# Requirements for timely data reception at ECMWF

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**ECMWF**

**with thanks to:**
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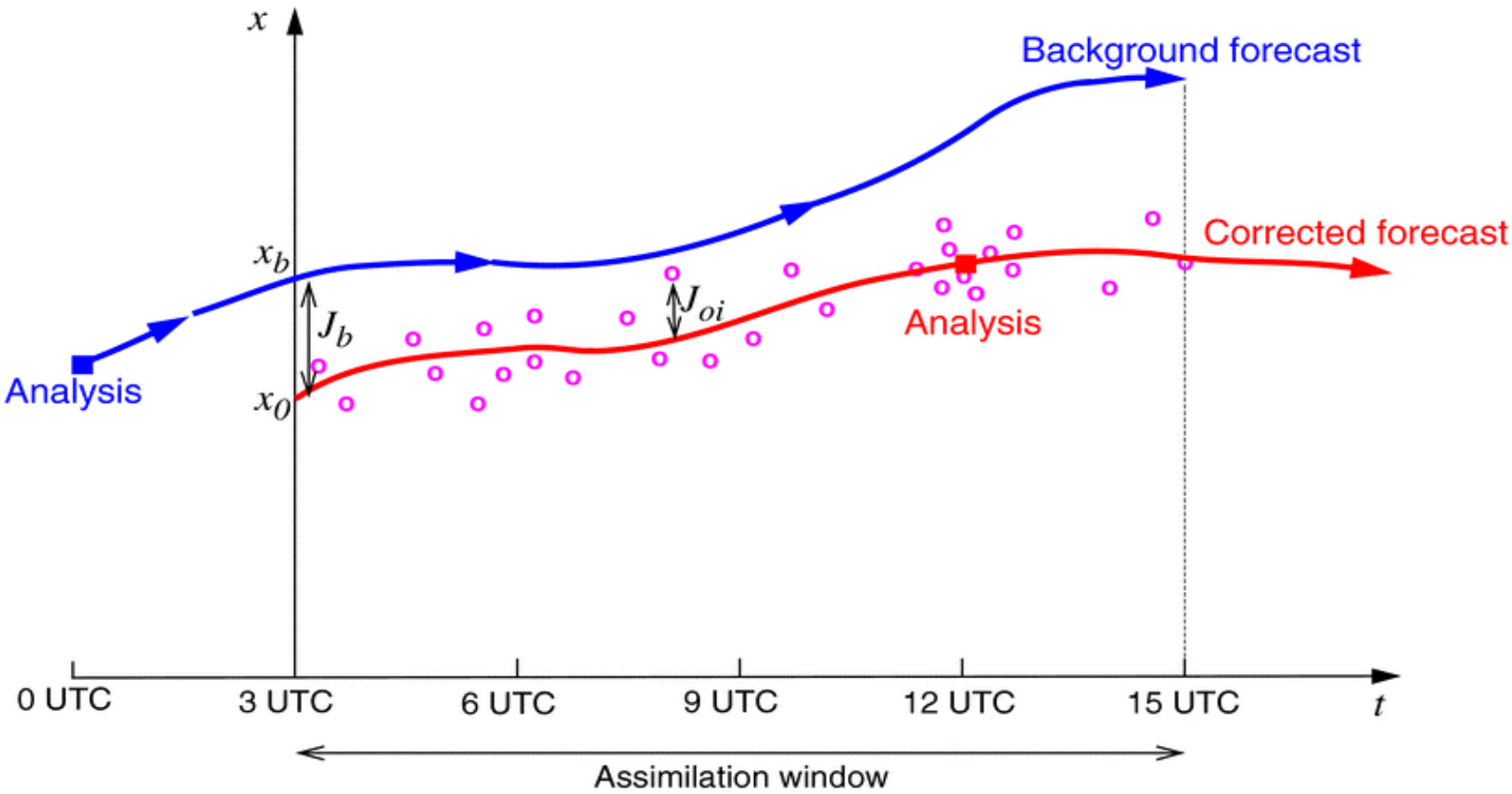
# Outline

- Current data assimilation configuration
- Timeliness of observations
  - Conventional data
  - Satellite data
- Early delivery project
  - Context
  - Impact of envisaged scenario
    - → data coverage
    - → meteorology
- Discussion

# Current Data Assimilation configuration: 12h 4D-Var

**12Z analysis: 07 h 15 cutoff**
**00Z analysis: 08 h 00 cutoff**



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# ECMWF operations October 2003 (26R3)

- AQUA AIRS
- 3xAMSUA (NOAA-15/16/17) + AQUA AMSUA
- 3 SSMI (F-13/14/15)
- 2xHIRS (NOAA-16/17)
- 2xAMSU-B (NOAA-16/17)
- Radiances from 5xGEOS (Met-5/7 GOES-9/10/12)
- Winds from 4xGEOS (Met-5/7 GOES-10/12)and MODIS/TERRA
- SeaWinds from QuiKSCAT
- ERS-2 Altimeter / SAR (limited coverage)
- SBUV (NOAA 16)
- ENVISAT OZONE (MIPAS)

***27 satellite data sources***

# Current data count 26R3 (18/06/03 00Z)

| Screened | | | Assimilated | | |
|---|---|---|---|---|---|
| Synop: | 190370 | (0.27%) | Synop: | 38112 | (1.06%) |
| Aircraft: | 233306 | (0.33%) | Aircraft: | 146749 | (4.07%) |
| Satob: | 543340 | (0.78%) | Satob: | 71220 | (1.97%) |
| Dribu: | 15081 | (0.02%) | Dribu: | 4381 | (0.12%) |
| Temp: | 110998 | (0.16%) | Temp: | 63763 | (1.77%) |
| Pilot: | 98364 | (0.14%) | Pilot: | 56324 | (1.56%) |
| UpperSat : | 68358565 | (97.97%) | UpperSat : | 3107200 | (86.19%) |
| PAOB: | 530 | (0.00%) | PAOB: | 185 | (0.00%) |
| Scat: | 222410 | (.32%) | Scat: | 117196 | (3.25%) |
| TOTAL: | 69 772 964 | | TOTAL: | 3 605 130 | |

