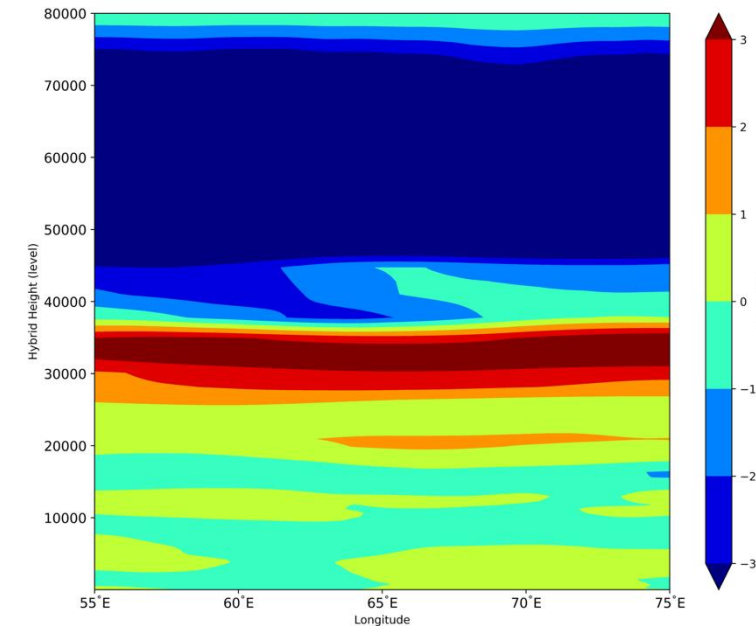


ATOVS



ATOVS colls the upper atmosphere and slightly warms mid troposphere; where as ATMS follows similar trend of CNTL.

ATMS+ATOVS





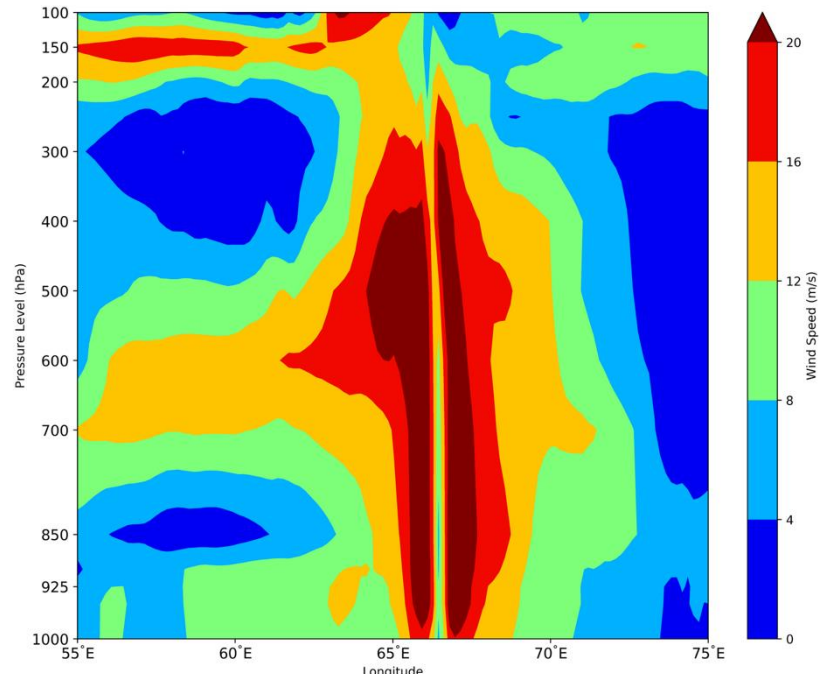
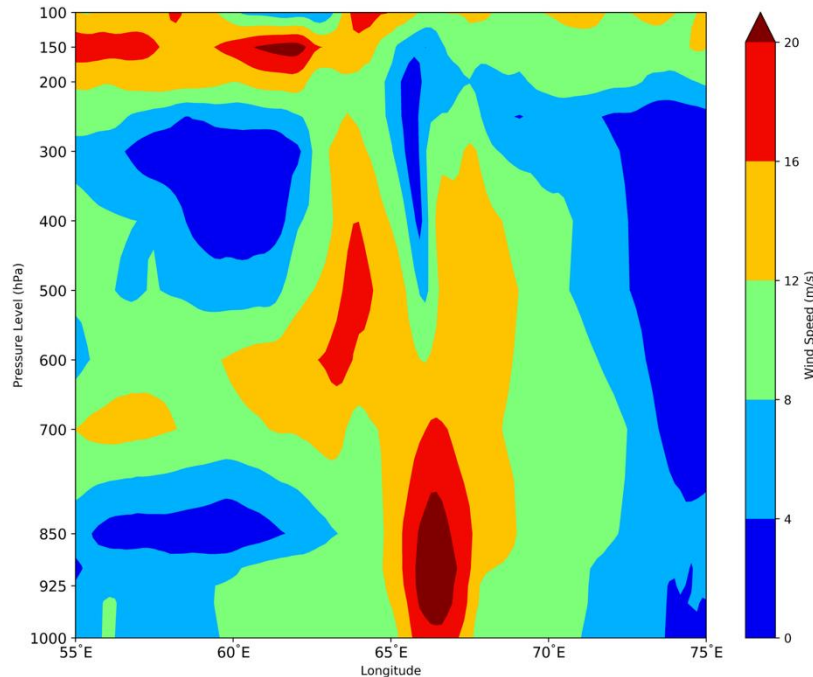
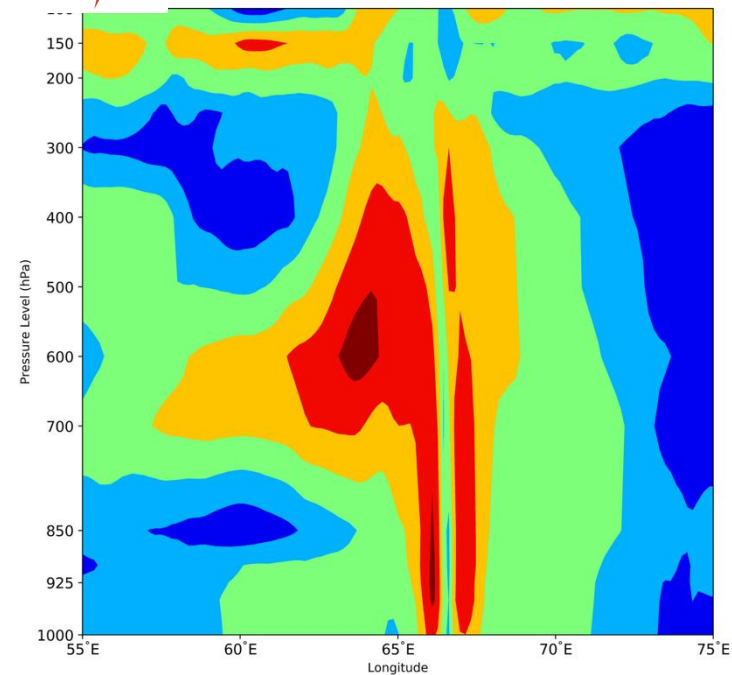


