

# **CS1 Data Analysis Update - Stability Issues**

**17<sup>th</sup> January, 2007**

**Inspected by:  
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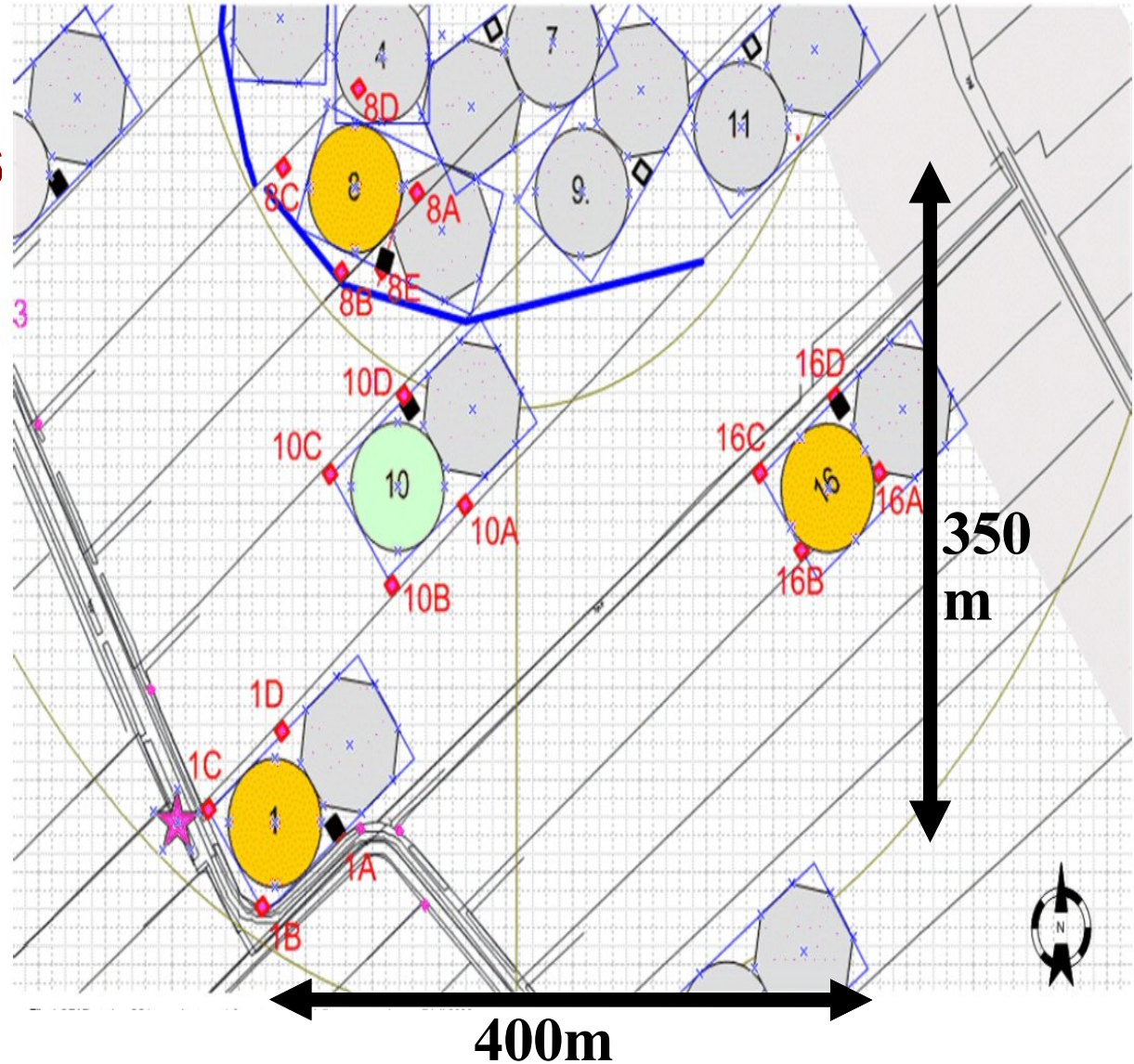
## Update -> Outline

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- **Auto Correlations** -> a few peak at different sidereal time
- **Stability Issues** -> Autocorrelations affected by level shifts
  - > **Bandpass stability**
- **Few new issues**
- **Inferences/More to do**

# CS1 - Configuration

- 96 dipoles
- 24 Micro stations
- 4 Stations 1,8,10,16
- Presently Obsvsn:  
**16 Microstns**
- *Stn 1 – 4 microstns*
- *Stn 8 – 4 microstns*
- *Stn 10 – 4 microstns*
- *Stn 16 – 4 microstns*

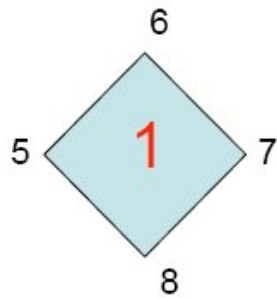
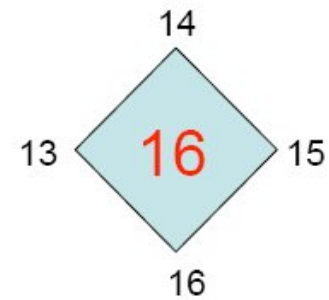
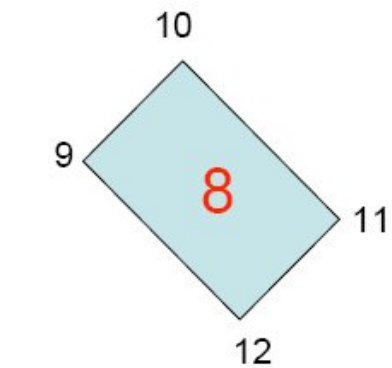


# CS1 - Layout

Exloo - CS1 16  $\mu$ stations (4 dipoles)

(stations 1-8-10-16)

(not to scale)



## Measurements Sets Inspected

L2006\_0583.MS to L2007\_00712.MS  
(Dec 15, 2006) to (Jan 7, 2007)

### New Observations

L2006\_0740.MS to L2007\_00777.MS  
(Jan 10, 2006) to (Jan 15, 2007)

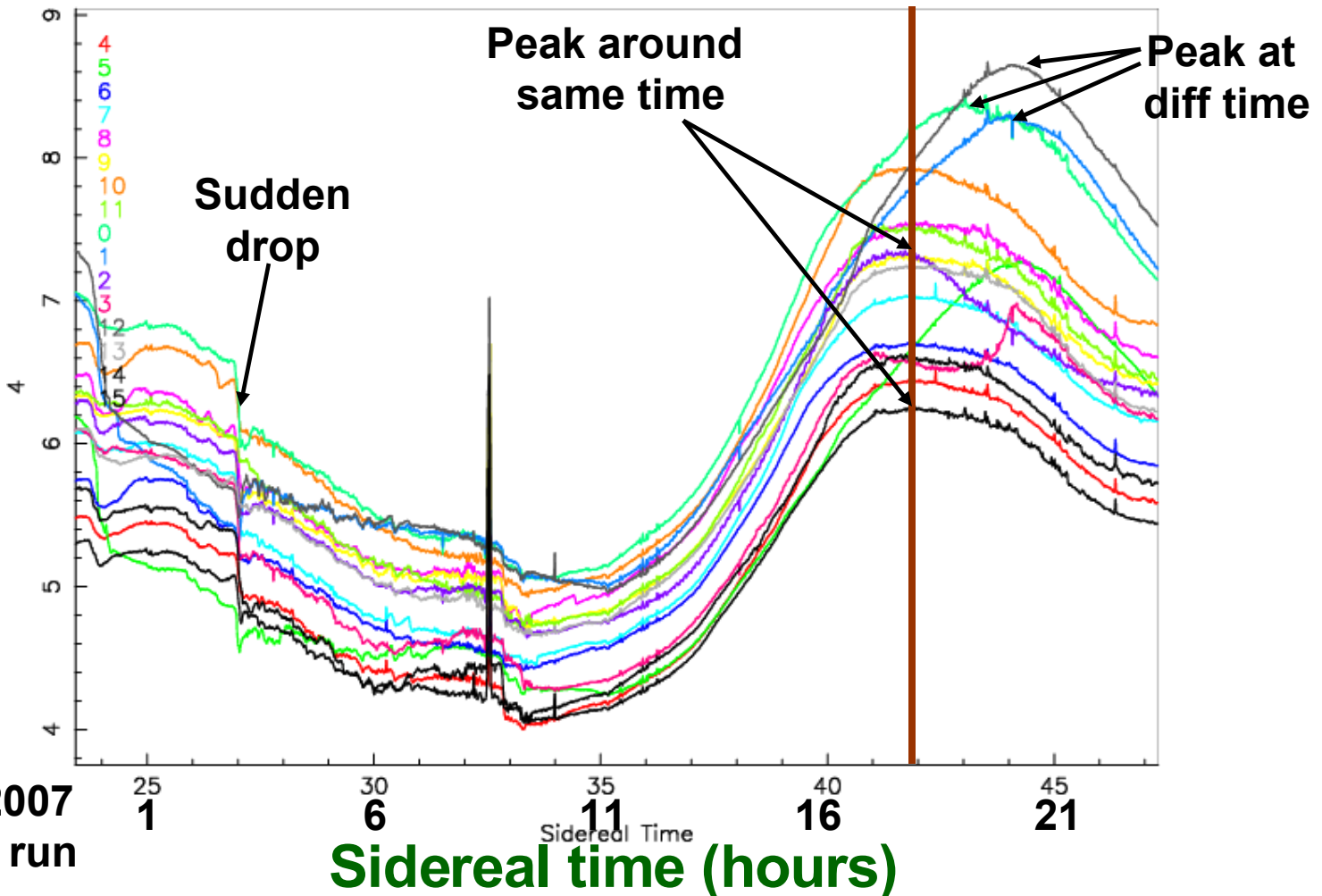
- **Micro stations 16 (1) (4 in each CS1, CS8, CS10, CS16).**
- **Frequency 60MHz, Sub band 156.25 KHz, 256 channels**
- **~0.6KHz resolution**
- **Integration time 60s**
- **MS740 onwards tracking working**
- **MS769, MS770, MS777 - 8 subbands from 33-75 MHz**
- **(for 60MHz band take L2007\_00769\_6.MS)**
- **Integraton time 30s**