99% of screened data are Sat. Data

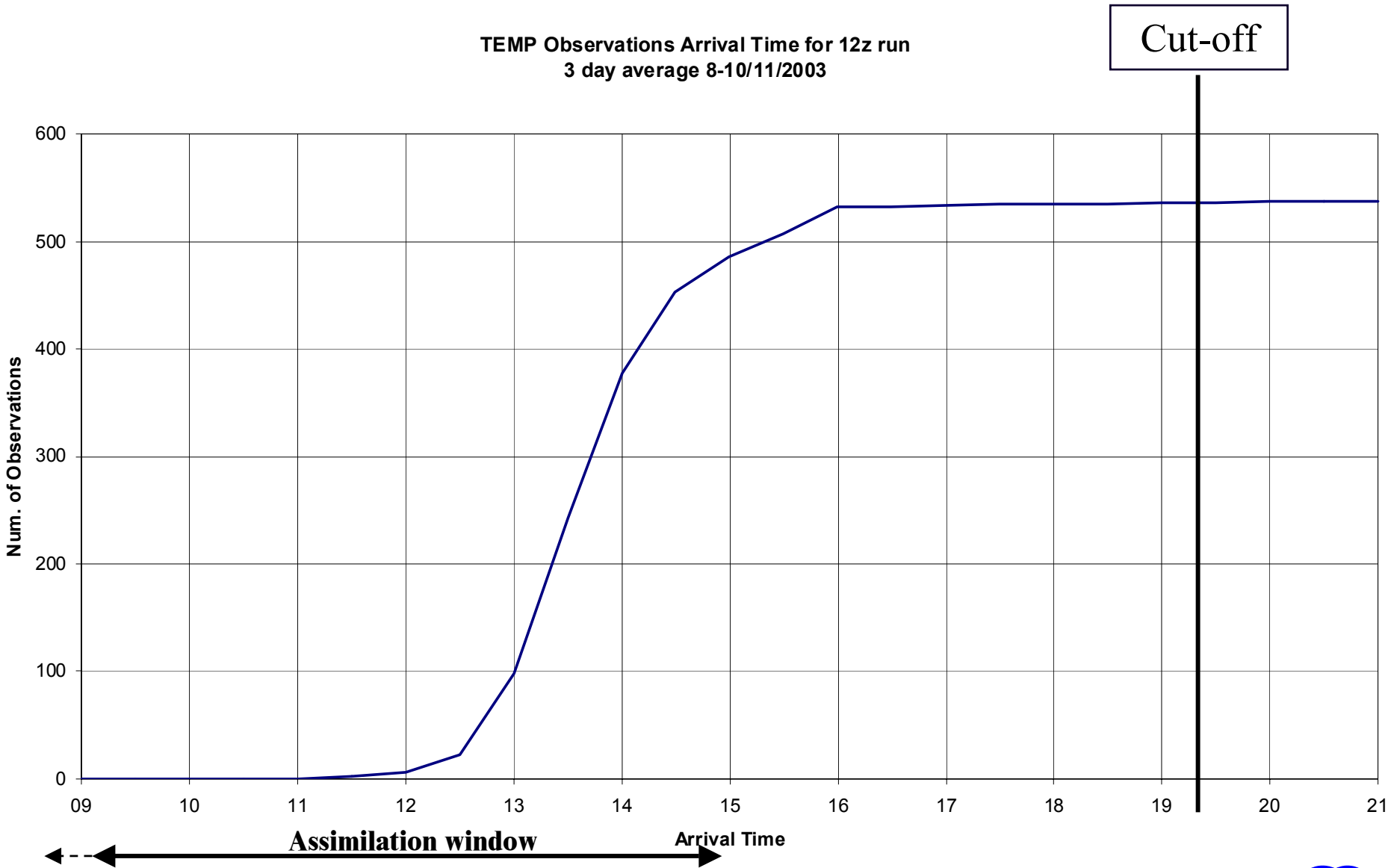
91% of assimilated data are Sat. Data

# Timeliness of Observations

**Conventional data**

**(radiosondes, aircrafts)**

# TEMP data



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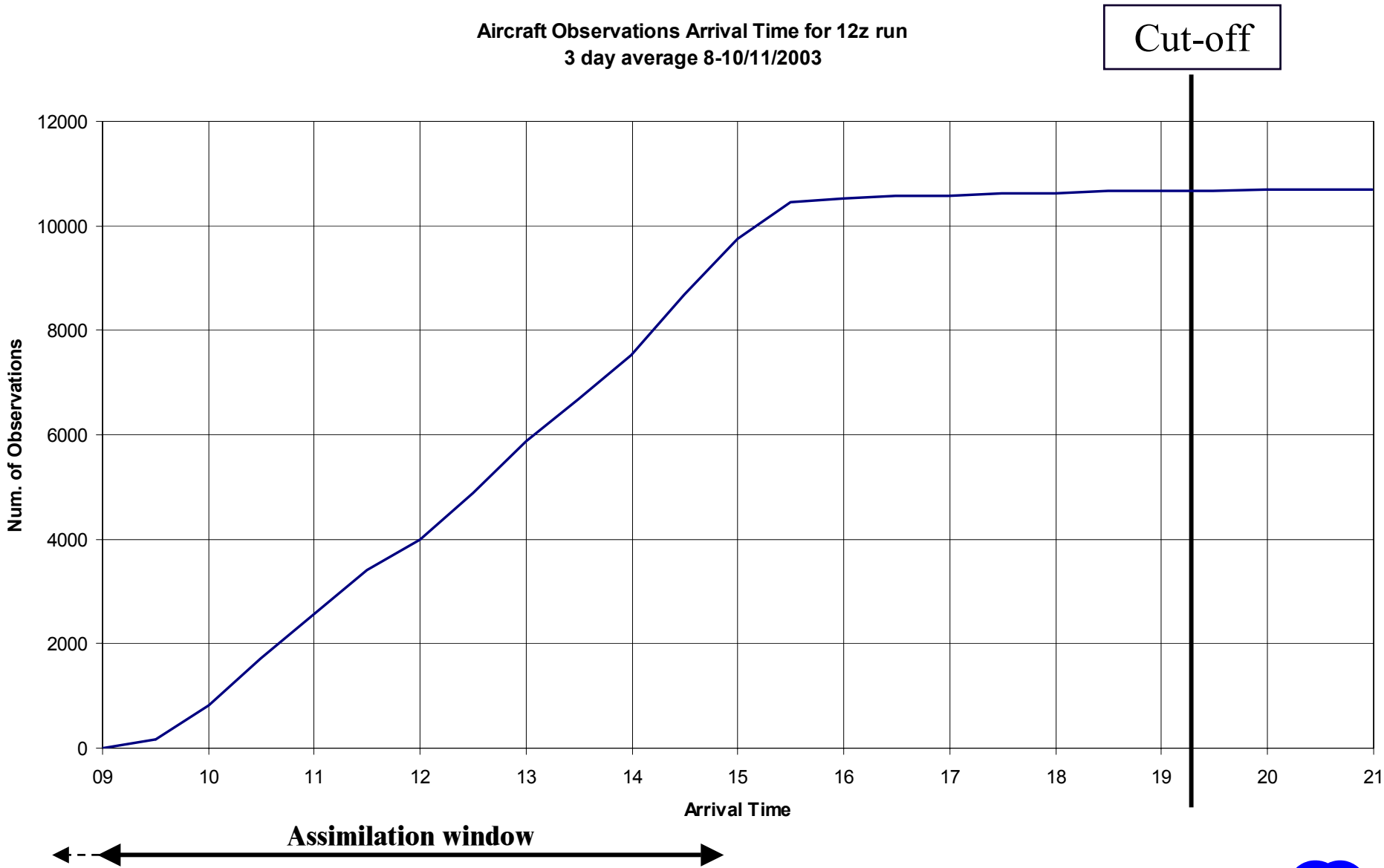
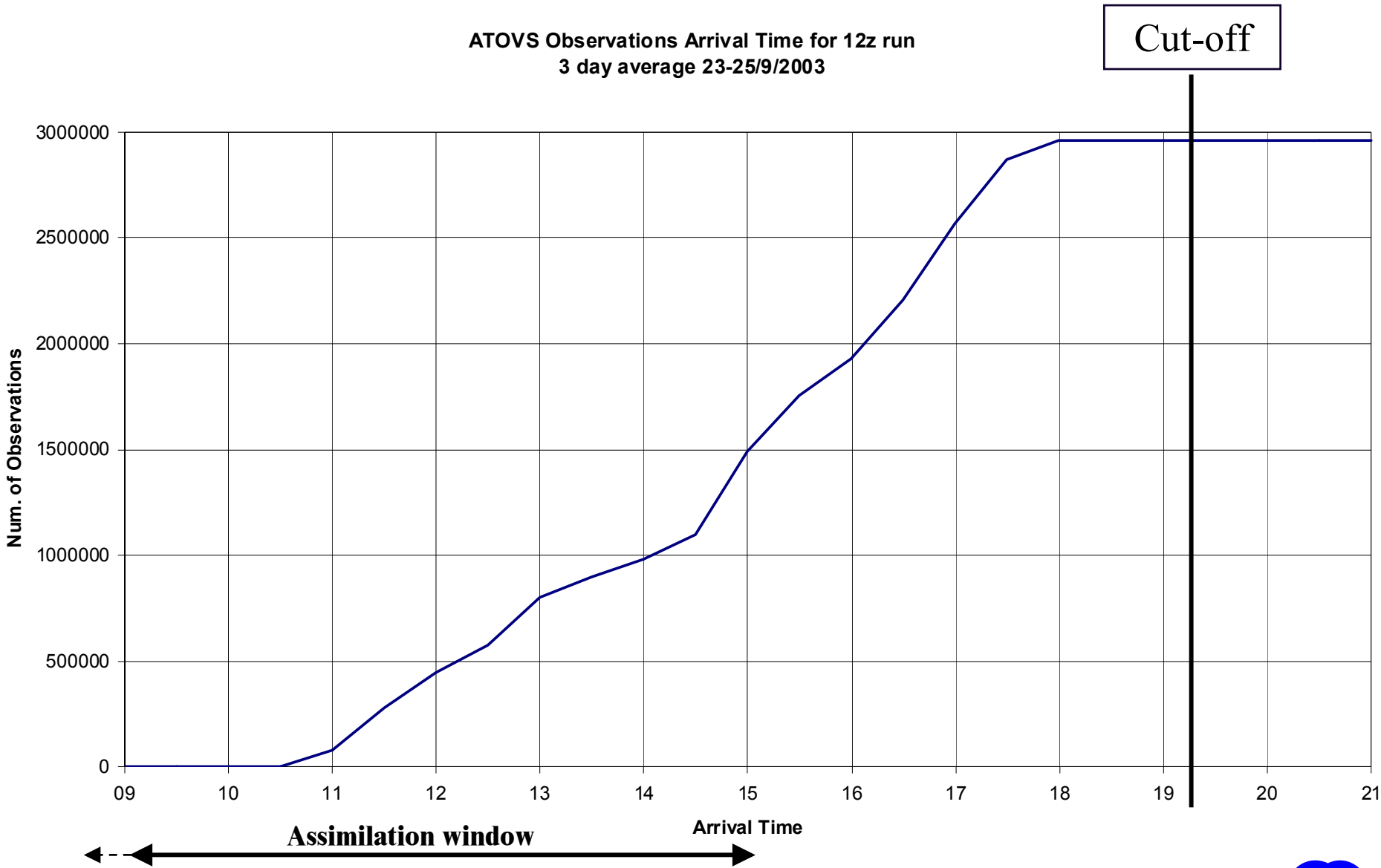
# Aircraft data



# Timeliness of Observations

## Satellite Data

# ATOVS (NOAA-15-16-17)



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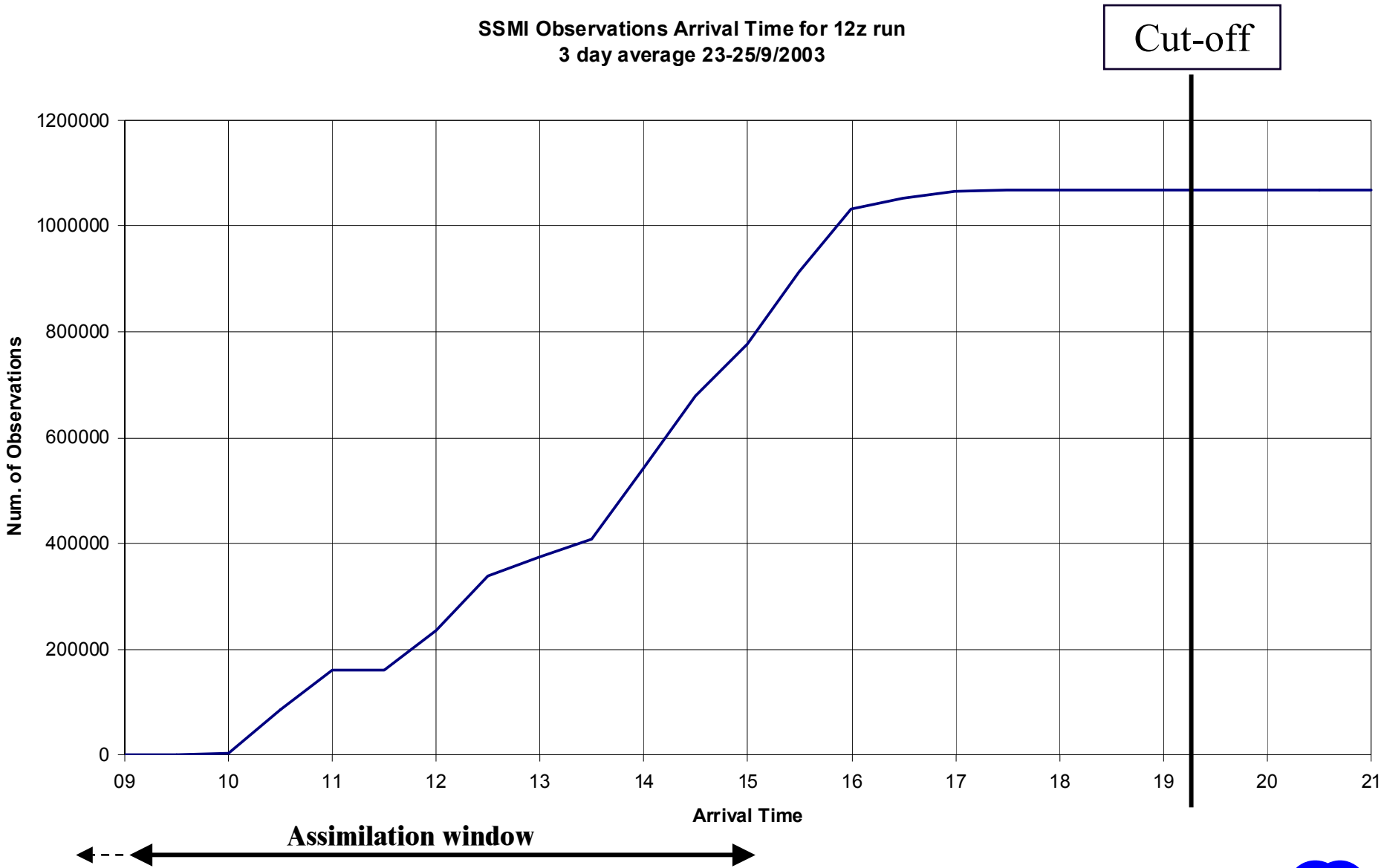
# SSM/I