Zonal Wind speed (m/s) – 08 June 2023 – 06 UTC

ATOVS

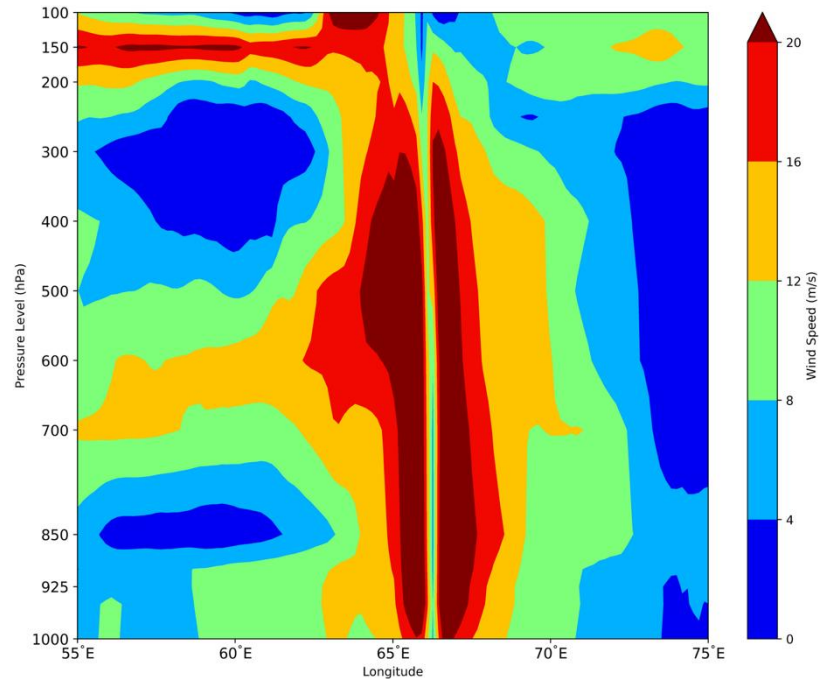
CNTL

ATMS



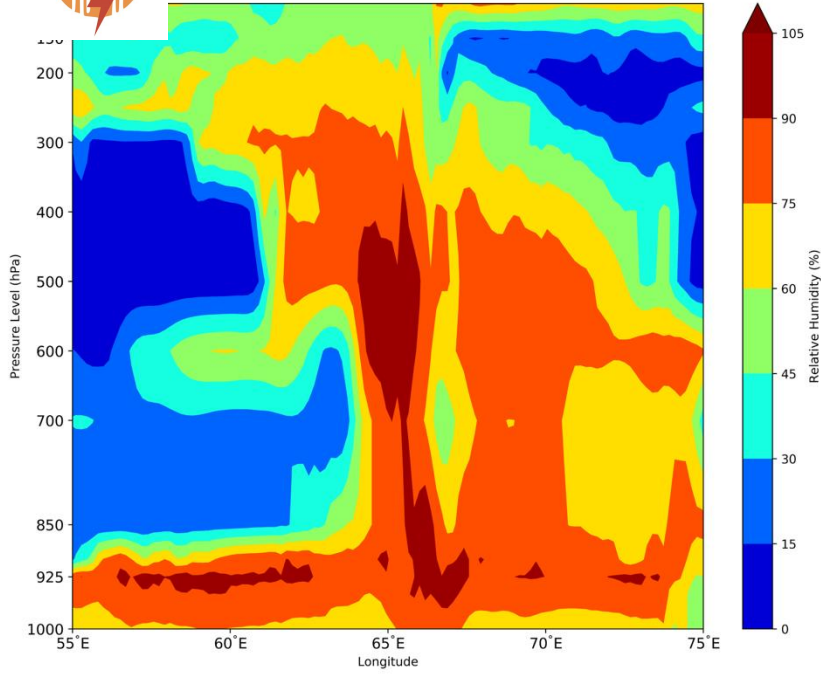
ATOVS reduces the wind speed in the mid-troposphere whereas ATOVS and ATMS+ATOVS show similar pattern with increasing wind speed whole column.