# MS693 - Avg (Ch 6:250) all microstns

Auto Correlation (ALL Channels averaged 6:250) L2007\_00693.MS All micro stations

RECAP

Auto Correlation



Jan 05, 2007  
24 hours run

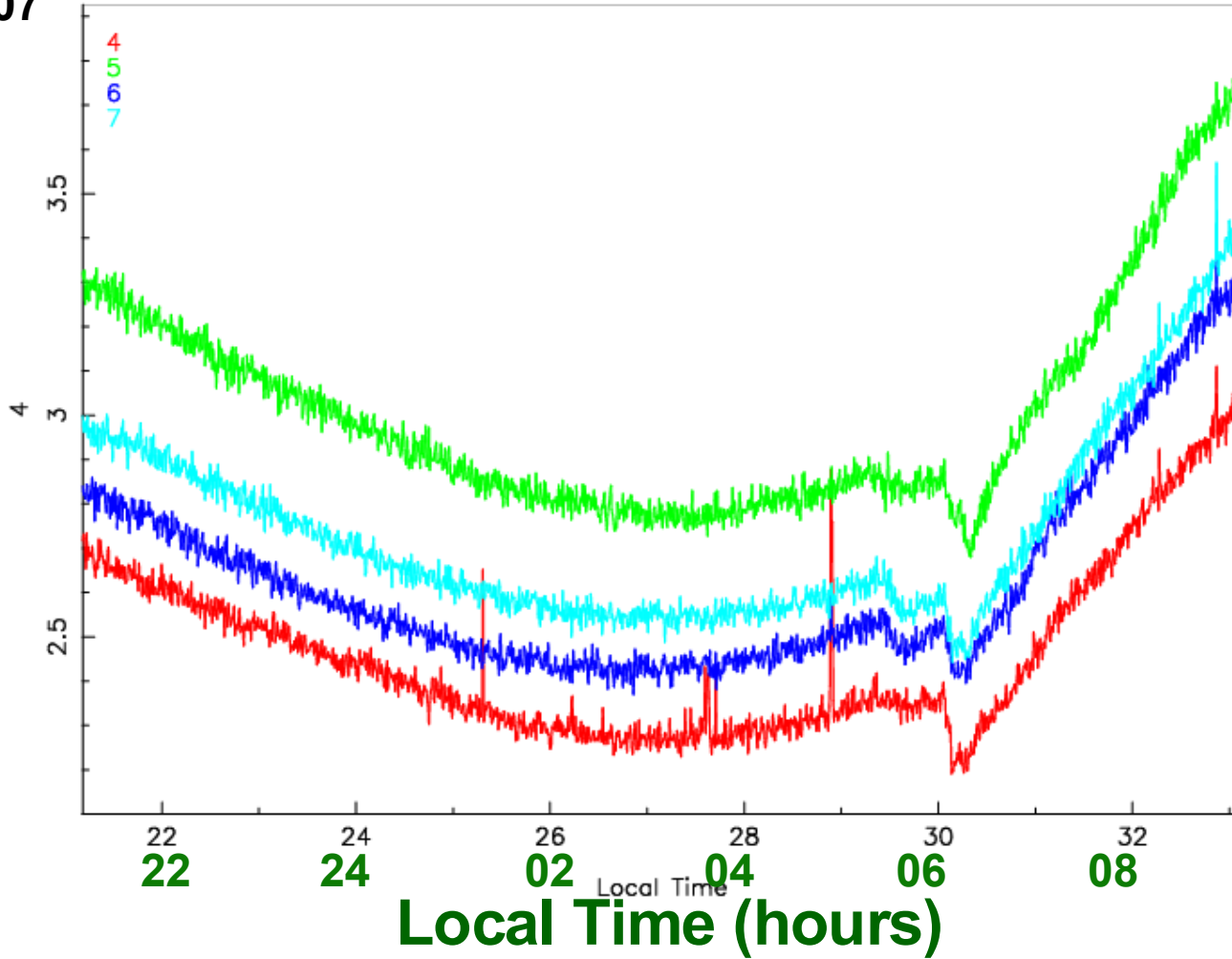
All the autocorrelations (16) now peak at same time after the XX-YY polarisation flip has been corrected (MS740 onwards)

# MS777 - Channel 128 CS1

Auto Correlation (Single Channel 128) L2007\_00777\_S6.MS All micro stations in CS1

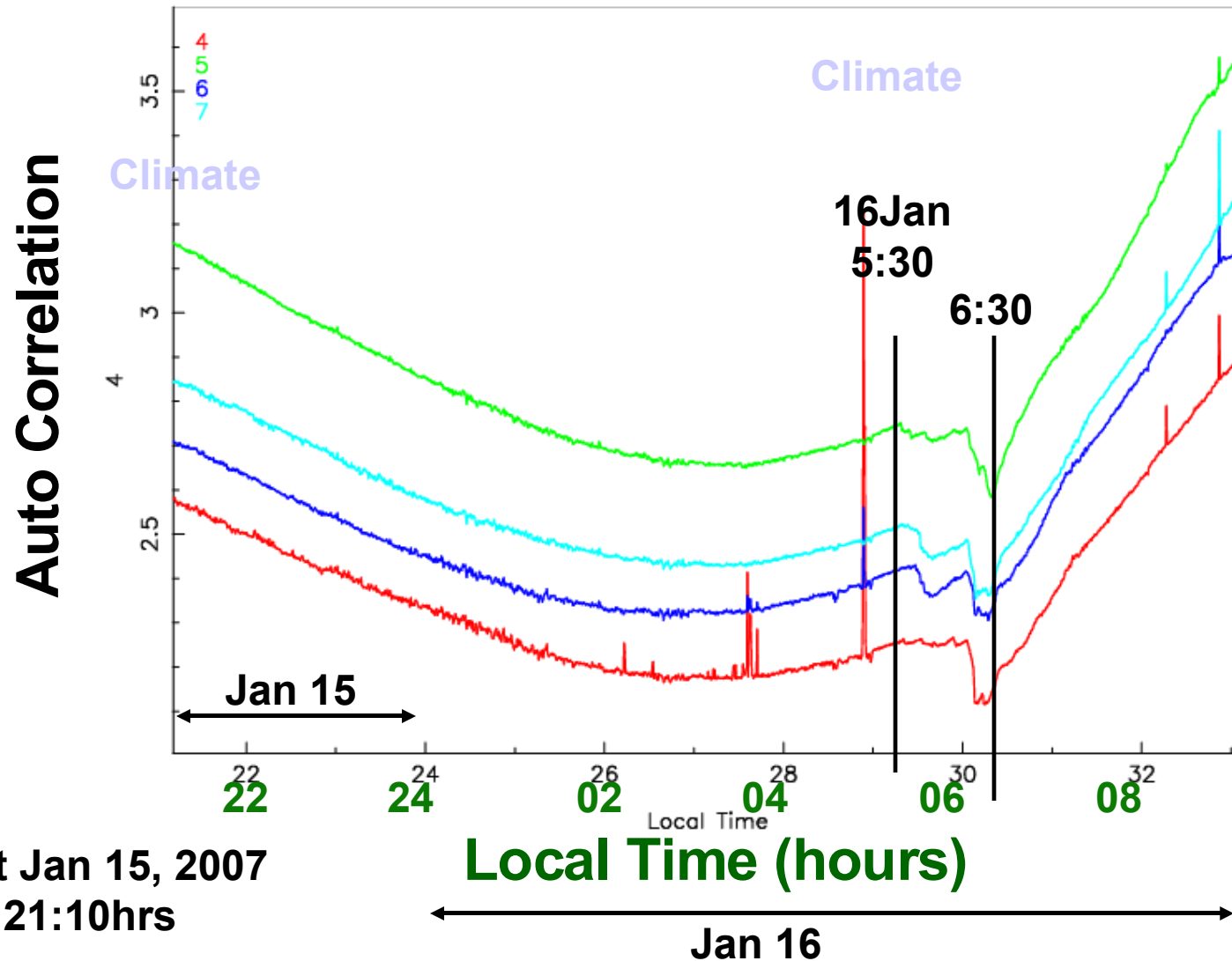
Jan 15, 2007  
21:10hrs

Auto Correlation



# MS777 - Avg(all channels) all Mstn CS1

Auto Correlation (ALL Channels averaged 6:250) L2007\_00777\_S6.MS\_LT All micro stations in CS1