SSMI Observations Arrival Time for 12z run
3 day average 23-25/9/2003
Cut-off
Num. of Observations
1200000
1000000
800000
600000
400000
200000
0
09
10
11
12
13
14
15
16
17
18
19
20
21
Arrival Time
Assimilation window



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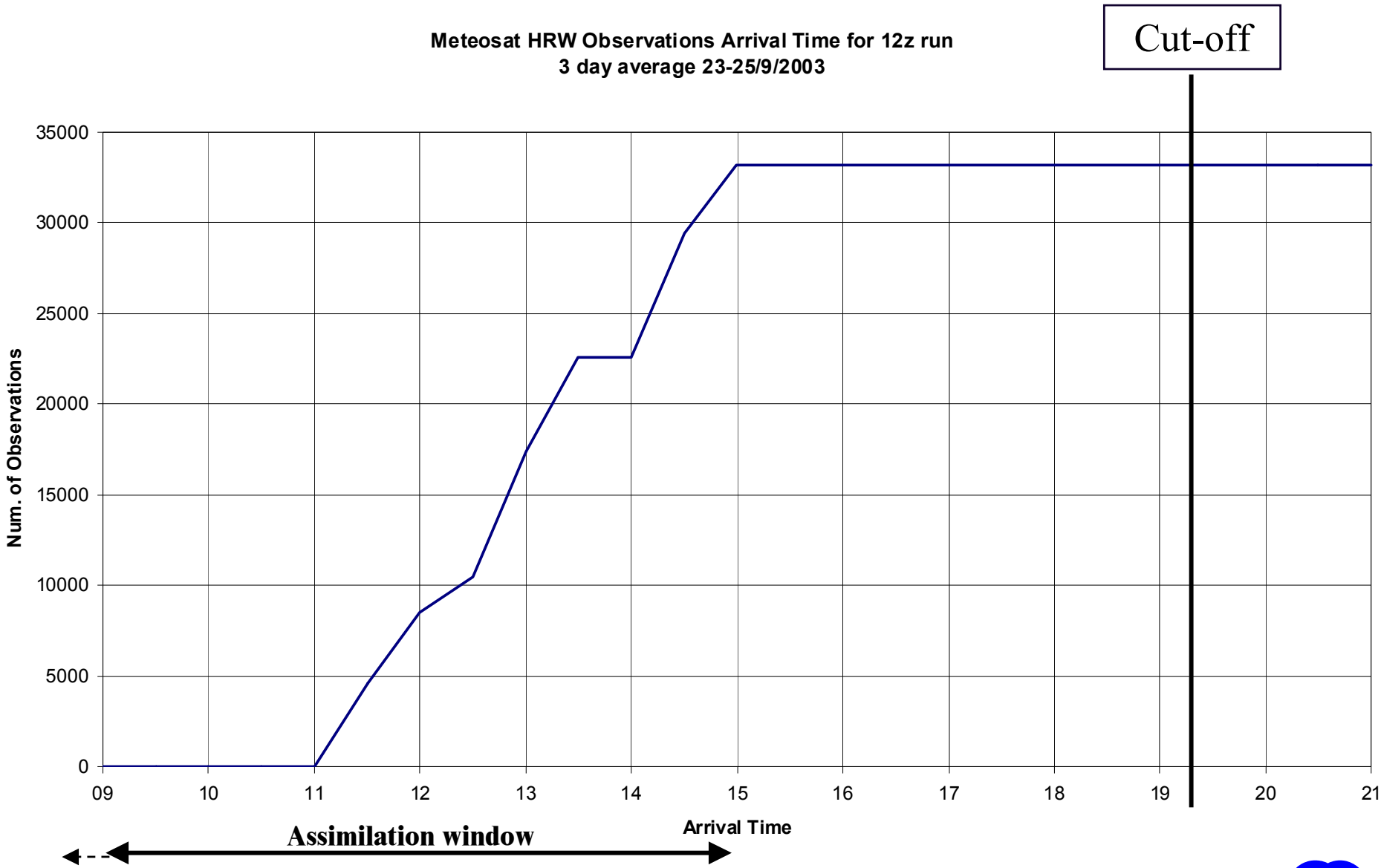
# METEOSAT HRW



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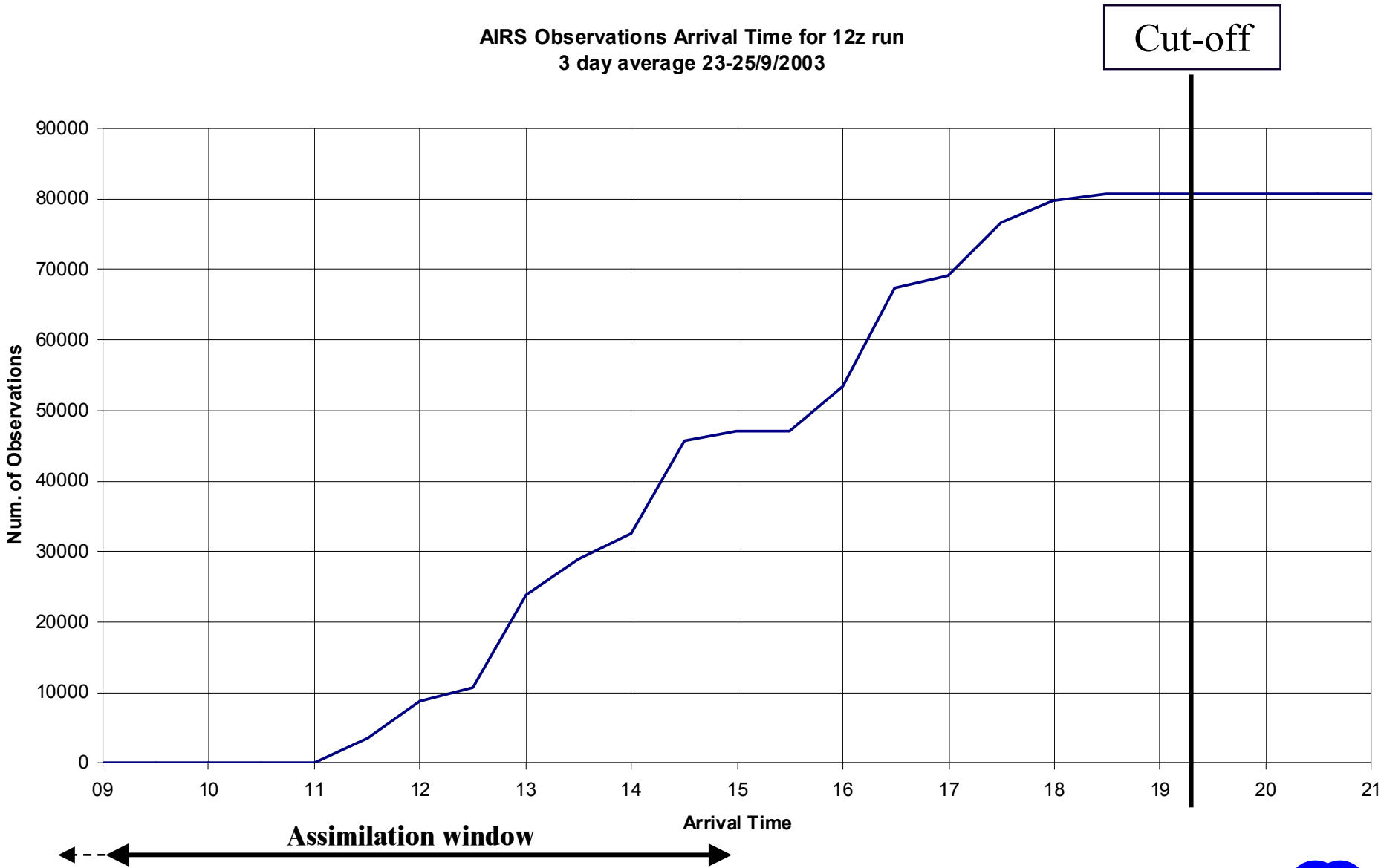
# AIRS-AQUA



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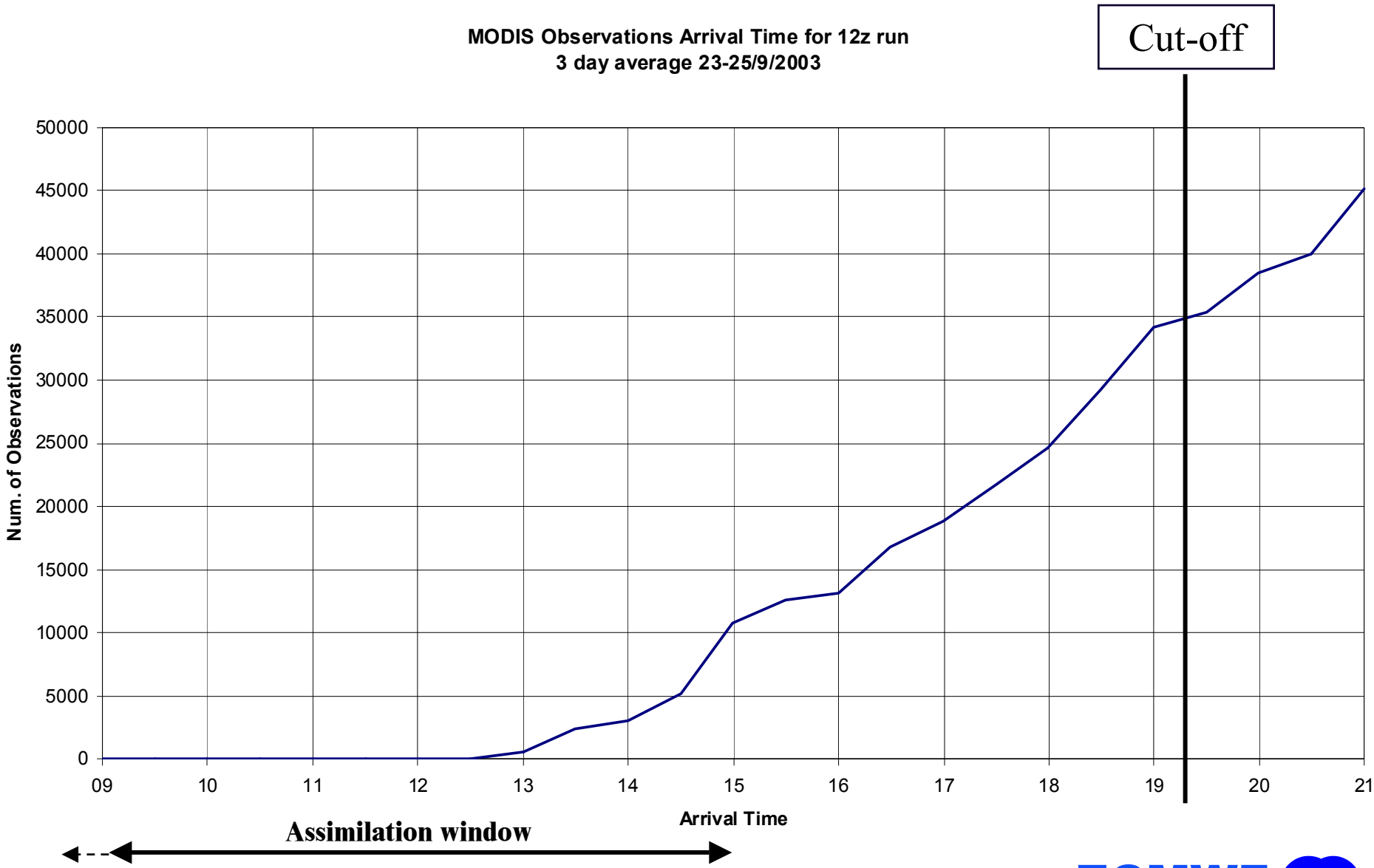
# MODIS-TERRA