ATMS+ATOVS



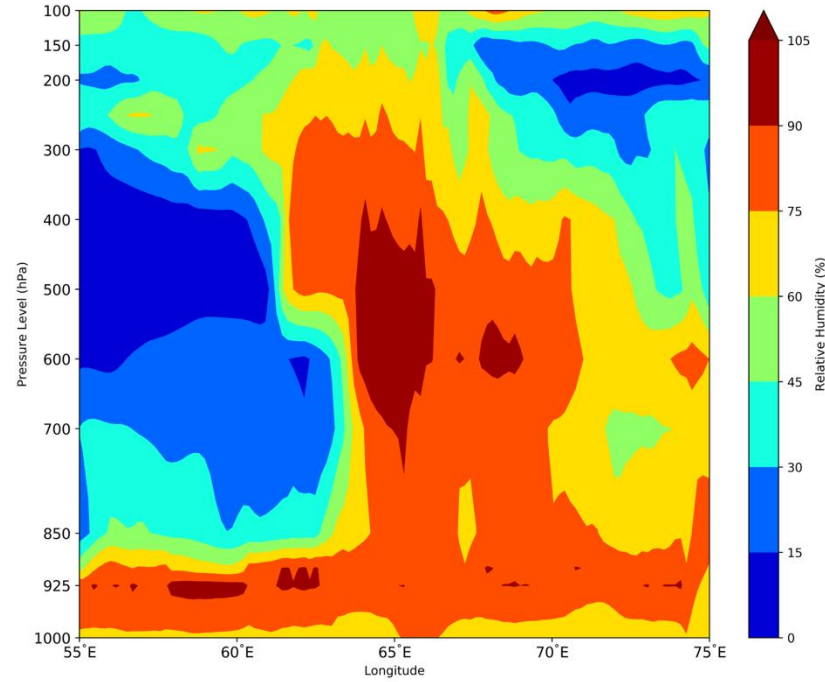


CNTL

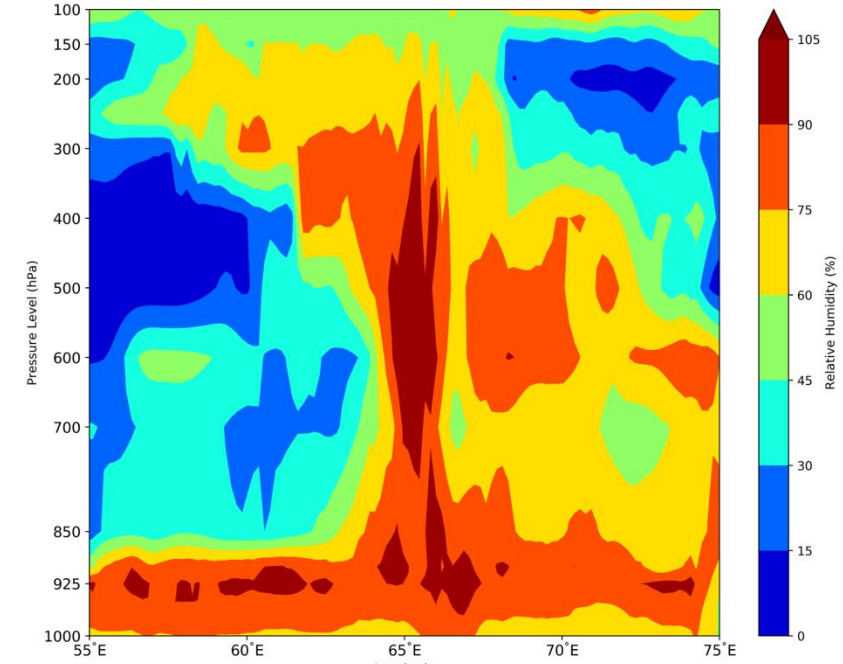


Relative Humidity (%) – 08 June 2023 – 06 UTC

ATMS

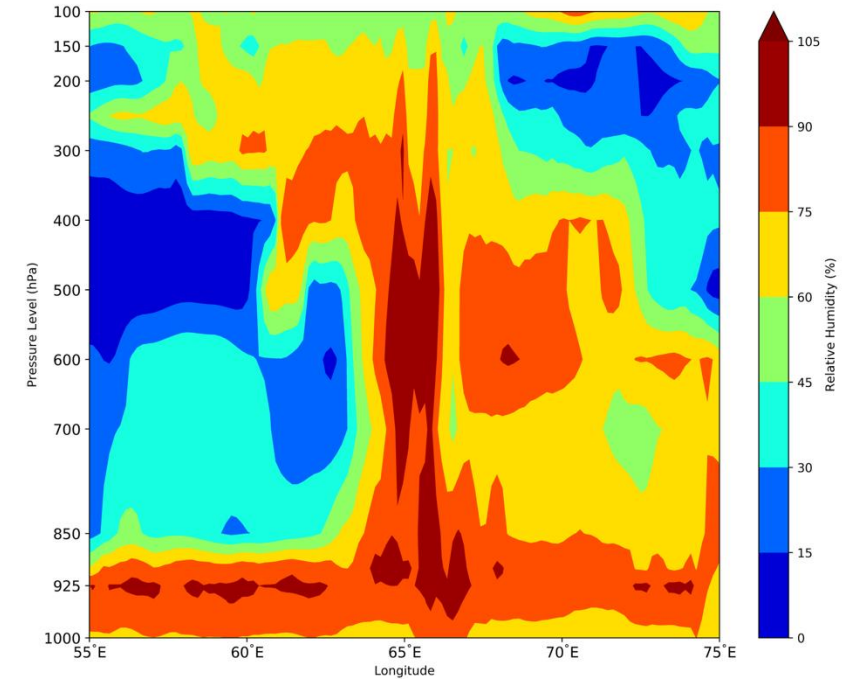


ATOVS



ATMS show more humid in the mid troposphere wider region.

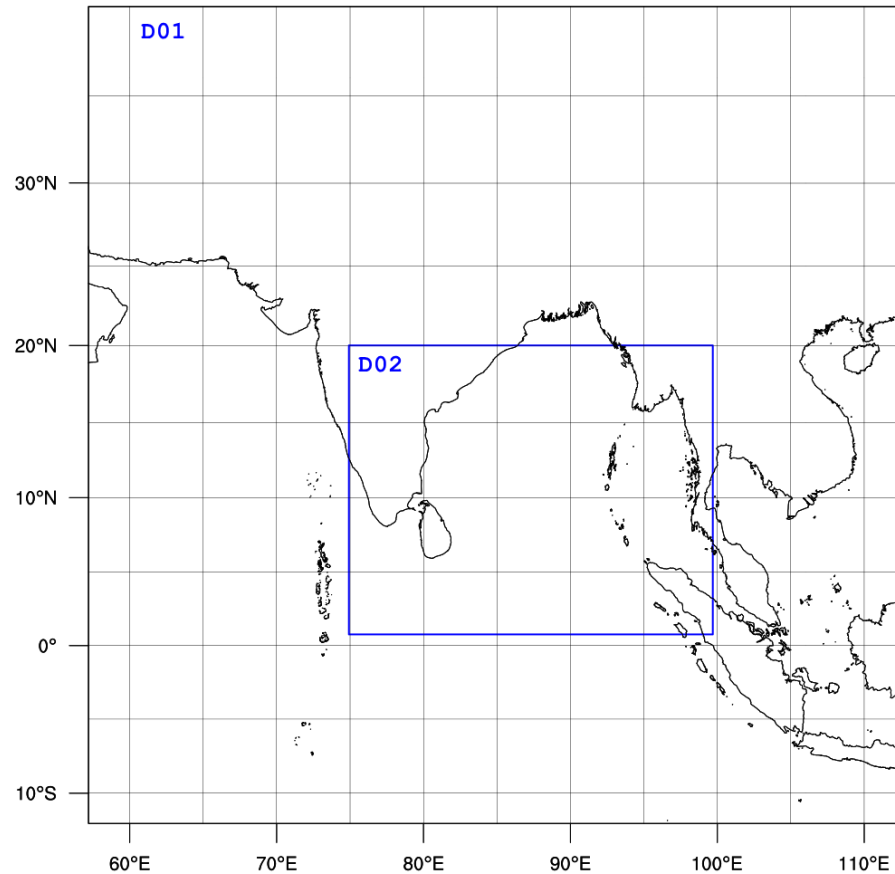
ATMS+ATOVS





# HRRR Regional System

## Domain Setup



| WRFV 3.9.1                        |                                              |
|-----------------------------------|----------------------------------------------|
| Horizontal resolution             | 27 & 9 km                                    |
| Vertical levels                   | 45                                           |
| Model top                         | 20 hPa                                       |
| Grid points                       | Dom1: 230 x 230                              |
|                                   | Dom2: 307 x 244                              |
| Physical Parameterization Schemes |                                              |
| Radiation                         | RRTMG for both short and long wave radiation |
| Boundary layer                    | YSU PBL scheme                               |
| Microphysics                      | Morrison (Double moments)                    |
| Convective parameterization       | Kain-Fritsch (new Eta) scheme                |
| Land surface                      | Noah Land surface scheme                     |

## Design of experiments

CNTL (Conventional & GPRSO)

EXP (CNTL + AMSU-A+MHS+ATMS)





## Life cycle of Cyclonic Storm “Fengal”

- ✓ A **low pressure** area formed over east Equatorial Indian Ocean and adjoining southeast Bay of Bengal on the morning of **23rd November**.
- ✓ It moved west-northwestwards and became a well-marked low on 24th November.
- ✓ Further **intensified into a depression** on **25th November** over central south Bay of Bengal and adjoining EIO.
- ✓ Strengthened into a **deep depression** over southwest Bay of Bengal on **26th November**.
- ✓ **Intensified into Cyclonic Storm “FENGAL”** on **29th November** over the southwest Bay of Bengal.
- ✓ Moved northwestwards and lay over the same region on the morning of 30<sup>th</sup> November.
- ✓ **Crossed North Tamil Nadu & Puducherry** coasts near Puducherry between 2230 and 2330 IST on 30th November with wind speeds of 70–80 kmph, gusting to 90 kmph.
- ✓ Weakened into a deep depression by forenoon of 1st December and further into a depression by the evening.