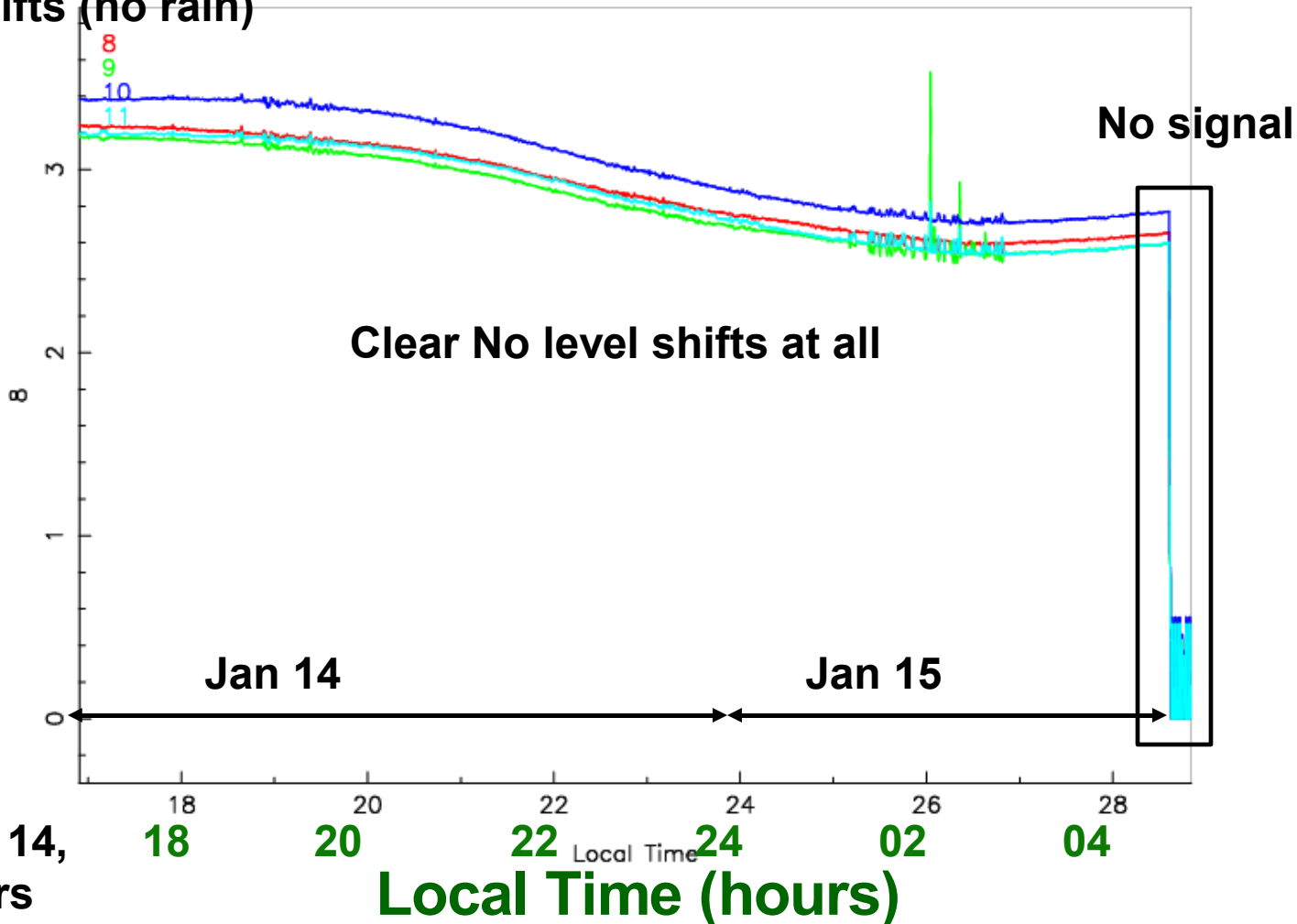


# MS770 - Avg(channels) CS8

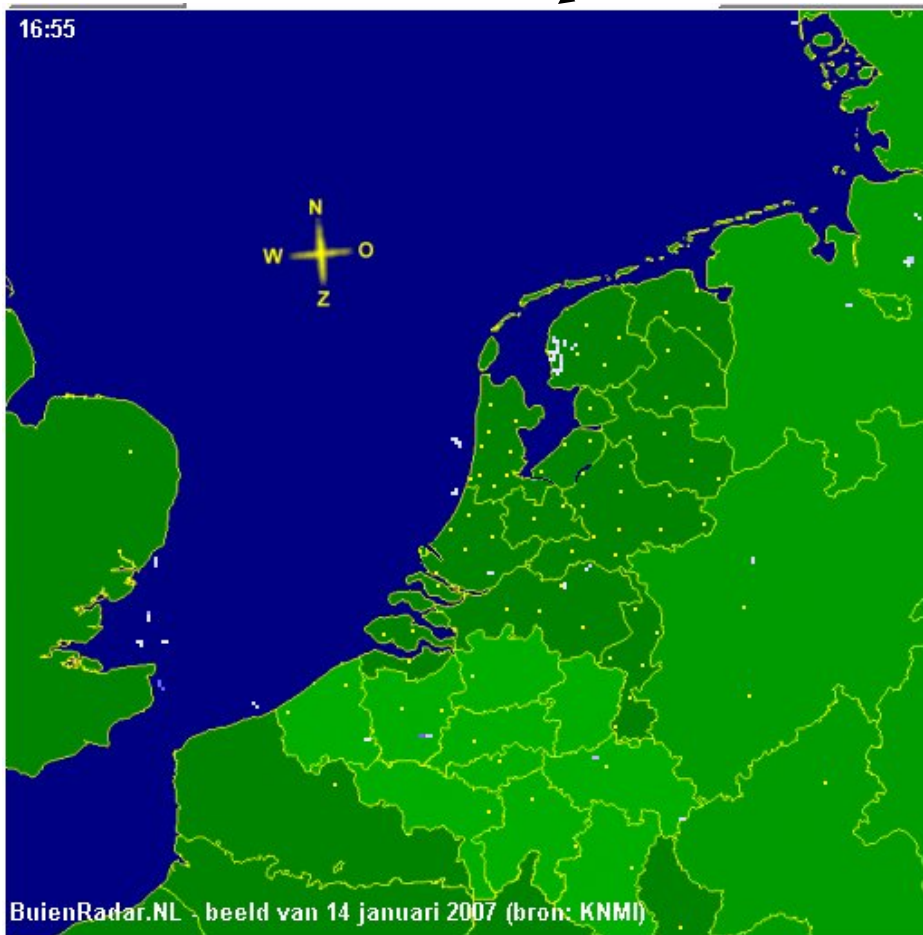
Auto Correlation (ALL Channels averaged 6:250) L2007\_00770\_S6.MS\_LT All micro stations in CS8

No level Shifts (no rain)