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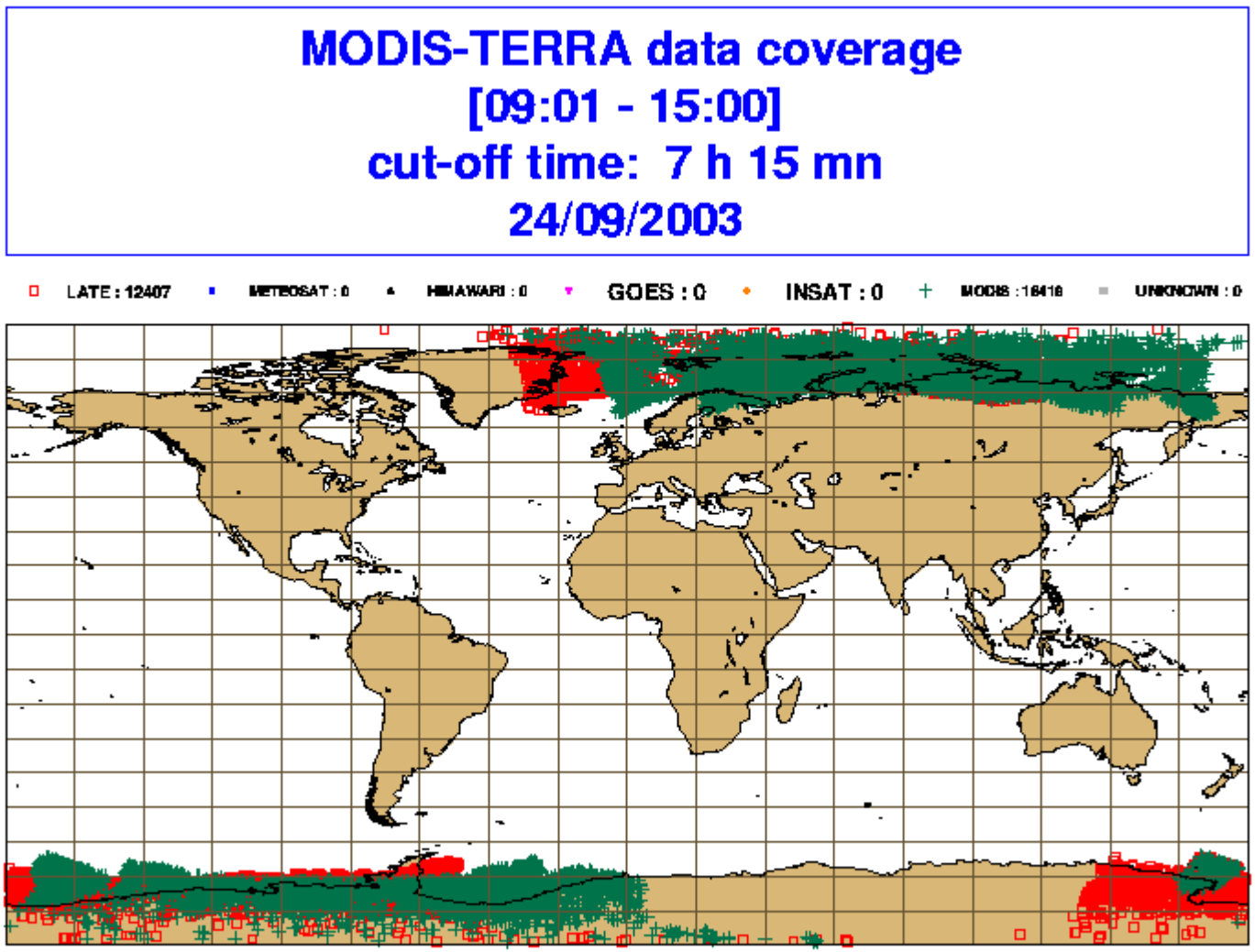
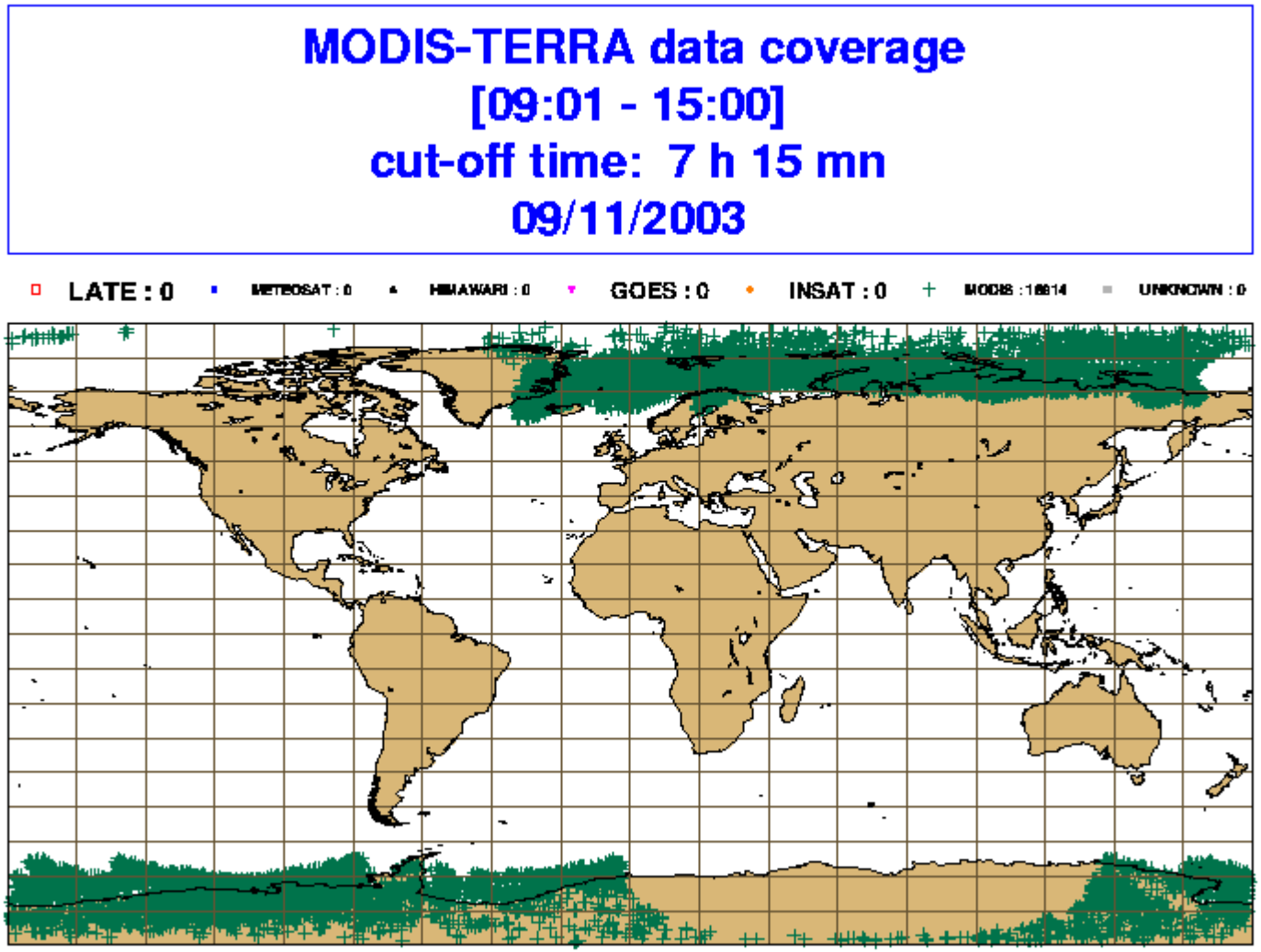
# MODIS timeliness variable in time (CIMSS processing)