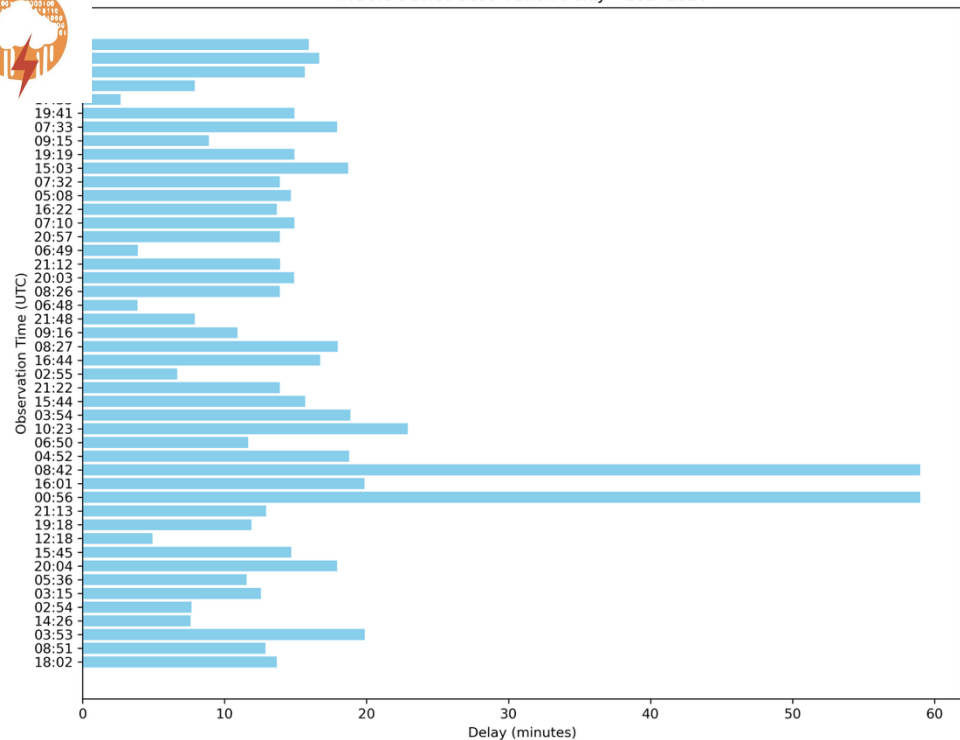


**Observed track of severe cyclonic storm “FENGAL” over Southwest Bay of Bengal during 24<sup>th</sup> November- 02<sup>th</sup> December, 2024 (IMD Report, 2024)**

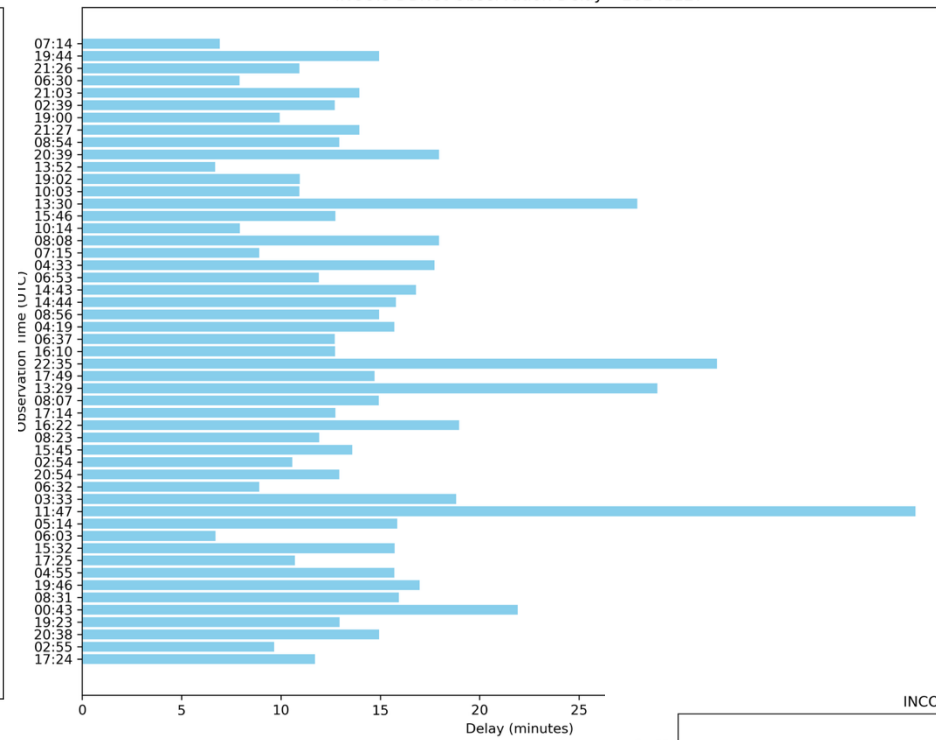
**Ref:** Cyclonic Storm “FENGAL” over the Bay of Bengal (23<sup>th</sup> November– 02<sup>nd</sup> December, 2024): A Report



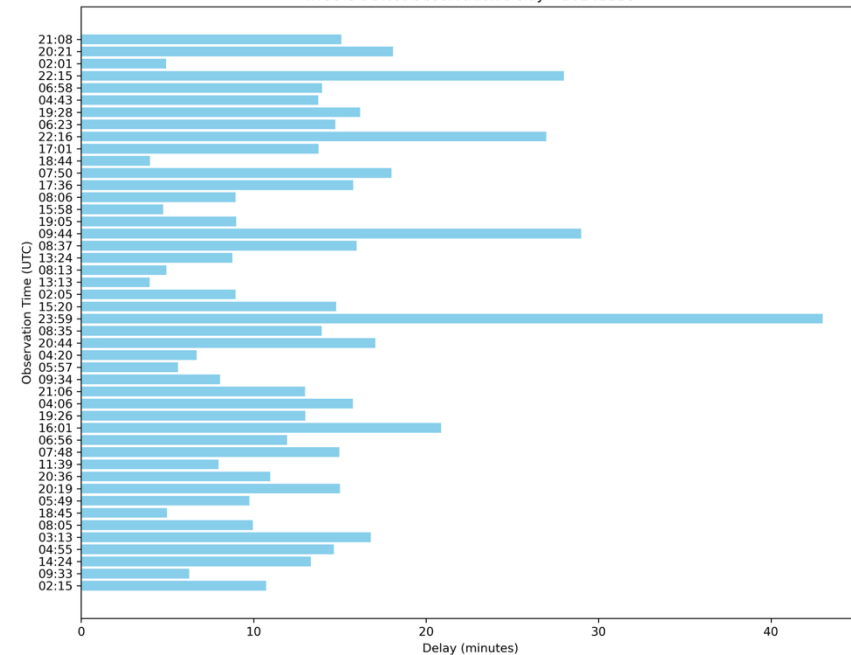
INCOIS DBNet Observation Delay - 20241126



INCOIS DBNet Observation Delay - 20241127



INCOIS DBNet Observation Delay - 20241128



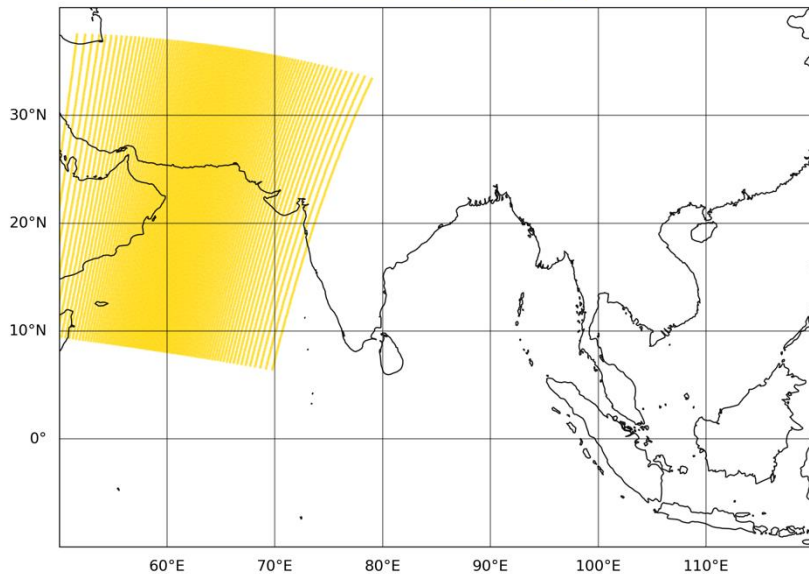
Data Reception via GTS from INCOIS  
26 - 28 Nov 2024