Auto Correlation



# Climate Jan 14, 16:55hrs, Jan 15, 05:00 hrs



**Start of Obsvsn**

**NEXT**

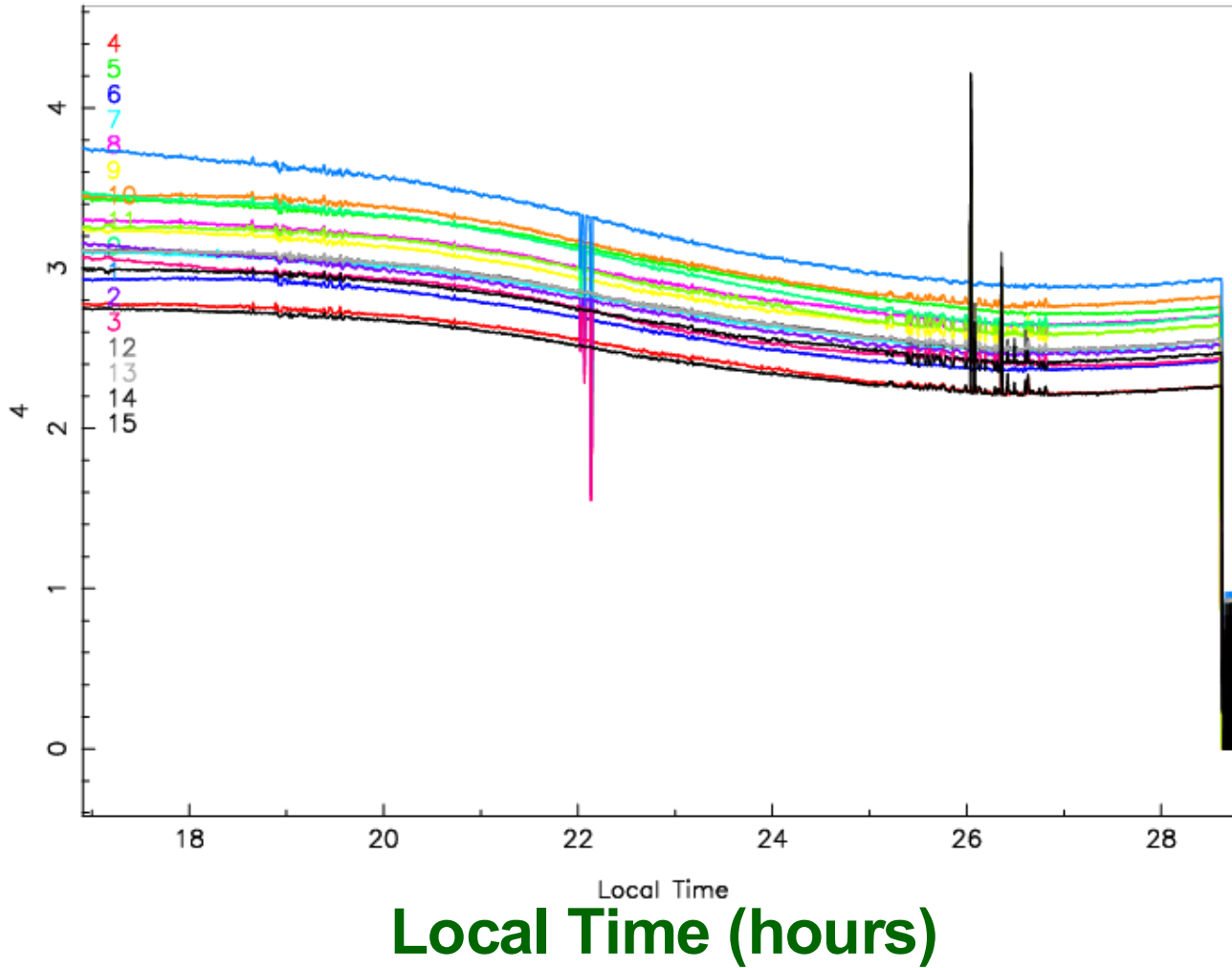


**End of Obsvsn**

# MS770 - Avg(channels) all microstn

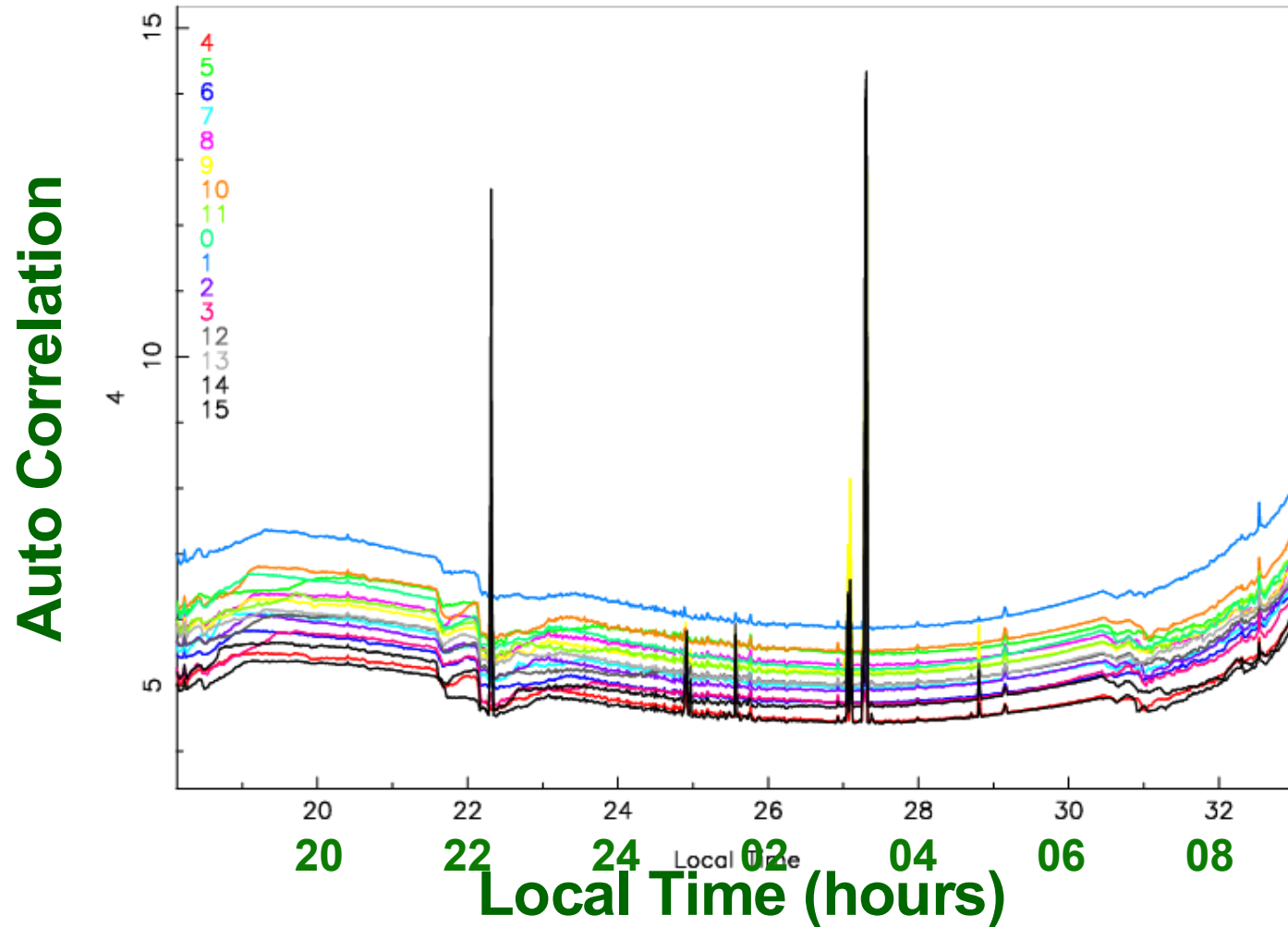
Auto Correlation (ALL Channels averaged 6:250) L2007\_00770\_S6.MS\_LT All micro stations

Auto Correlation



# MS740 - Avg(channels) all microstn

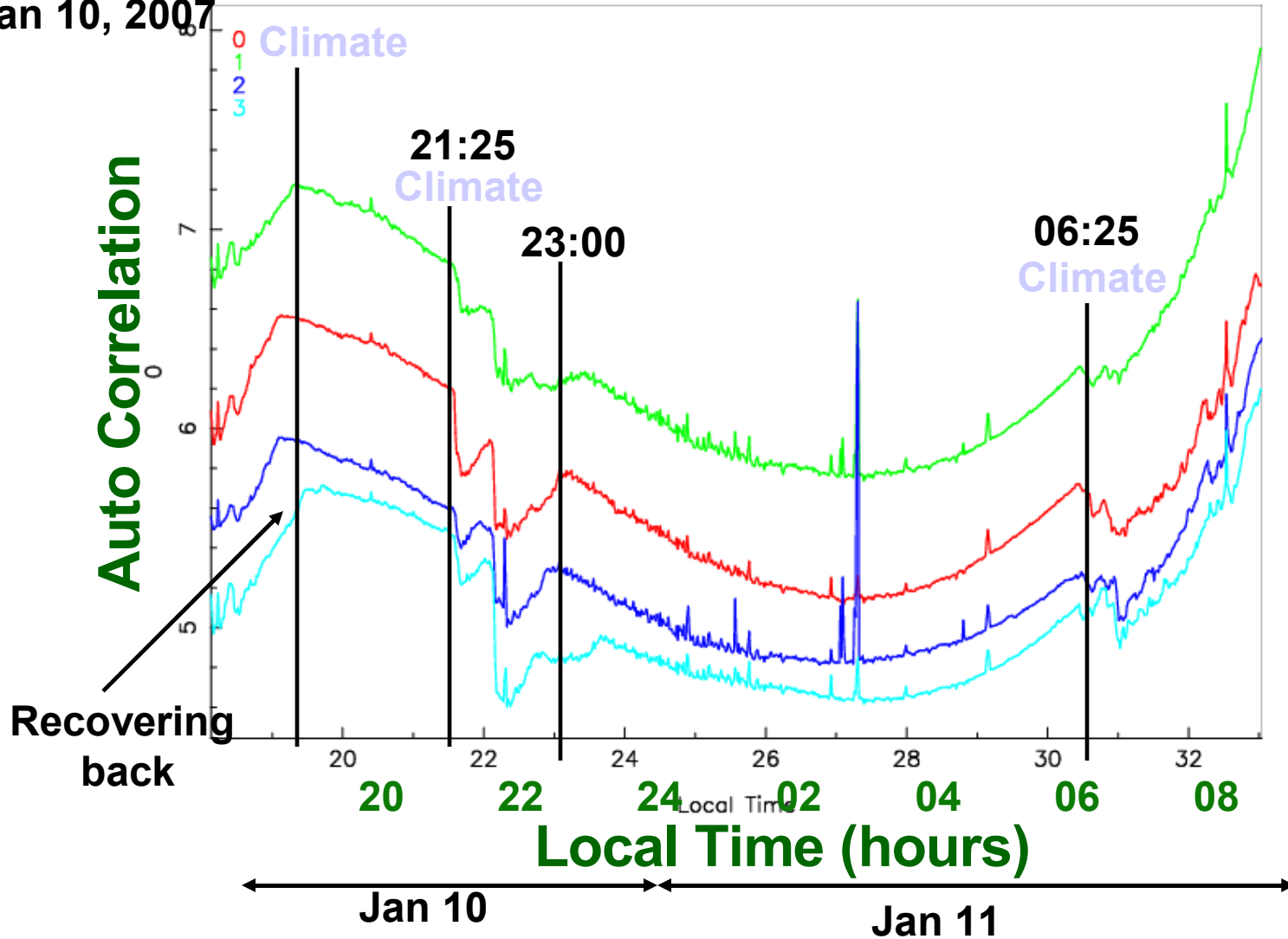
Auto Correlation (ALL Channels averaged 6:250) L2007\_00740.MS\_LT All micro stations



# MS740 - Avg(channels) CS10 microstn

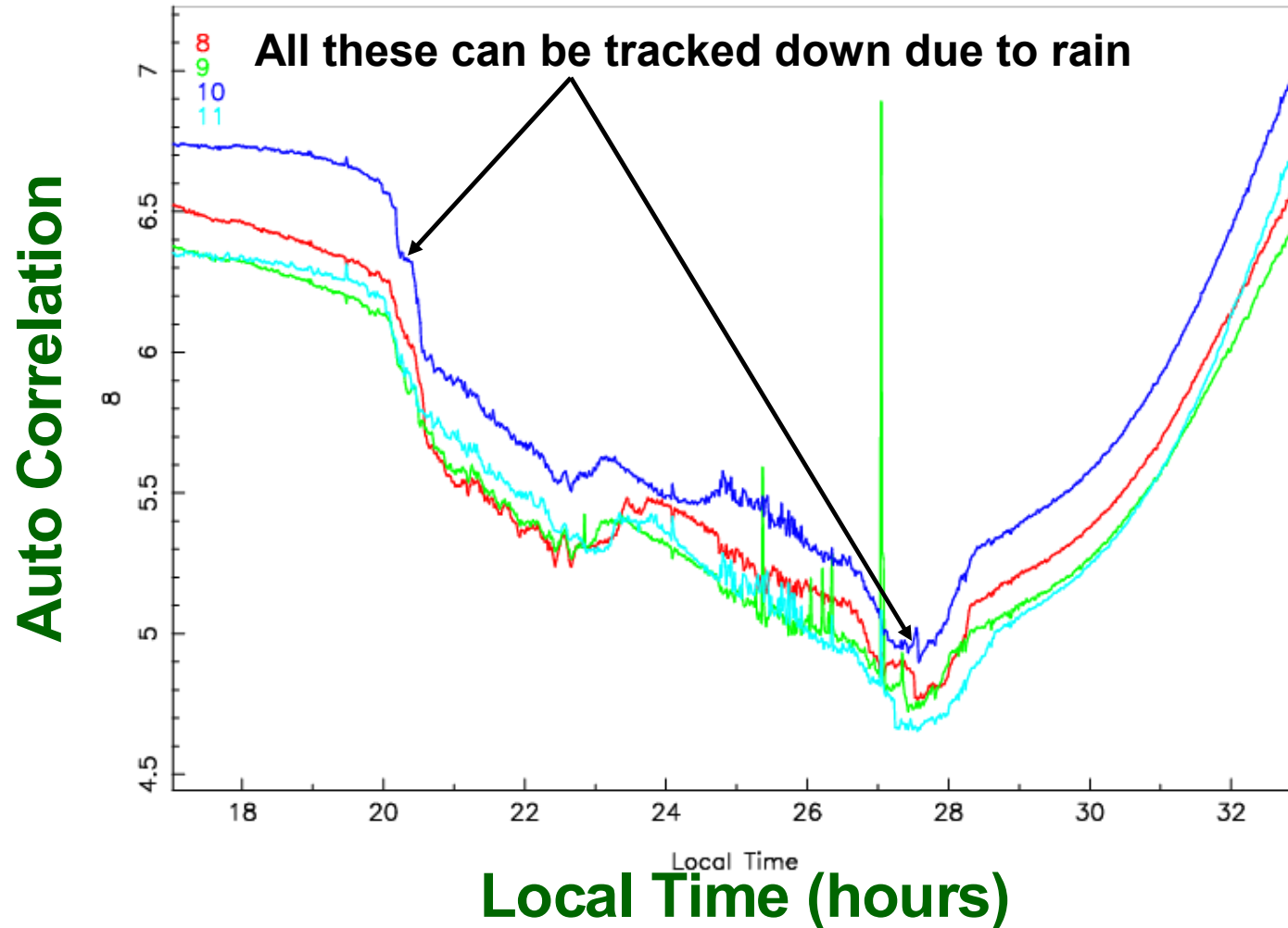
Auto Correlation (ALL Channels averaged 6:250) L2007\_00740.MS\_LT All micro stations in CS10