## September Case



# MODIS timeliness variable in time (CIMSS processing)

## November Case



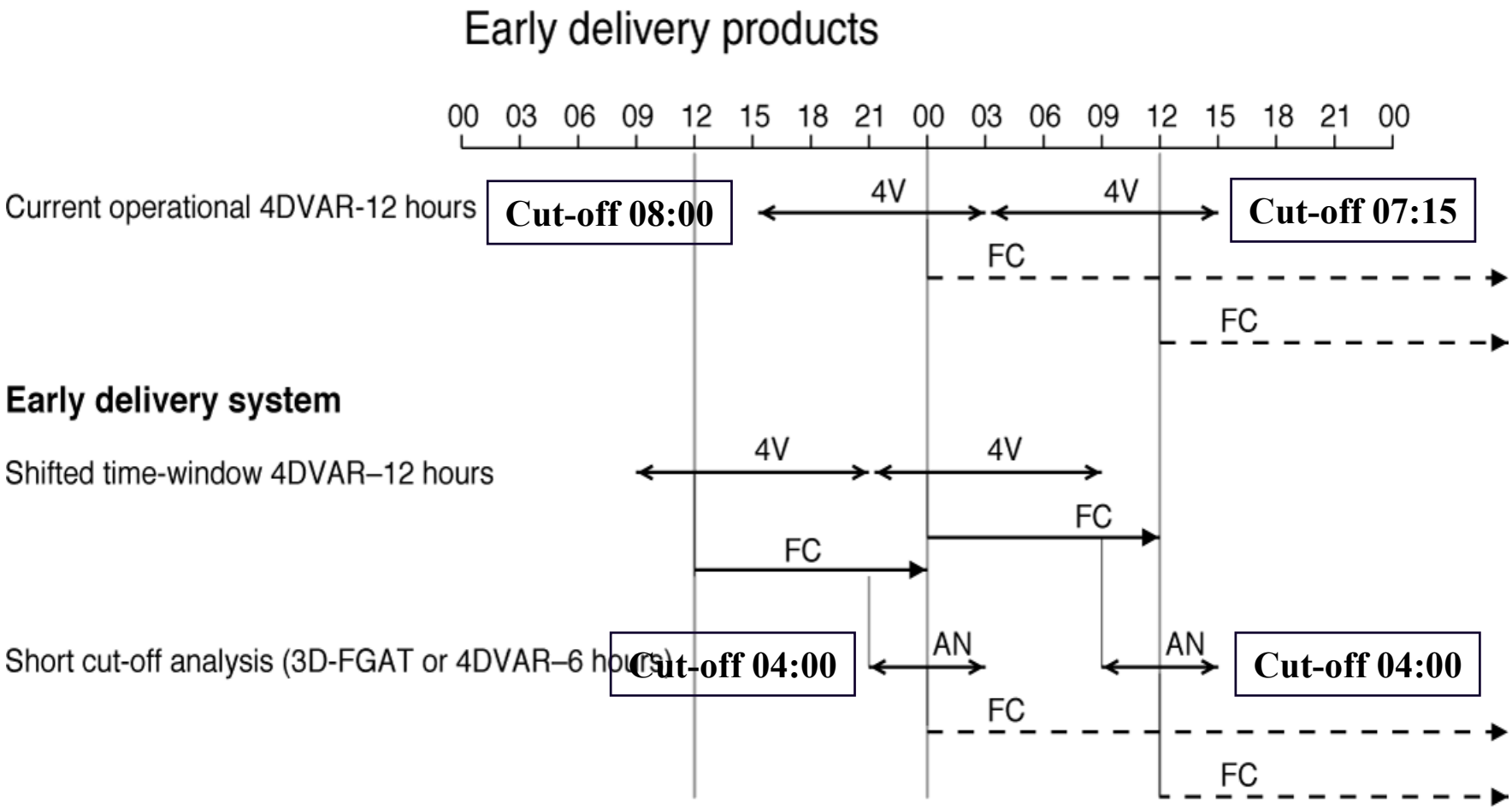
# Timeliness of Observations

- **The timeliness of conventional observations is acceptable**
- **The ECMWF observation timeliness requirements are driven by the satellite requirements (more than 90% of the data currently assimilated)**
- **With the current data assimilation configuration (generous 7 to 8 h Cut-Off)**
  - **The current timeliness of satellite observations is acceptable for the main run**
    - → Blind Orbit problem at 00 UTC (not shown)
    - → Except for MODIS wind products (although improvement in the last weeks)

# Early Delivery Project

- **Context**
  - **Interest from a number of Member States to access ECMWF products earlier**
  - **A new configuration of the operational suite is being tested**
    - ➔ Long cut-off assimilation coupled with short cut-off production analyses
      - **“rapid update cycle” twice a day**
    - ➔ Shares common features with current practices in national NWP Centres