# Data Coverage (28 Nov 2024)

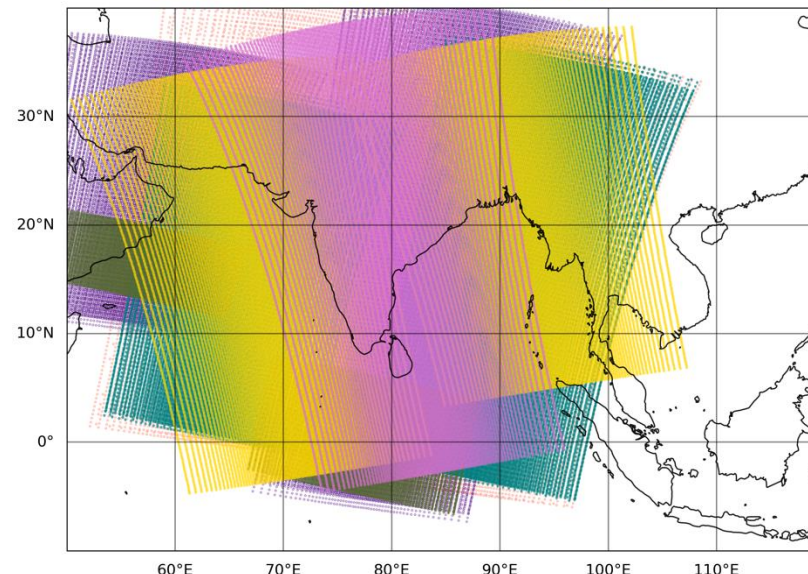
00 UTC

NOAA-18 (0) METOP-B (0) NPP (0) NOAA-21 (0)  
NOAA-19 (0) METOP-C (0) NOAA-20 (17280)



06 UTC

NOAA-18 (15286) METOP-B (54890) NPP (0) NOAA-21 (25344)  
NOAA-19 (56044) METOP-C (10890) NOAA-20 (42624)

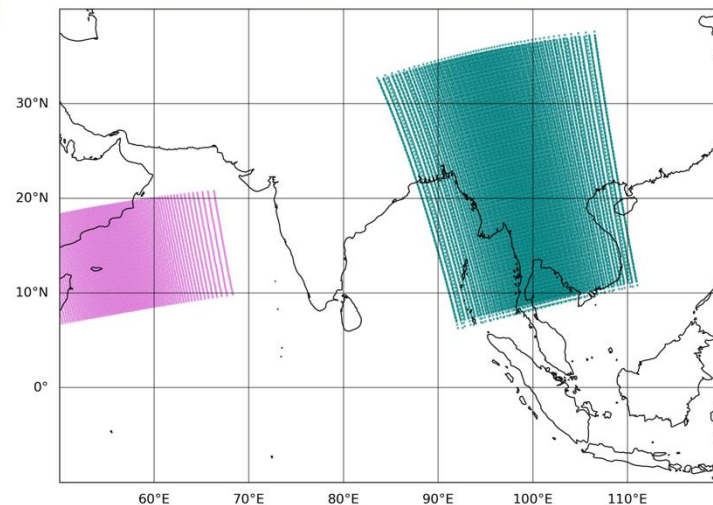


18 UTC

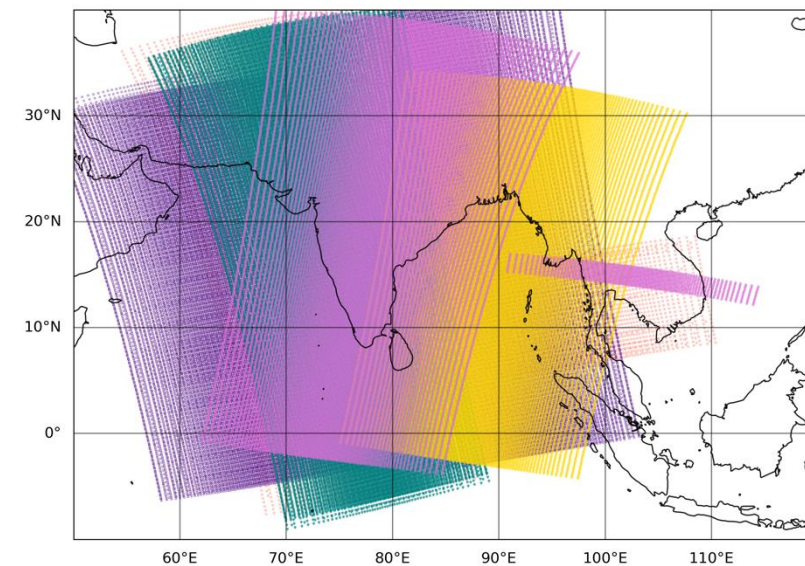
12 UTC



NOAA-18 (0) METOP-B (20948) NPP (0) NOAA-21 (6912)  
NOAA-19 (0) METOP-C (0) NOAA-20 (0)