Start 18:15hrs  
Jan 10, 2007



# MS712 - Avg(channels) CS8

Auto Correlation (ALL Channels averaged 6:250) L2007\_00712.MS\_LT All micro stations in CS8



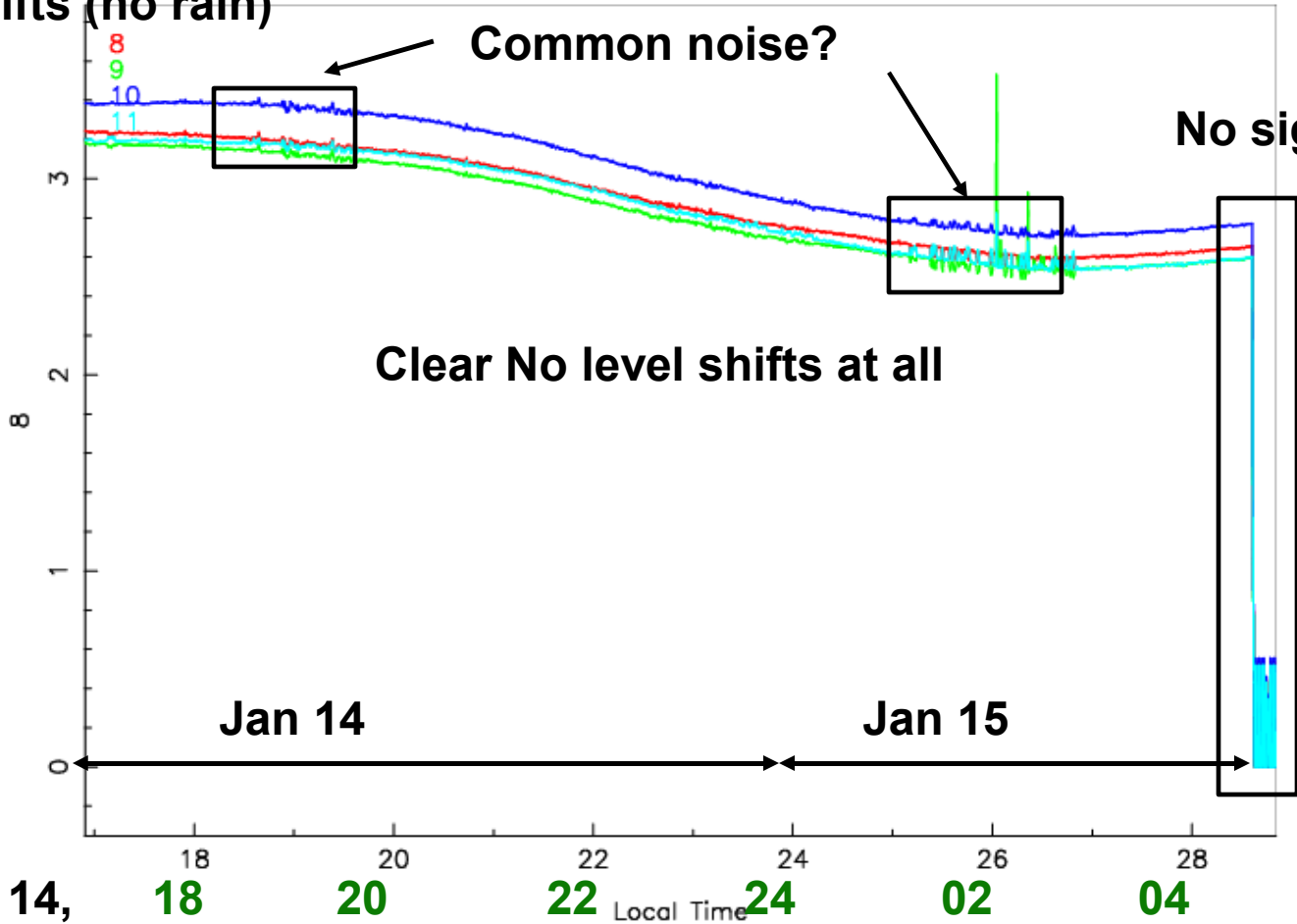
And similarly for all MS 698, 693 etc..

# MS770 - Avg(channels) CS8

Auto Correlation (ALL Channels averaged 6:250) L2007\_00770\_S6.MS\_LT All micro stations in CS8

No level Shifts (no rain)

Auto Correlation



We are looking into it....!!