# Early delivery system



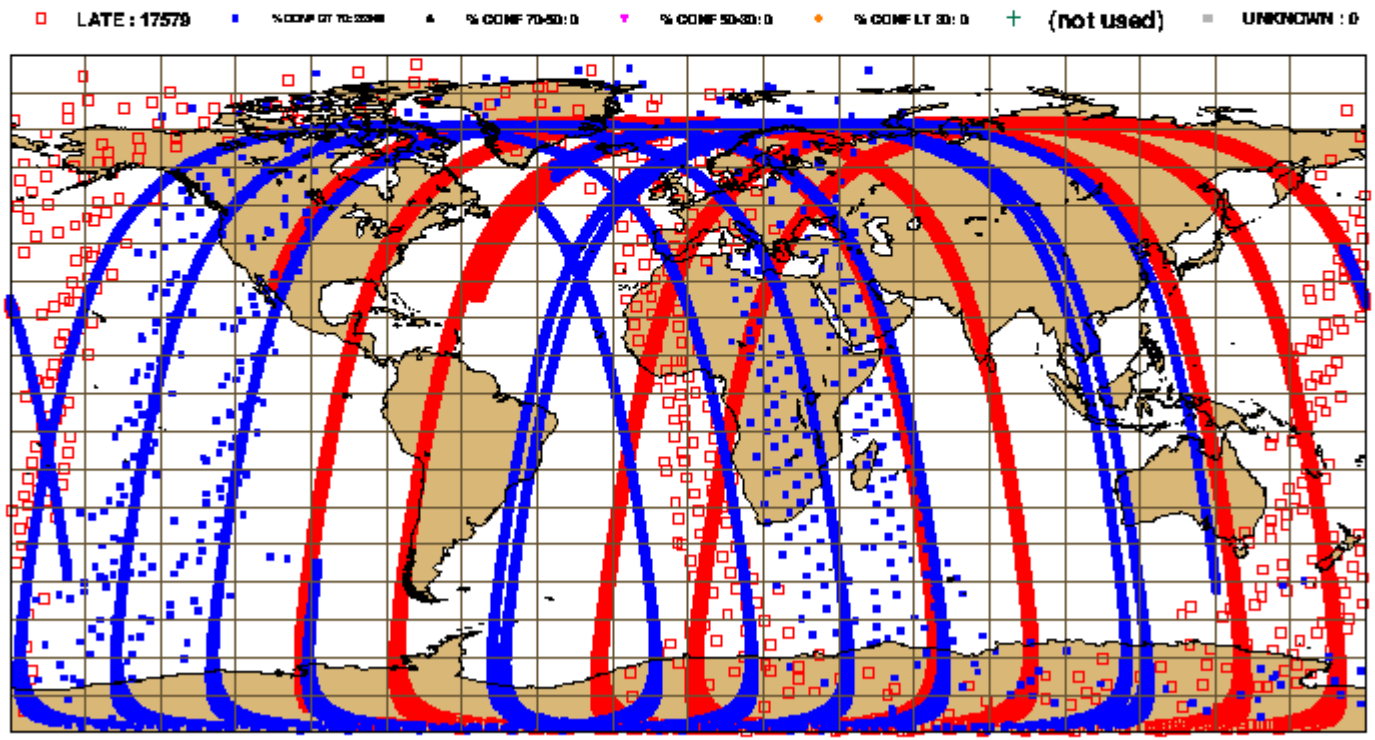
# Early Delivery Project

- **Impact of envisaged scenario**

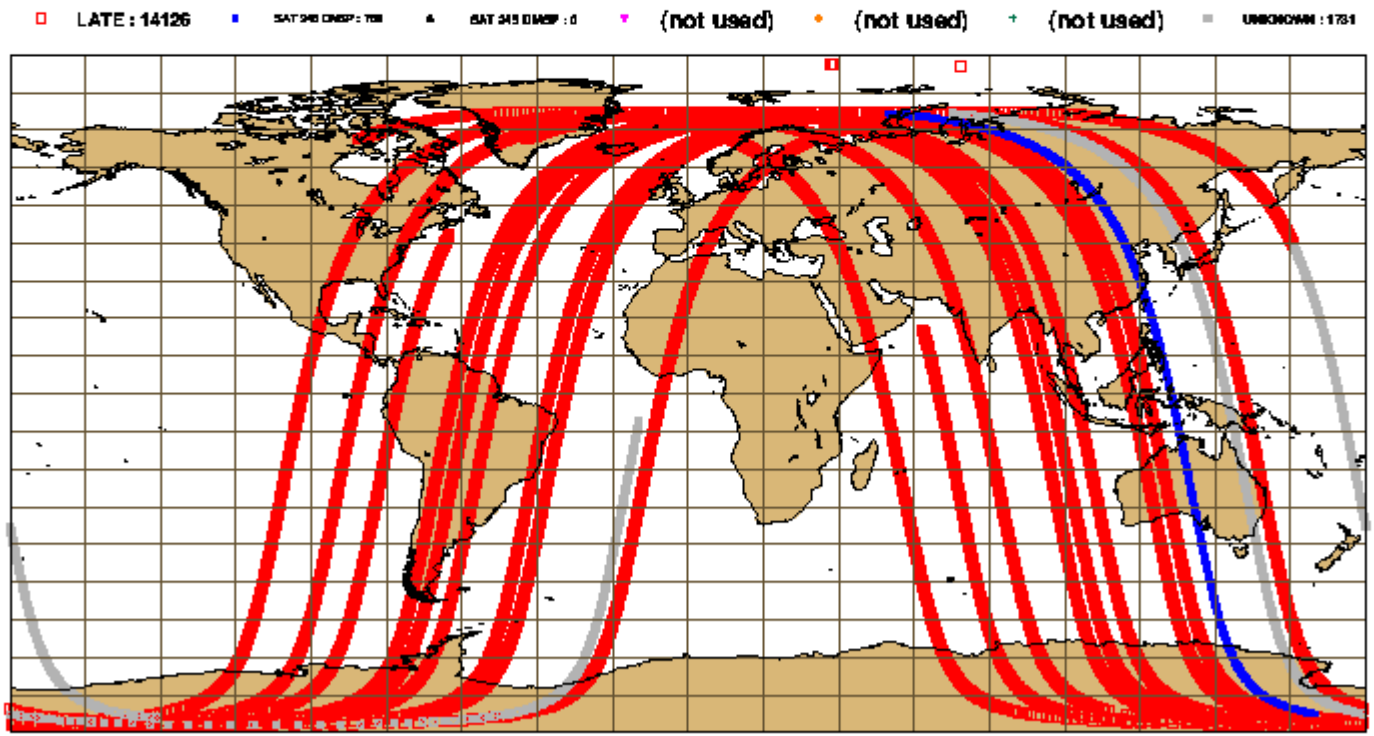
  → data coverage

  → Meteorology

# AMSU data coverage (subset) N15-N16-AQUA
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn



# SSM/I data coverage (subset)
# [09:01 - 15:00]
# cut-off time: 4 h 0 mn



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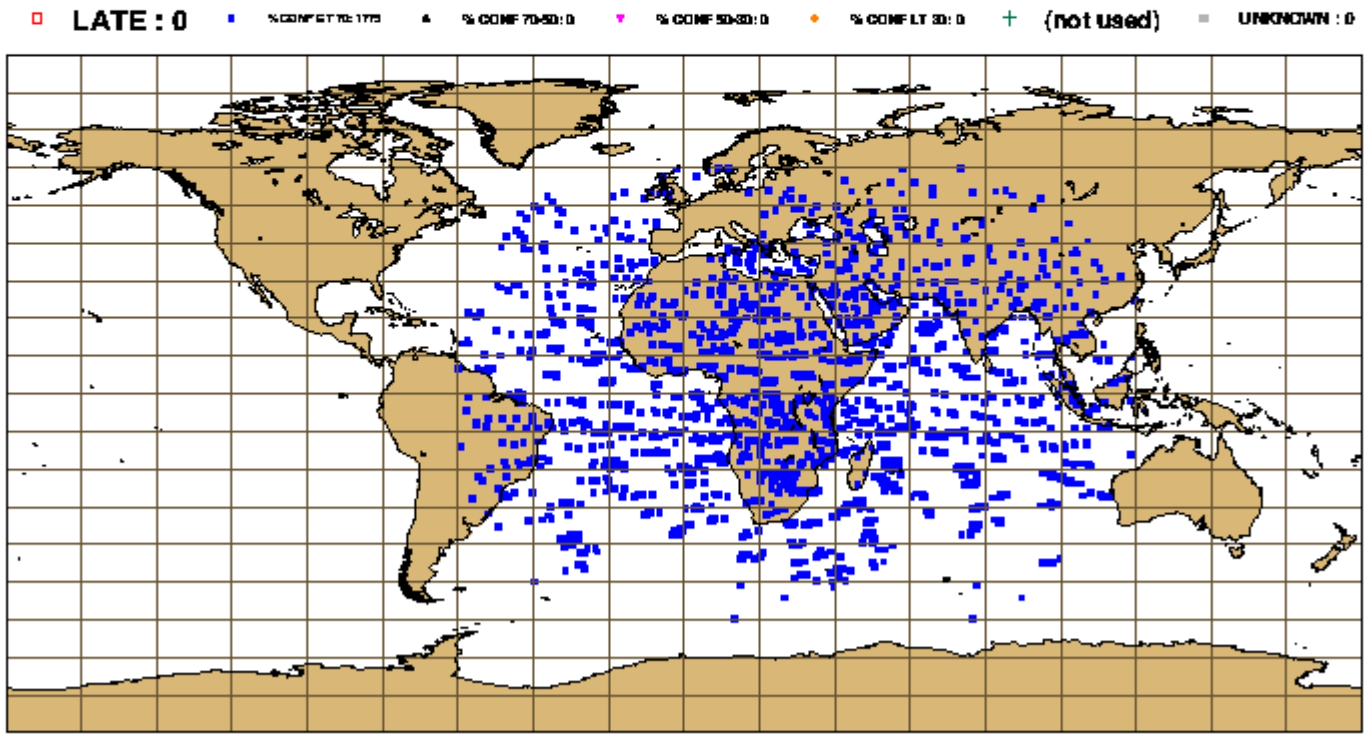
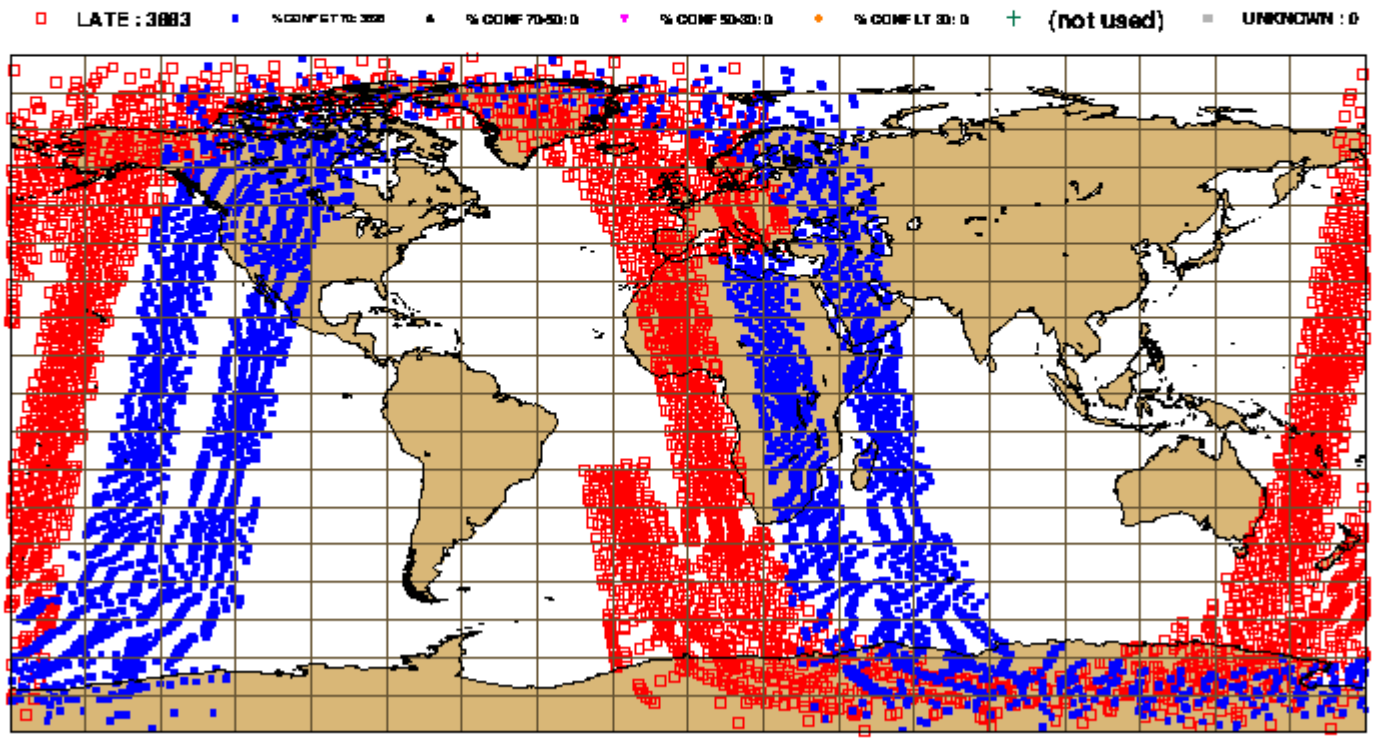
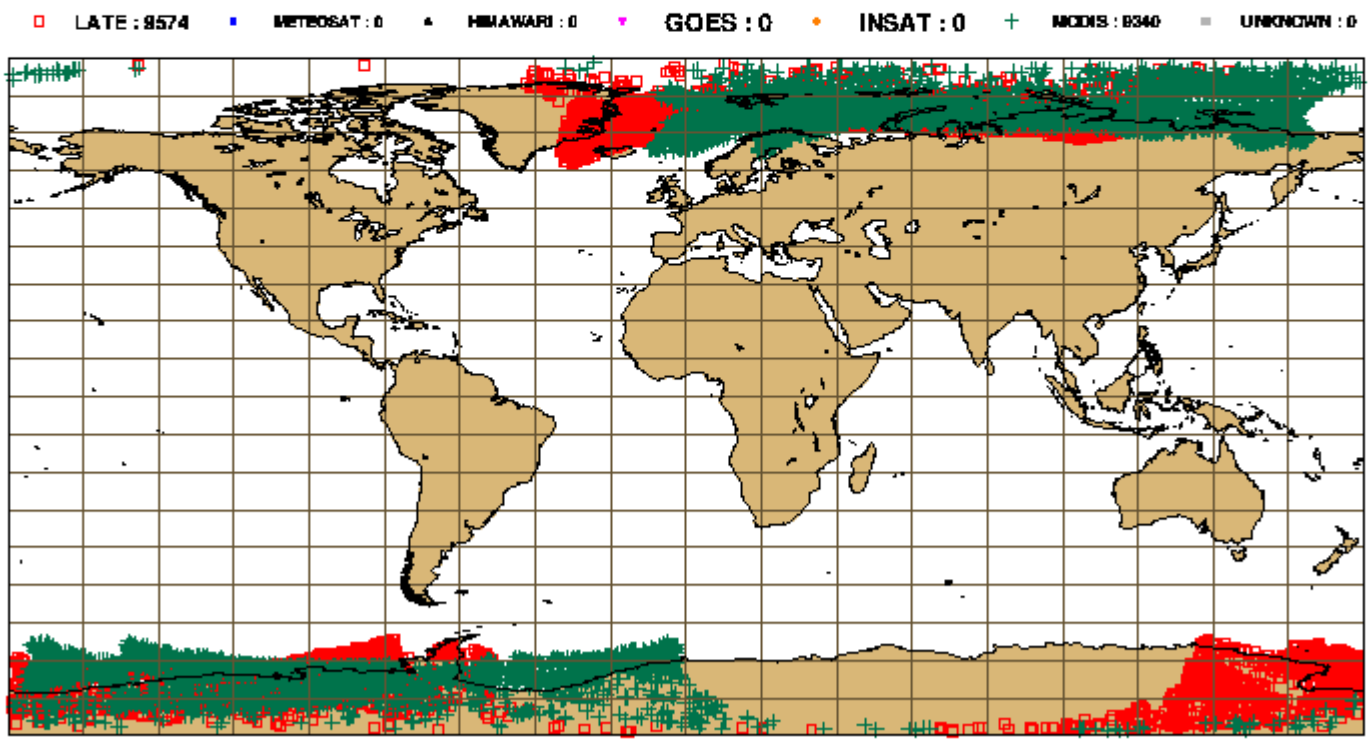
# METEOSAT data coverage
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn