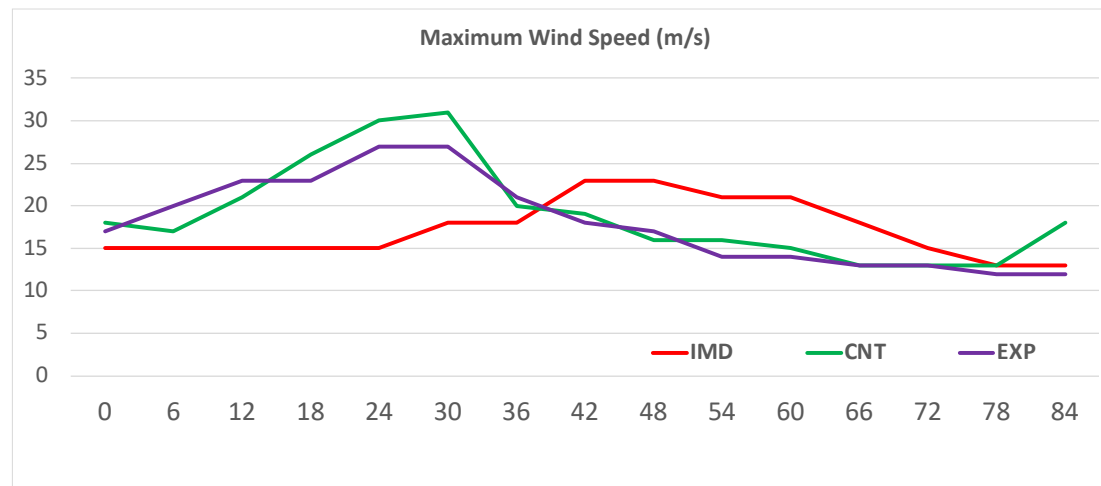
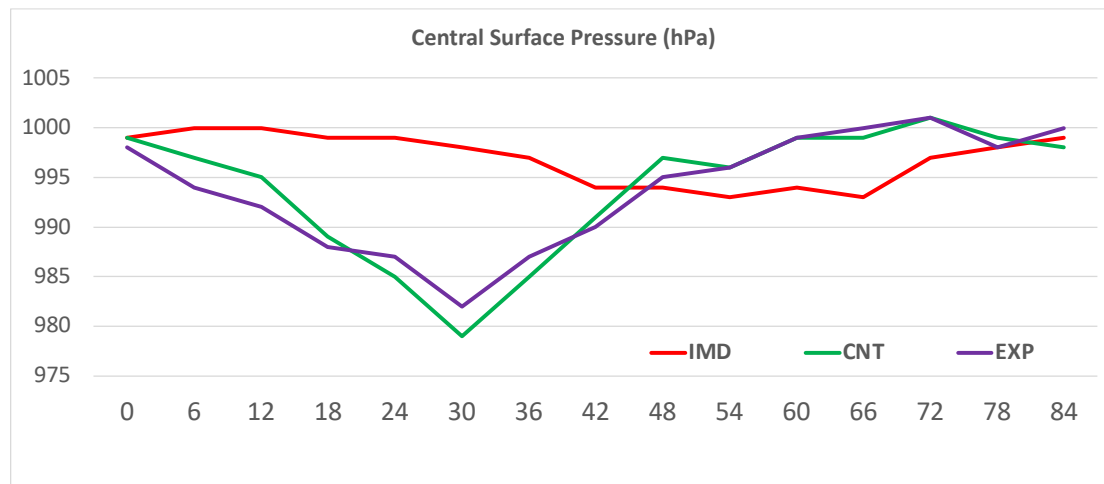
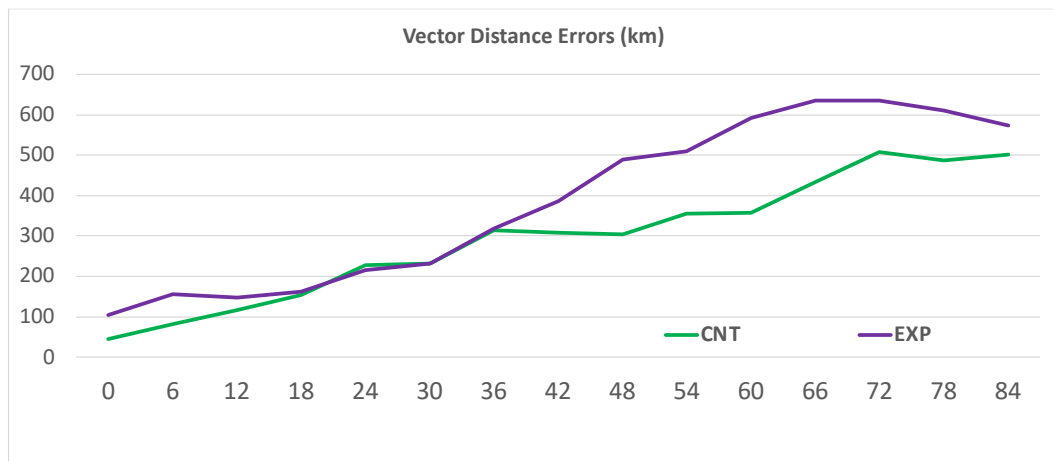
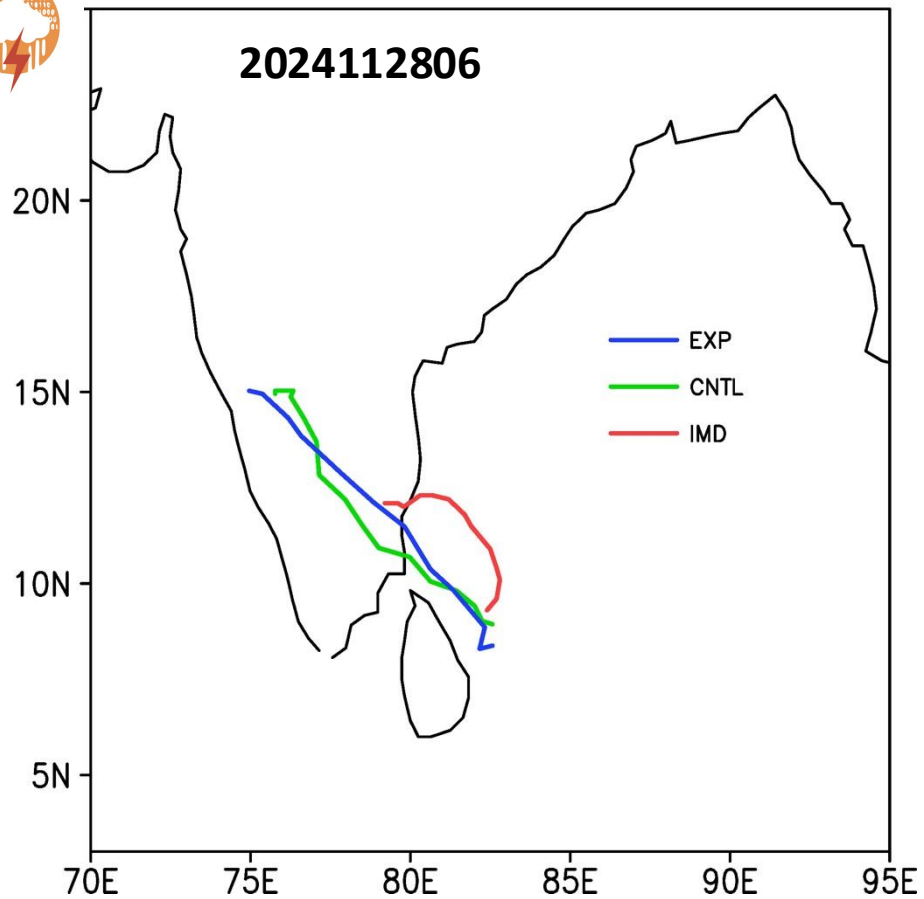
NOAA-18 (11284) METOP-B (35336) NPP (0) NOAA-21 (26496)  
NOAA-19 (62750) METOP-C (0) NOAA-20 (21888)







2024112806



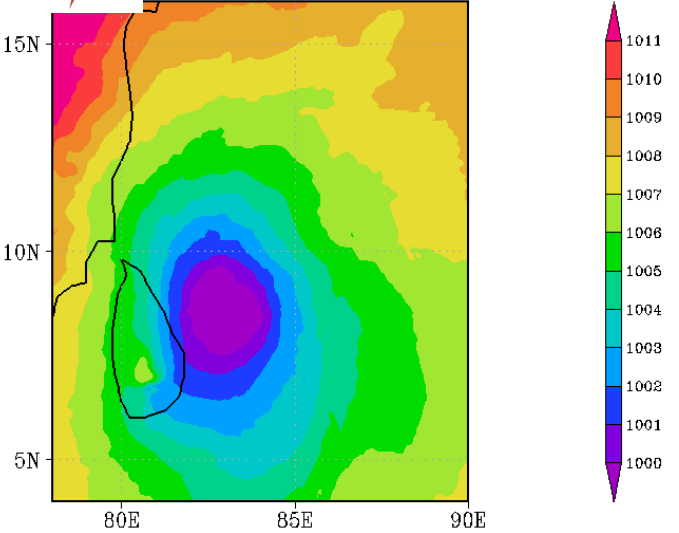
❖ Blue color (EXP) better than CNTL until 36.42 hours