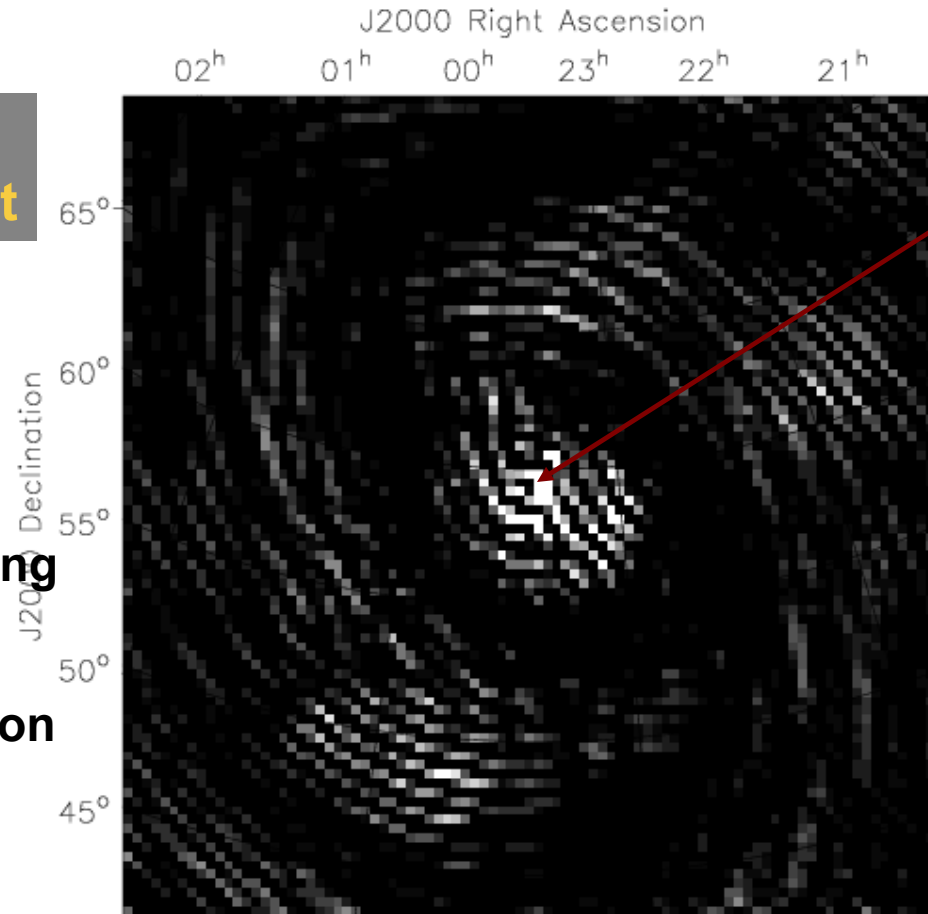


# MS740 - Jan 11, 2007 : Images

**The Golden  
Measurement Set**

**Fringe stopping/  
Delay tracking working**

**Image  
without any calibration  
Using AIPS++**



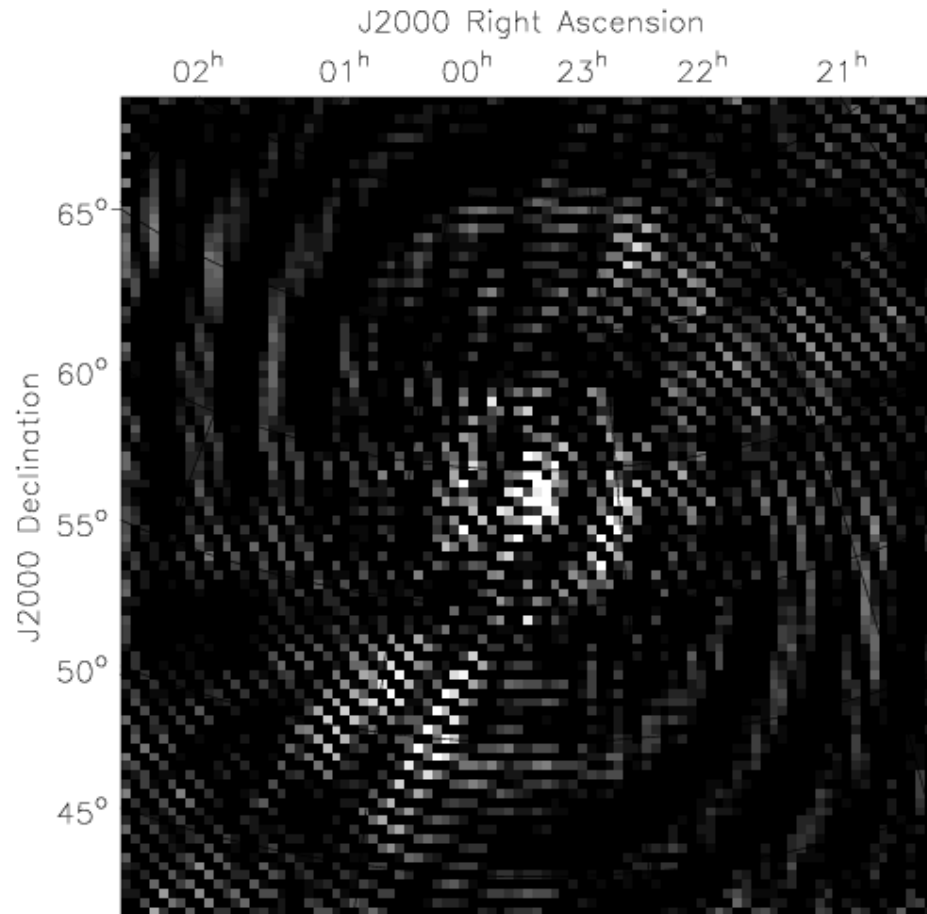
**Cas A**

**~25,000 Jy  
J2000  
23:23:24, -58:48**

**CS 1**

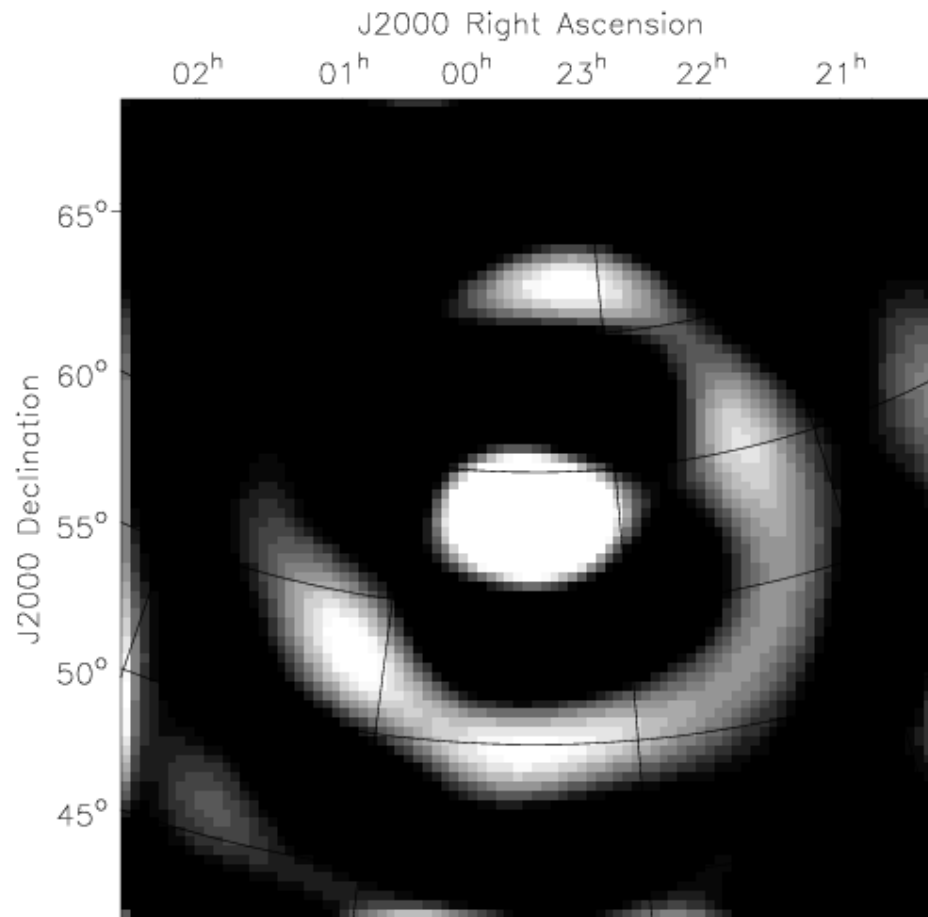
**60 MHz  
(all channels  
156KHz )**