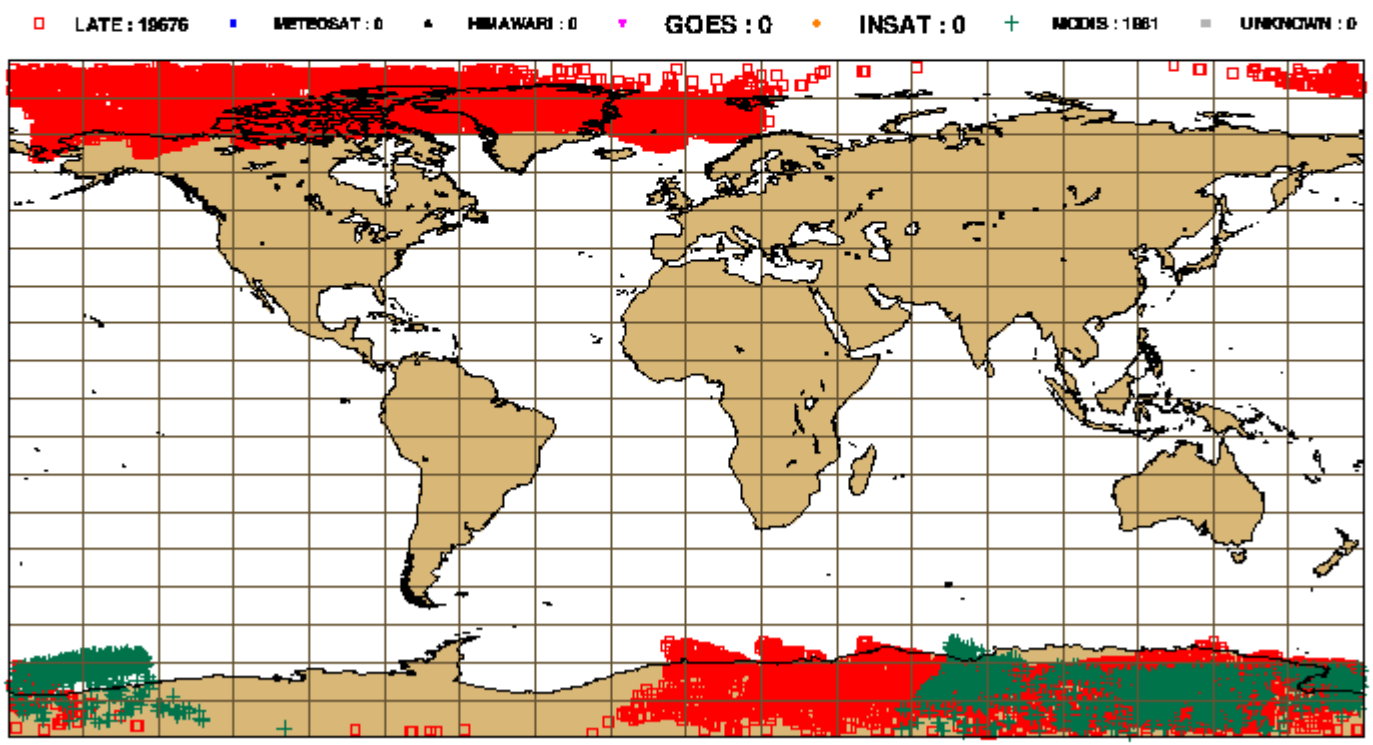
# AIRS data coverage
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn



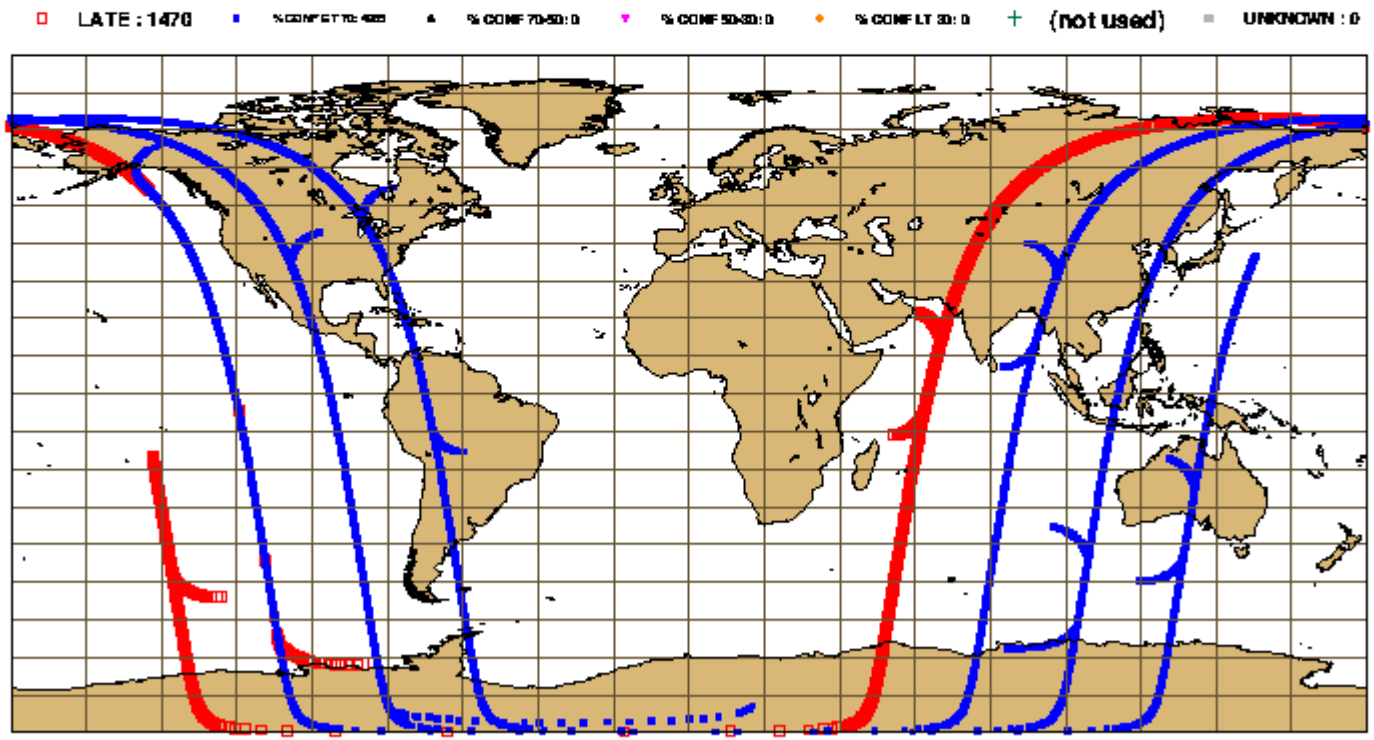
# MODIS-TERRA data coverage
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn