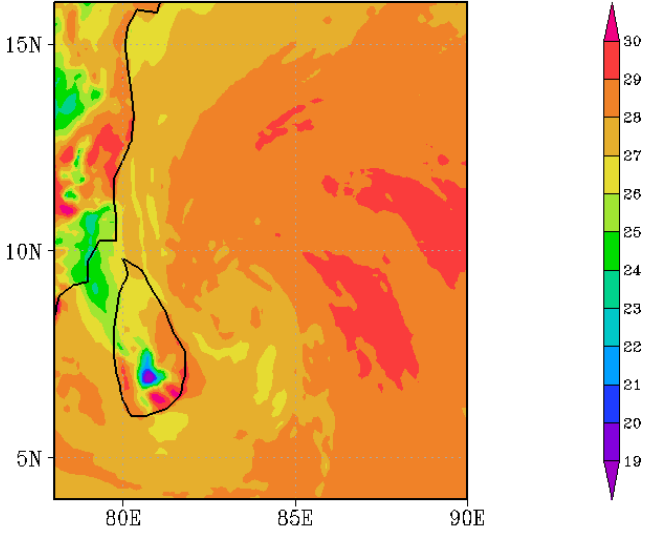
2024112806

# Initial Conditions

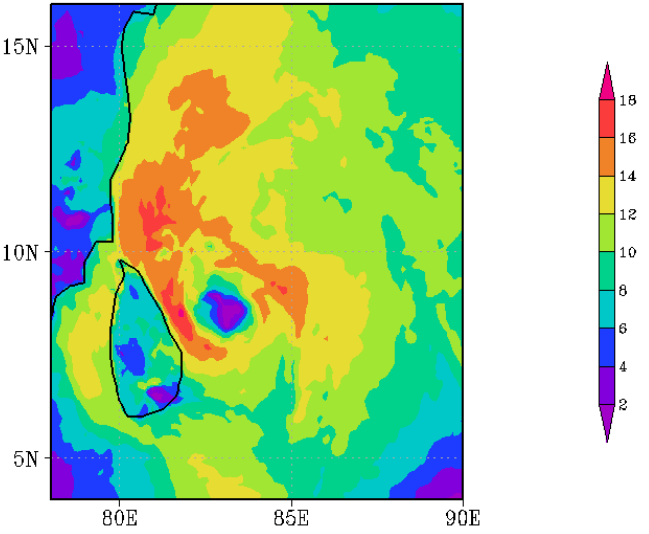
CNTL SLP (hPa)



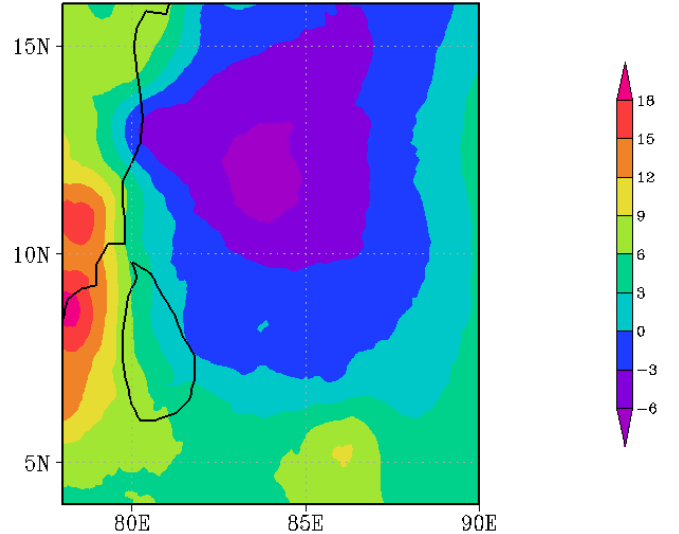
CNTL T (C)



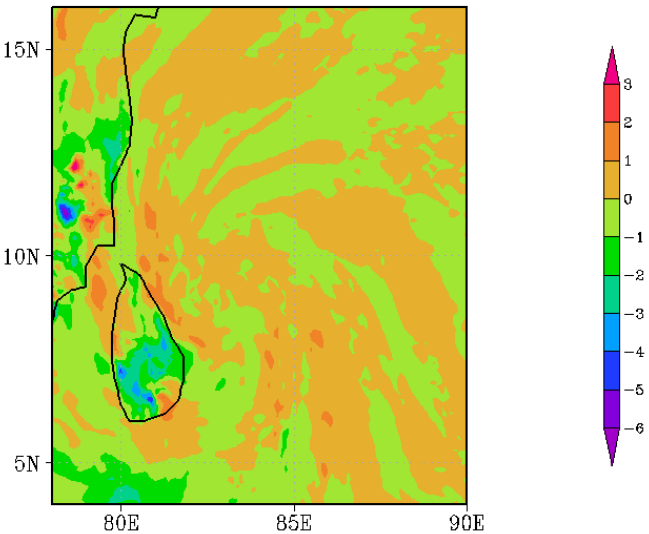
CNTL WS (m/s)



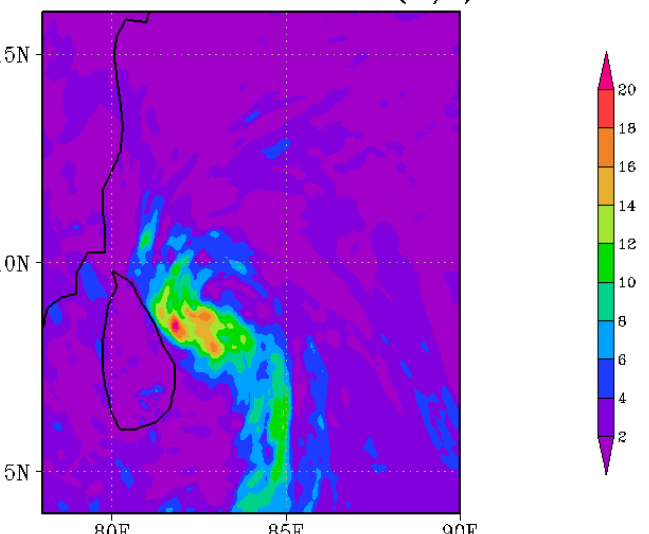
EXP - CNTL SLP Difference (hPa)



EXP - CNTL T2m Difference (C)



EXP - CNTL WS Difference (m/s)

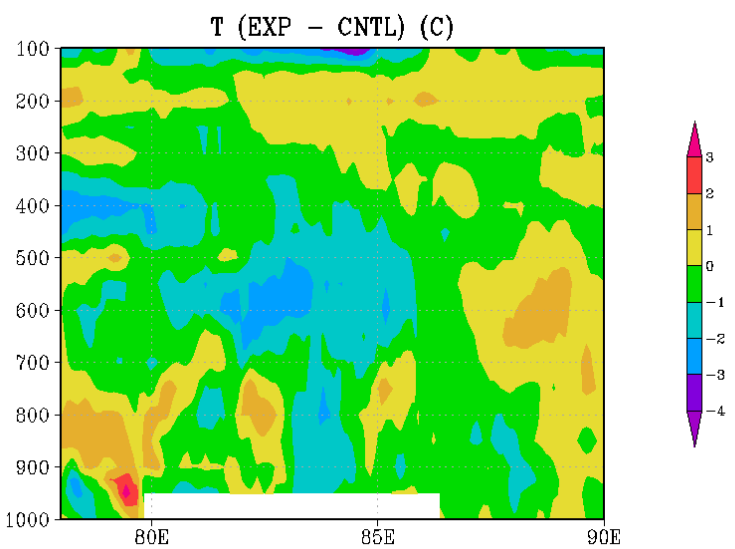
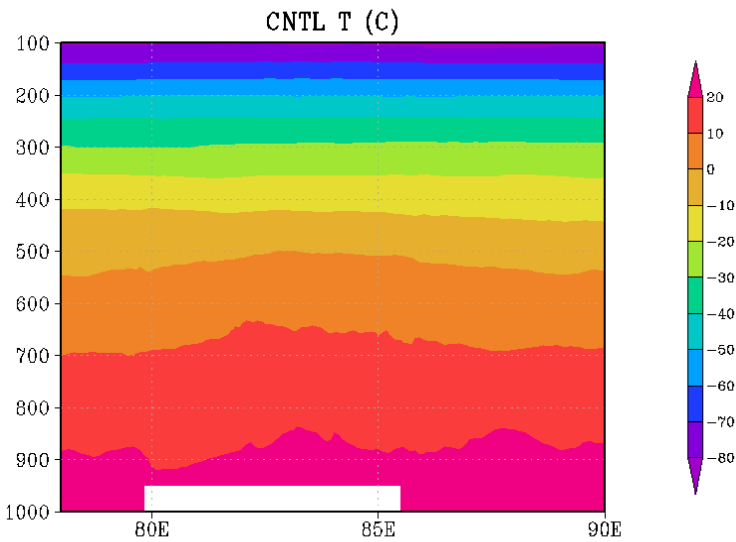