# MS740 - Jan 11, 2007



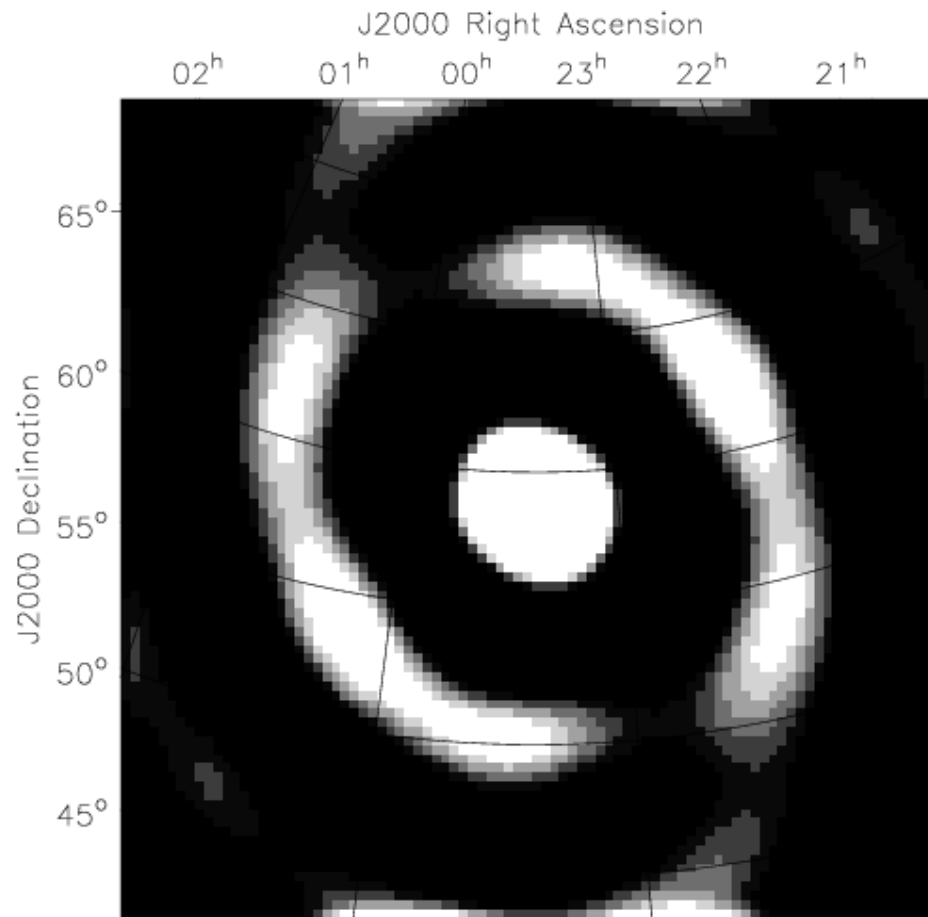
**CS 8**

# MS740 - Jan 11, 2007



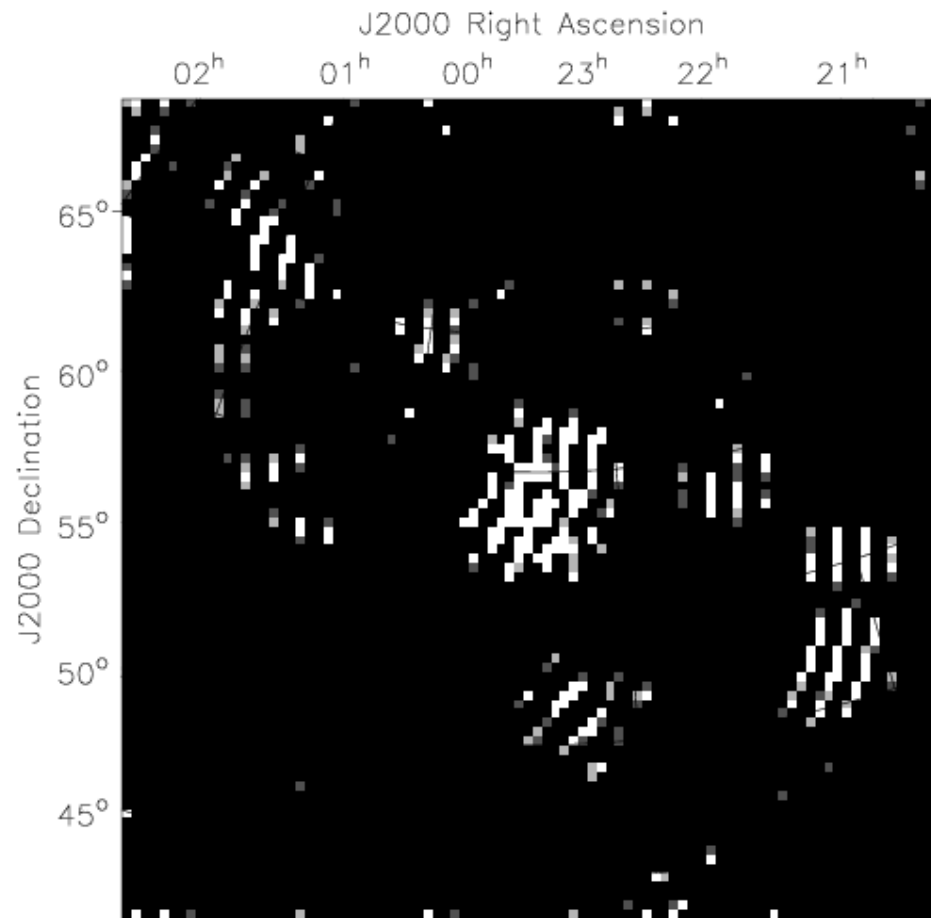
**CS 10**

# MS740 - Jan 11, 2007



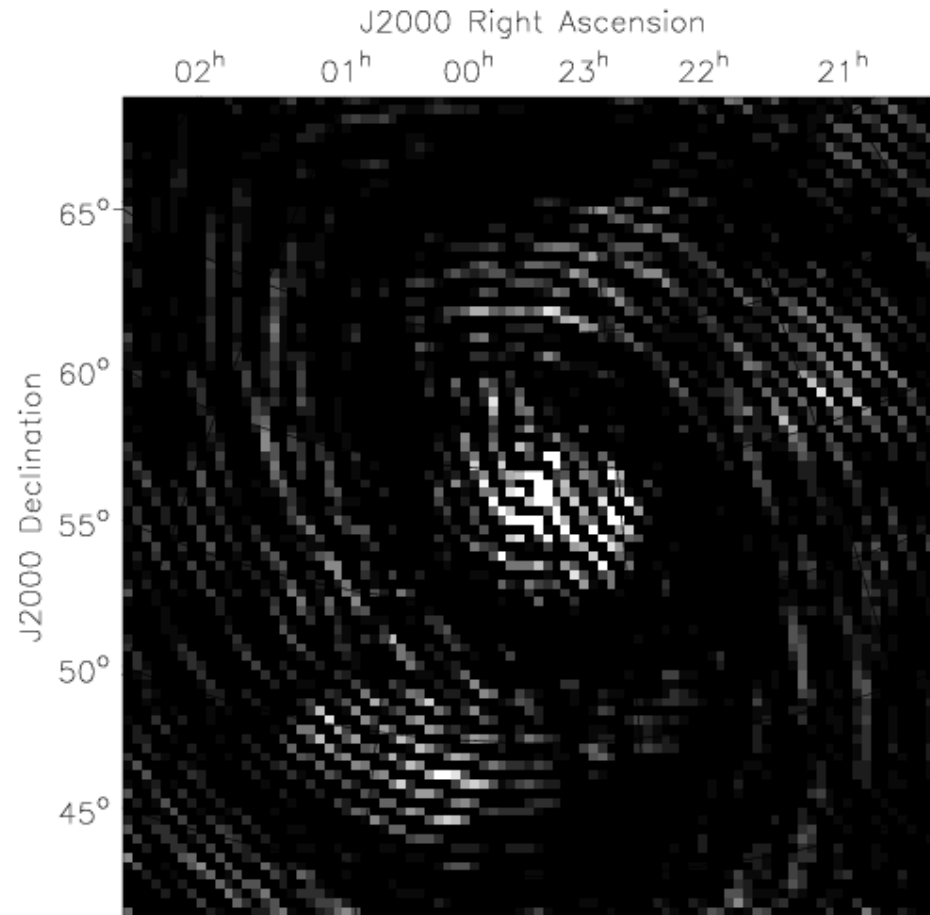
**CS 10 PSF**

# MS740 - Jan 11, 2007



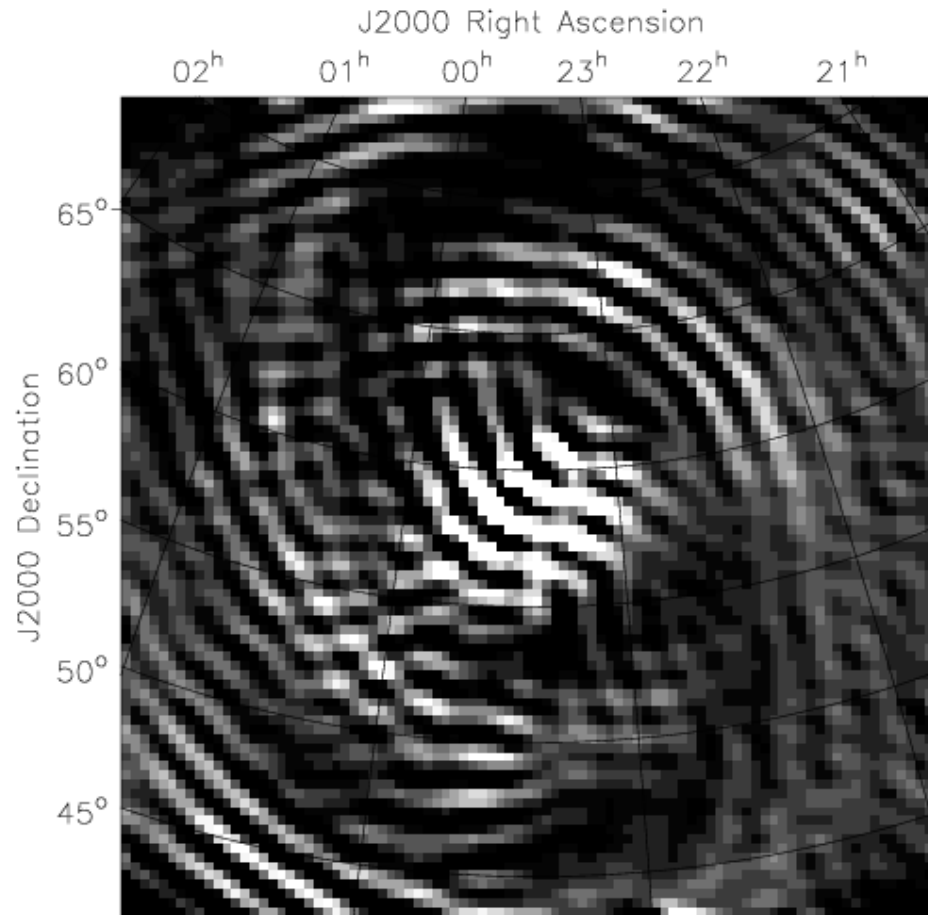
**CS 16**

# MS740 - Jan 11, 2007



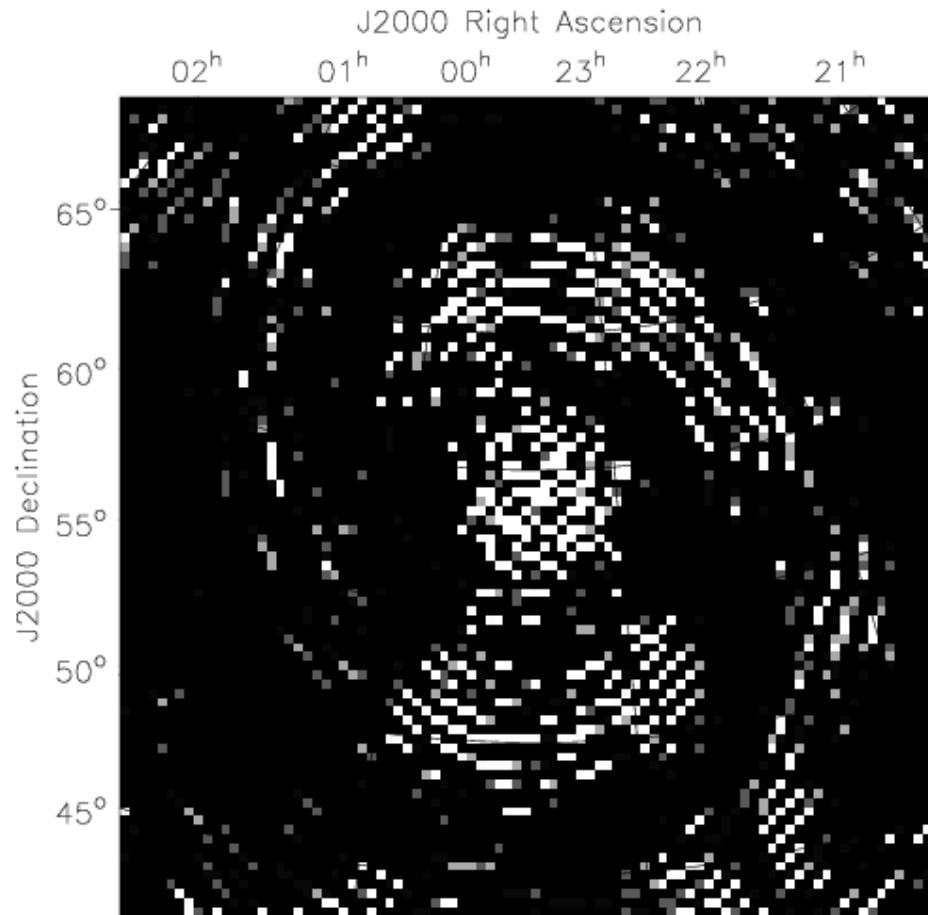