# MODIS-AQUA data coverage
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn

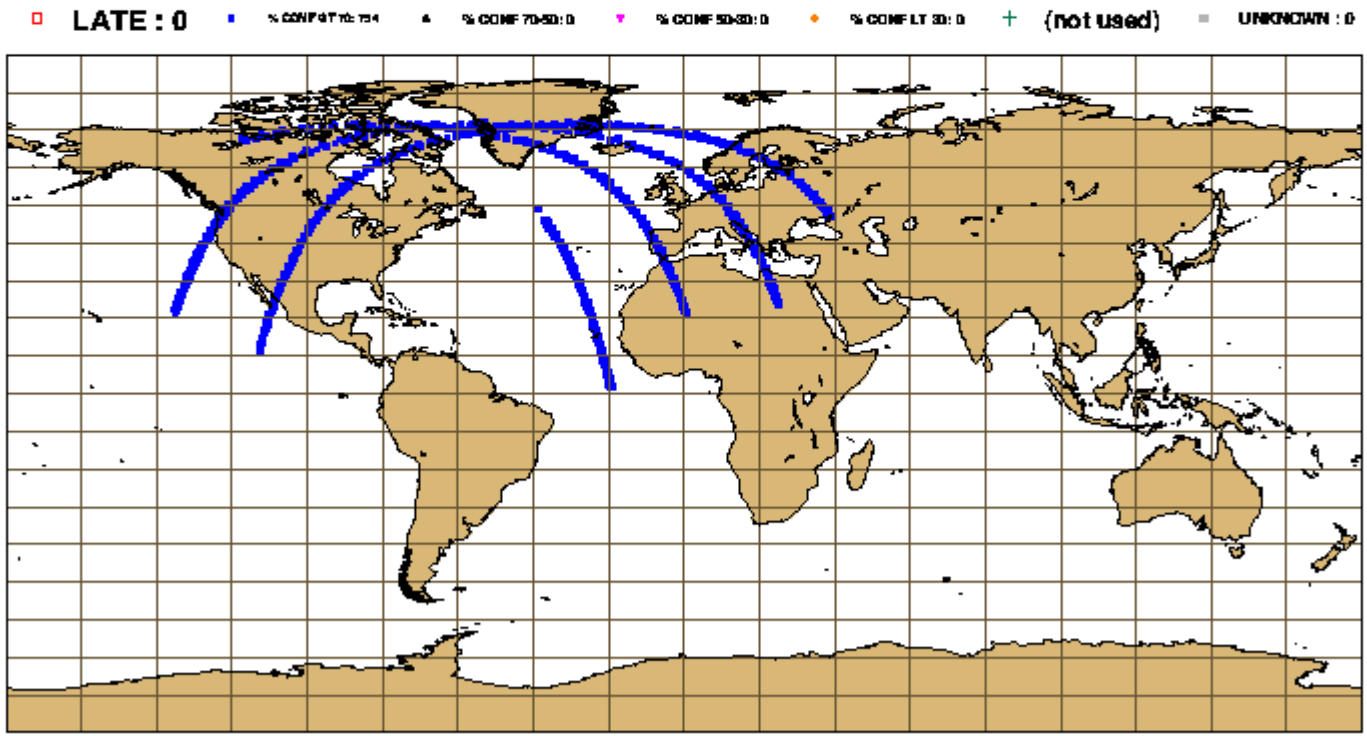


# QUIKSCAT data coverage
# [09:01 - 15:00]
# cut-off time: 4 h 00 mn

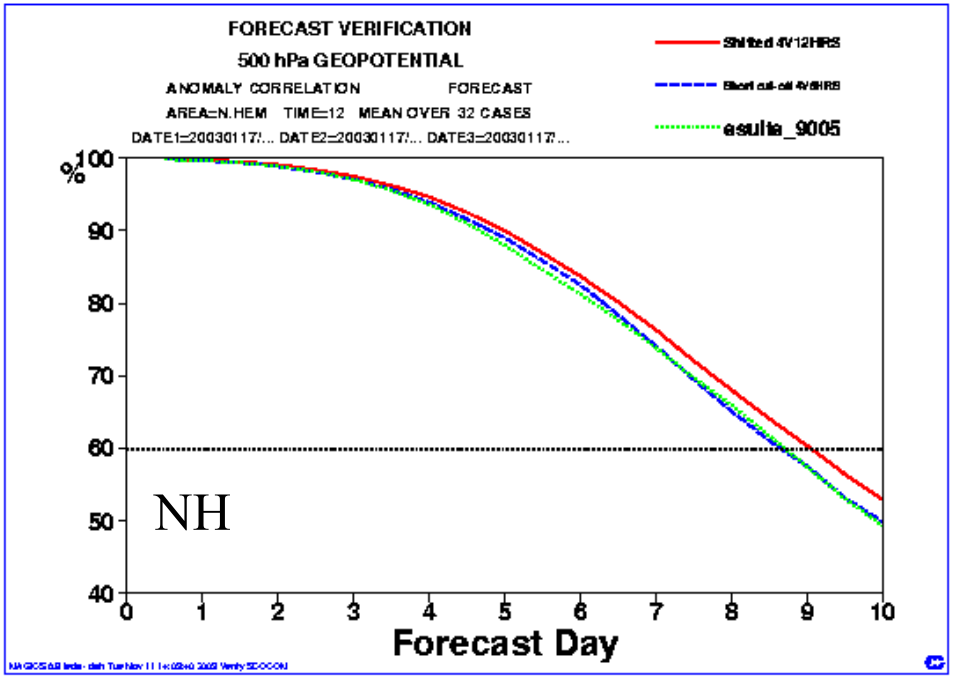


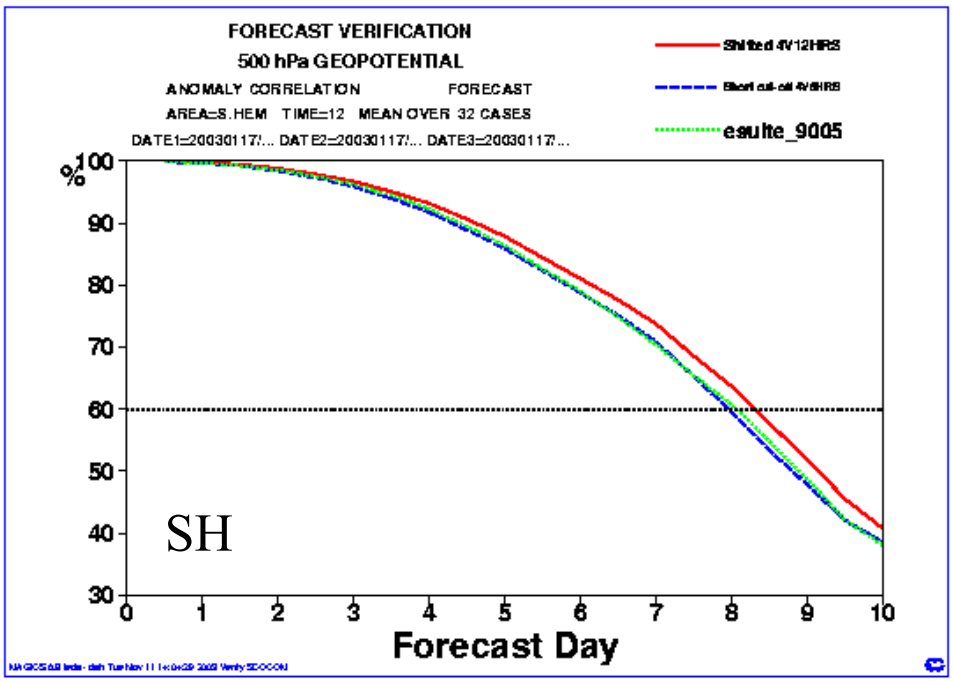
# Potential benefit of the Eumetsat Atovs Retransmission Service

## EARS data coverage (subset)
## [09:01 - 15:00]
## cut-off time: 4 h 0 mn



# Meteorology
## (mean scores Z500)




control

Shifted window 4V-12h

Short cut-off 4V-6h

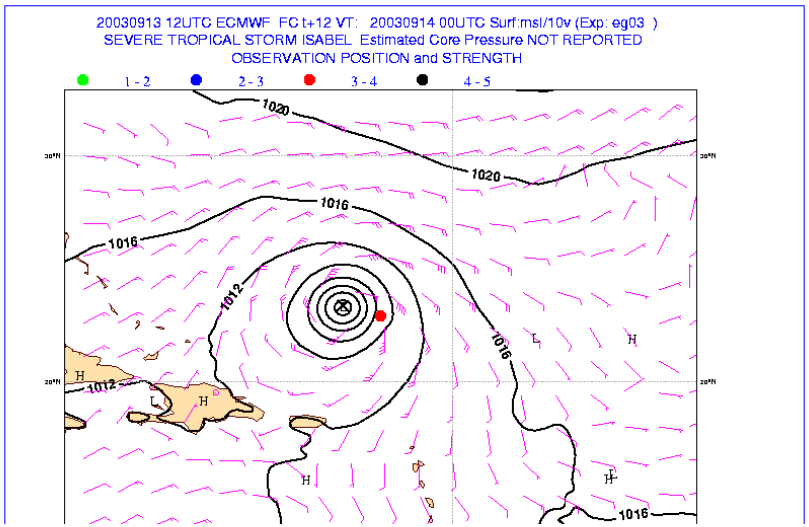
- Shifted window 4V-12h performs best (uses additional 6h worth of data)
- Short cut-off forecasts overall perform similarly to the control

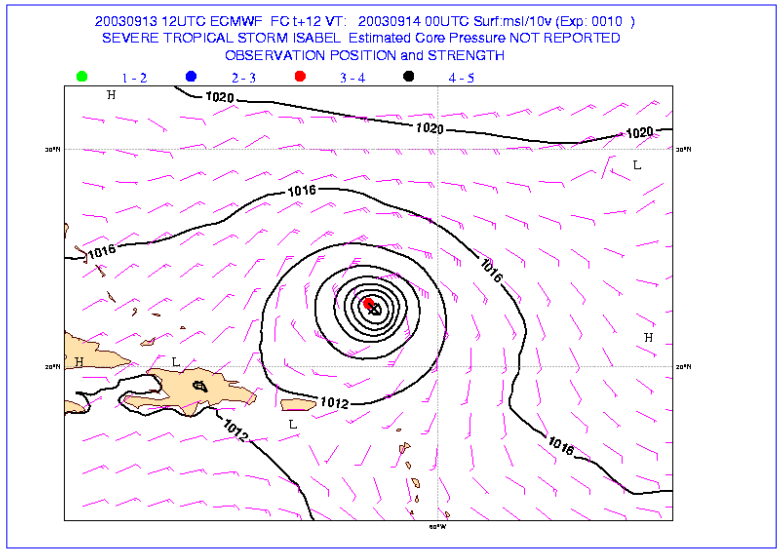
# Meteorology (Tropical cyclone ISABEL)

## Short cut-off 4V6h

## Control

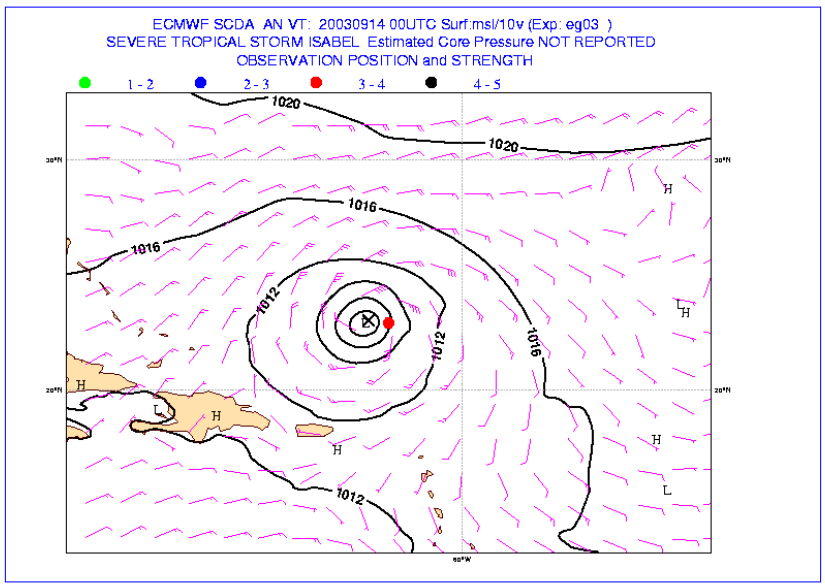
FG

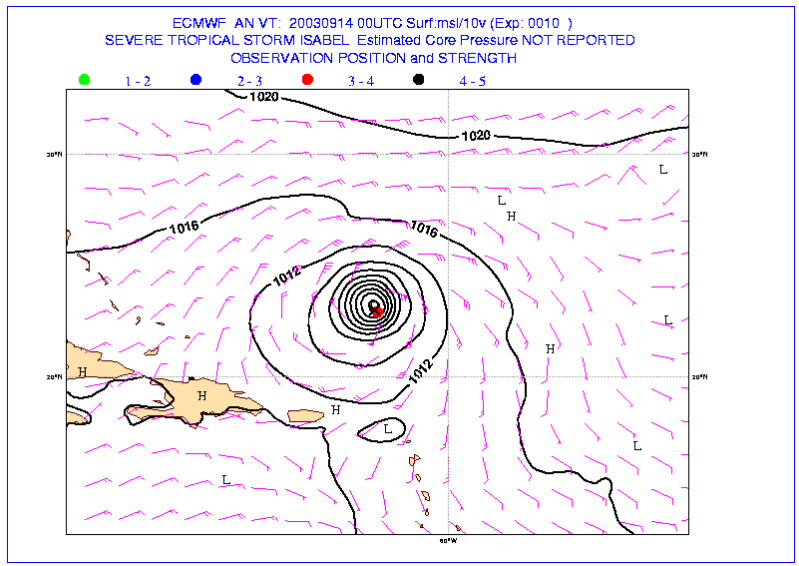



FG

AN




AN

# Discussion (1)

- **The current timeliness of satellite data is acceptable with the current data assimilation configuration**
  - **Although:**
    - ➔ Modis winds are irregular
    - ➔ Blind orbits are missing for the 00Z run
- **The situation will radically change if/when a new data assimilation configuration is in place**
  - **Short-cut off (4h = 1h after the end of the window) analyses will miss a lot of satellite data**
    - ➔ In particular SSM/I and MODIS
  - **A global extension of EARS could solve the problem (~30mn)**

# Discussion (2)

- The impact of the short-cut-off strategy developed at ECMWF is under evaluation
  - The quality of the assimilation cycle seems essential
  - On average, short cut-off 4V6h performs reasonably well (too limited number of cases yet to be conclusive)
  - Synoptically, differences between short cut-off 4V6h and 4V12h can be large
- The ECMWF requirements will converge towards those from most national NWP centres (1h or less)
- The definition of the “Near Real Time = 3 hours” should be revisited by regional and global NWP community