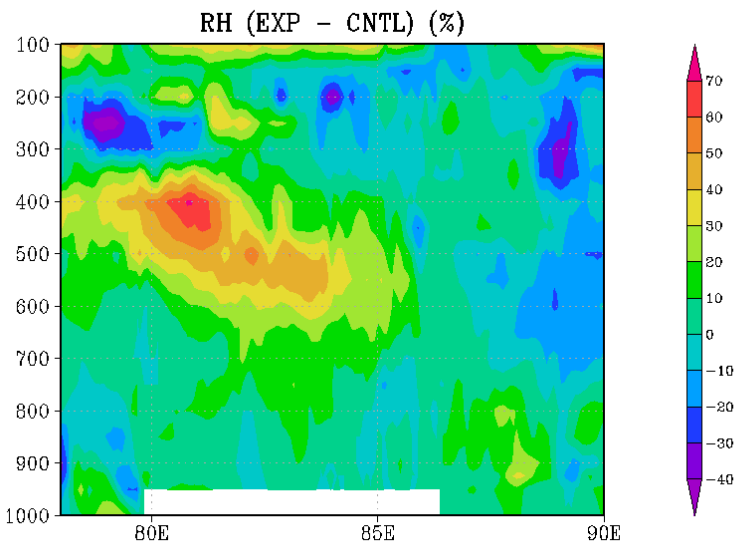
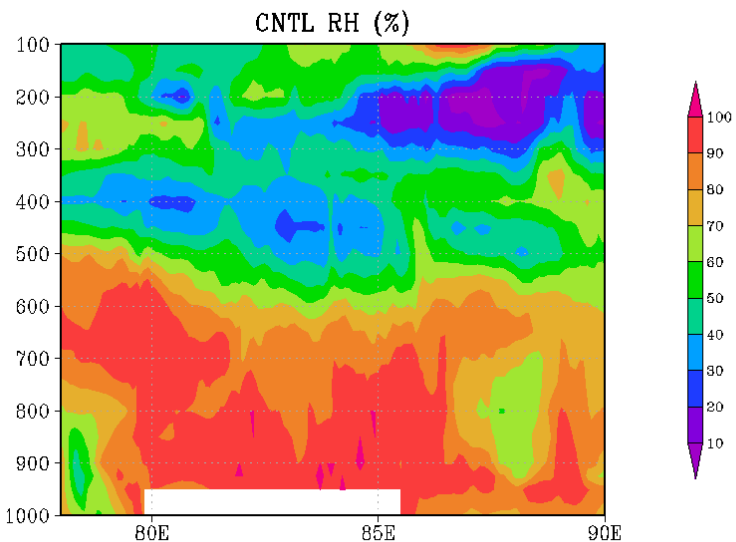
# Initial Conditions (Centered 8 Deg N)

2024112806

Height Vs T



Height Vs RH





# DBNet Plans for India

Under the **Mission Mausam** initiative of the Ministry of Earth Sciences, India is establishing **two additional DBNet Stations** to strengthen satellite data reception capabilities across the country.

Currently, the Indian National Centre for Ocean Information Services (INCOIS) DBNet station primarily supports coverage over central India. The proposed DBNet stations will be strategically located at:

**NCMRWF, Noida** – covering North India

**Chennai** – covering South India

These new stations will significantly enhance the acquisition of meteorological and oceanographic satellite sensor data across India and the North Indian Ocean region.

## Importance of DBNet Data

### Applications

Enhances **high-resolution nowcasting products** for the India Meteorological Department

Supports **Numerical Weather Prediction (NWP)** applications at National Centre for Medium Range Weather Forecasting and global NWP centers

Enables improved severe weather monitoring and forecasting

Supports future operational and research activities

### Data Sharing

All the acquired Satellite datasets will be disseminated through **WIS 2.0**

NCMRWF will initiate sharing of Hyderabad DBNet data with the meteorological community via WIS2.0 soon.



## NCMRWF Planned DBNet Stations Specifications

| Parameter                | Details          |
|--------------------------|------------------|
| Expected Commissioning   | End of 2026      |
| Antenna Size             | 2.4 m            |
| Frequency Bands          | L-Band & X-Band  |
| Planned Operational Life | Minimum 10 Years |

| Planned Satellite Missions |         |
|----------------------------|---------|
| NOAA-20                    | NOAA-21 |
| MetOp-B                    | MetOp-C |
| FY-3D                      | FY-3E   |
| MetOP-SG-A1                |         |

### Collaboration & Capacity Building

- Strengthen operational expertise through collaborations
- Build advanced capabilities in satellite data reception, processing, and utilization

### Operational Challenges

- Managing future and current satellite missions
- Ensuring continuous operational reliability
- Supporting real-time nowcasting applications
- Improving satellite data assimilation for NWP systems
- Enhancing WIS 2.0 interoperability and dissemination
- Developing skilled technical manpower for operations and maintenance





## NCMRWF (MoES) Future DBNet Plans





# Conclusions

- ✓ Indian DBNet level 0 data from NRSC has been processed at NCMRWF with in house developed scripts by using opensource software AAPP, OPS-LRS, Metopizer, RT-STPS, CSPP.
- ✓ INCOIS directly transmitting the data through GTS via RTH Delhi
- ✓ The level 1c bufr data (ATOVS, ATMS, CrIS, IASI) data was generated shared with global community in near real time through GTS.
- ✓ The study presents the impact of ATOVS and ATOVS data in the global NCUM DA system and regional HRRR systems.
- ✓ The ATOVS and ATMS have positive impact which help the environment for further movement of system inland as comparative to Control experiment. The track errors less with ATMS followed by ATOVS+ATMS. Similarly intensity (maximum wind) premature stage was forecasted well with ATMS and deepening and decay stages were predicted well by ATMS+ATOVS.
- ✓ The MW sounder DBNet data has the impact upto 36 hours in the Regional system adding moisture in the mid-troposphere.
- ✓ More case studies studies will be done to address the impact of DBNet in the Global and Regional systems.
- ✓ Current Status and Future plans of Indian DBNet stations are discussed.





Write to us

[indira@ncmrwf.gov.in](mailto:indira@ncmrwf.gov.in)  
[srinivas@ncmrwf.gov.in](mailto:srinivas@ncmrwf.gov.in)