**CS 1-8**

# MS740 - Jan 11, 2007



**CS 1-10**

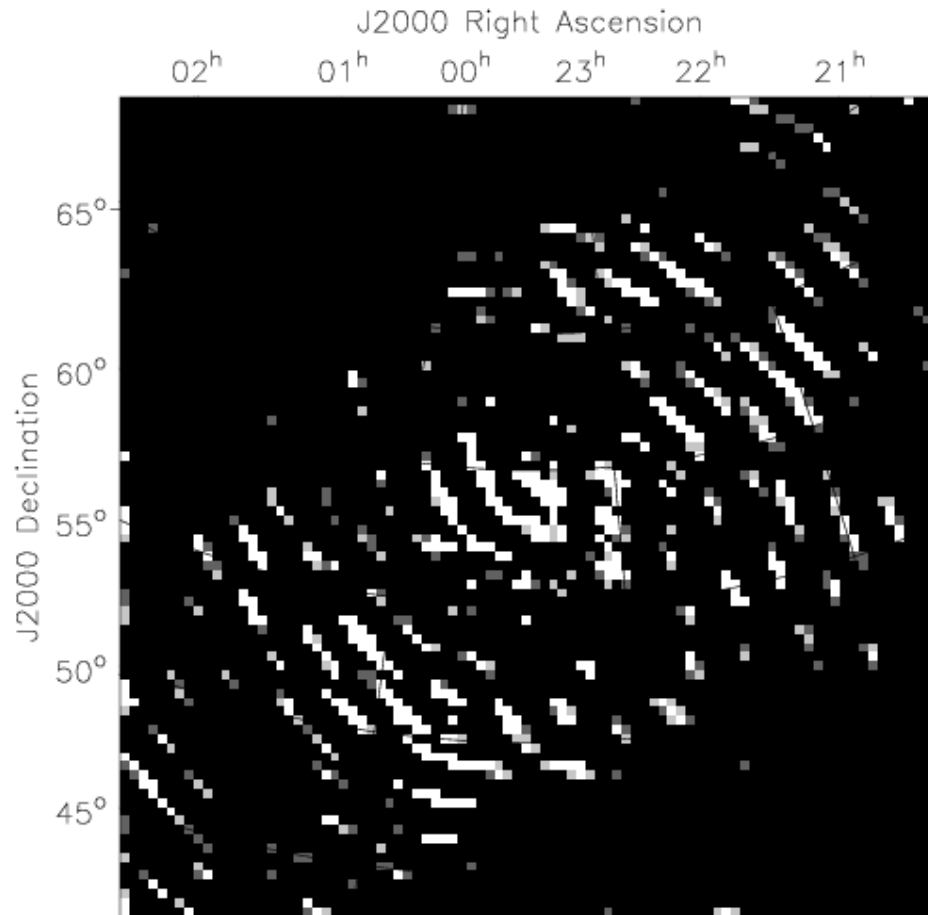
# MS740 - Jan 11, 2007



**CS 1-16**

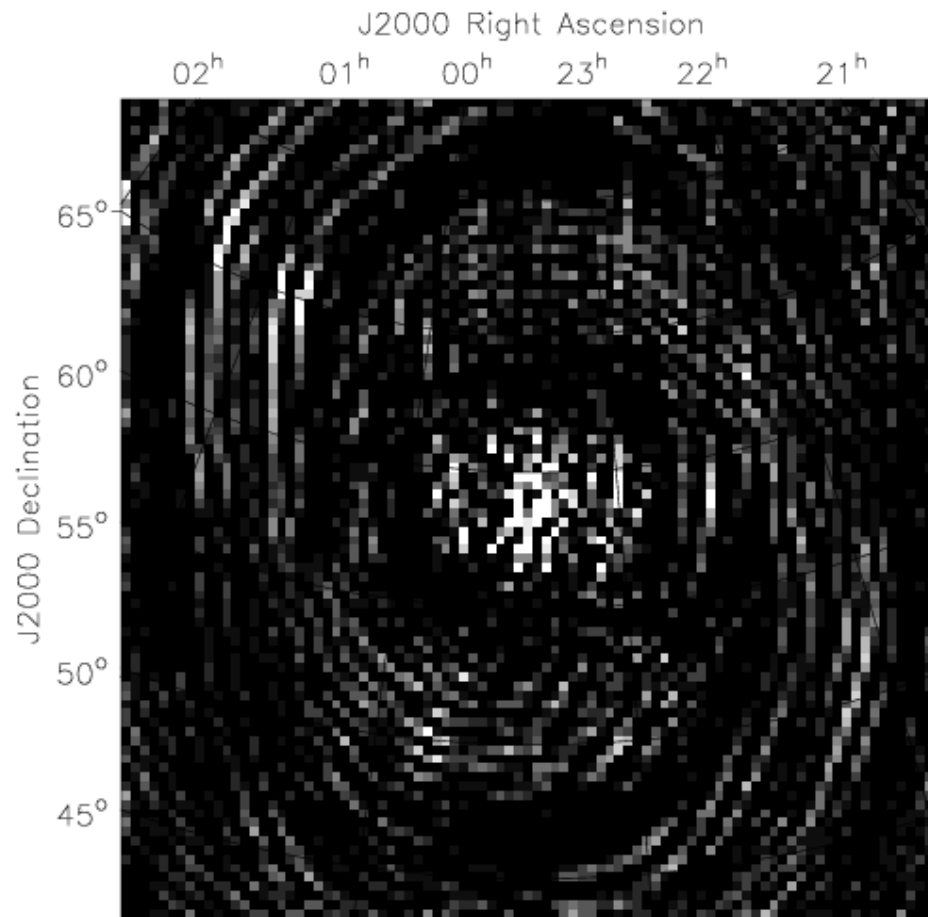


# MS740 - Jan 11, 2007



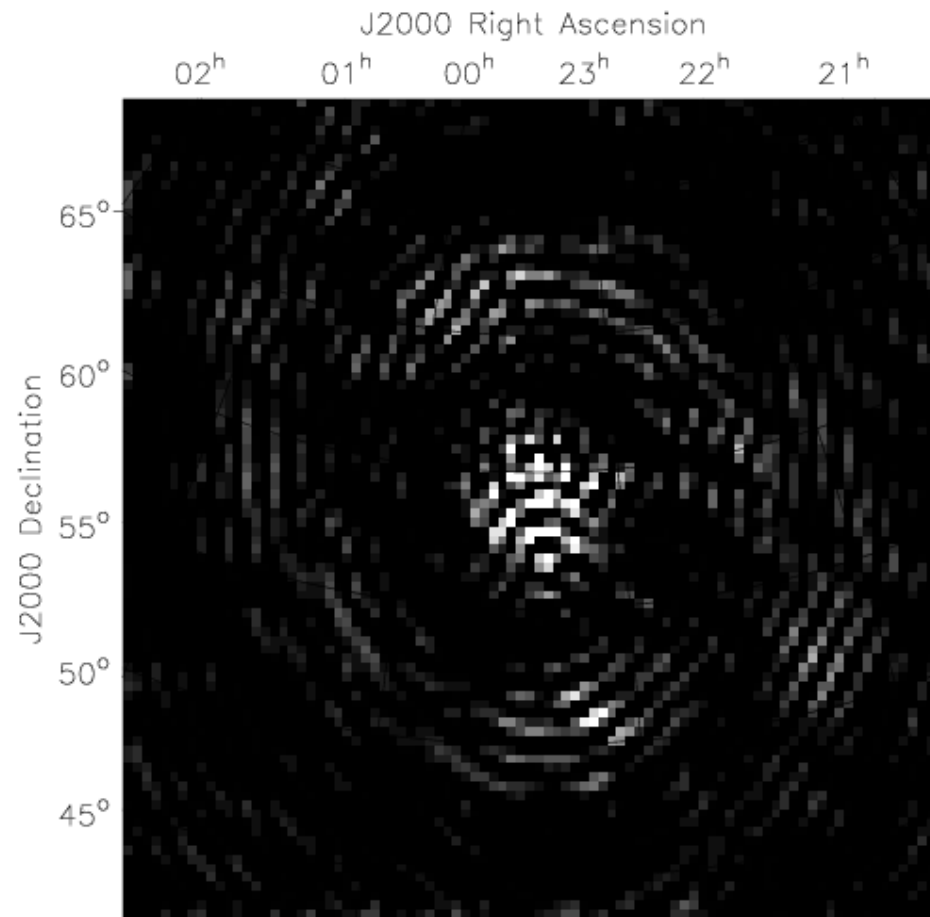
**CS 8-10**

# MS740 - Jan 11, 2007



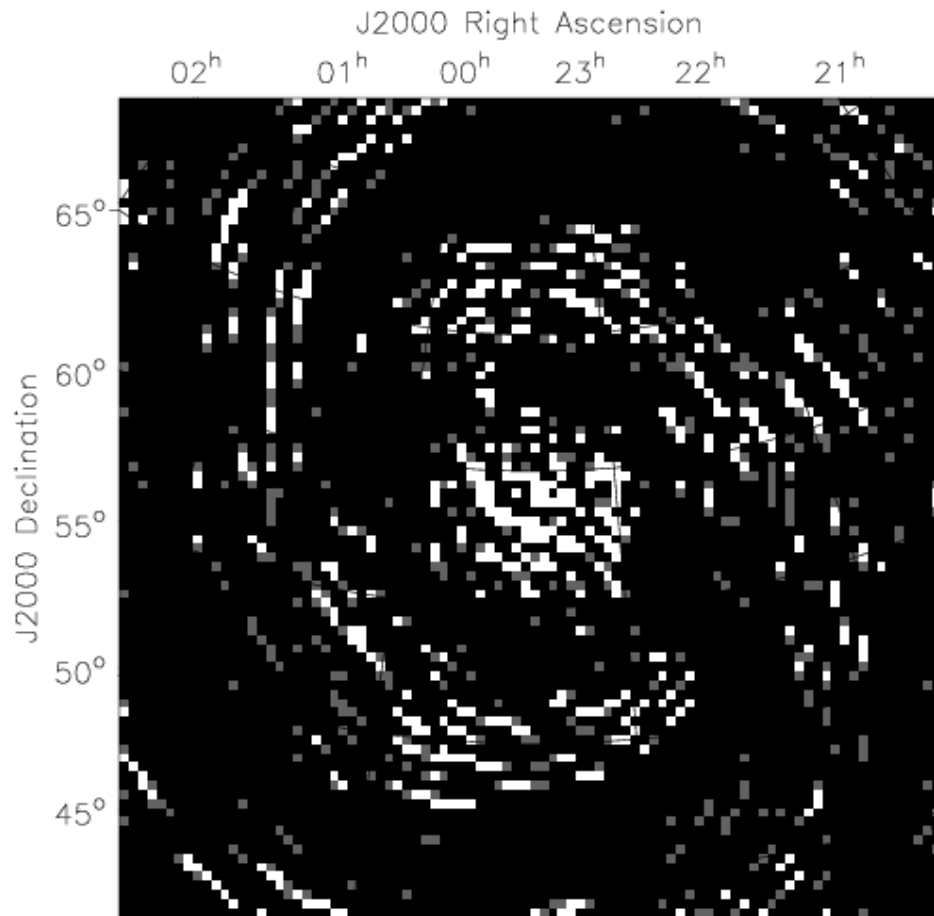
**CS 8-16**

# MS740 - Jan 11, 2007



**CS 10-16**

# MS740 - Jan 11, 2007



**CS 1-8-10-16**

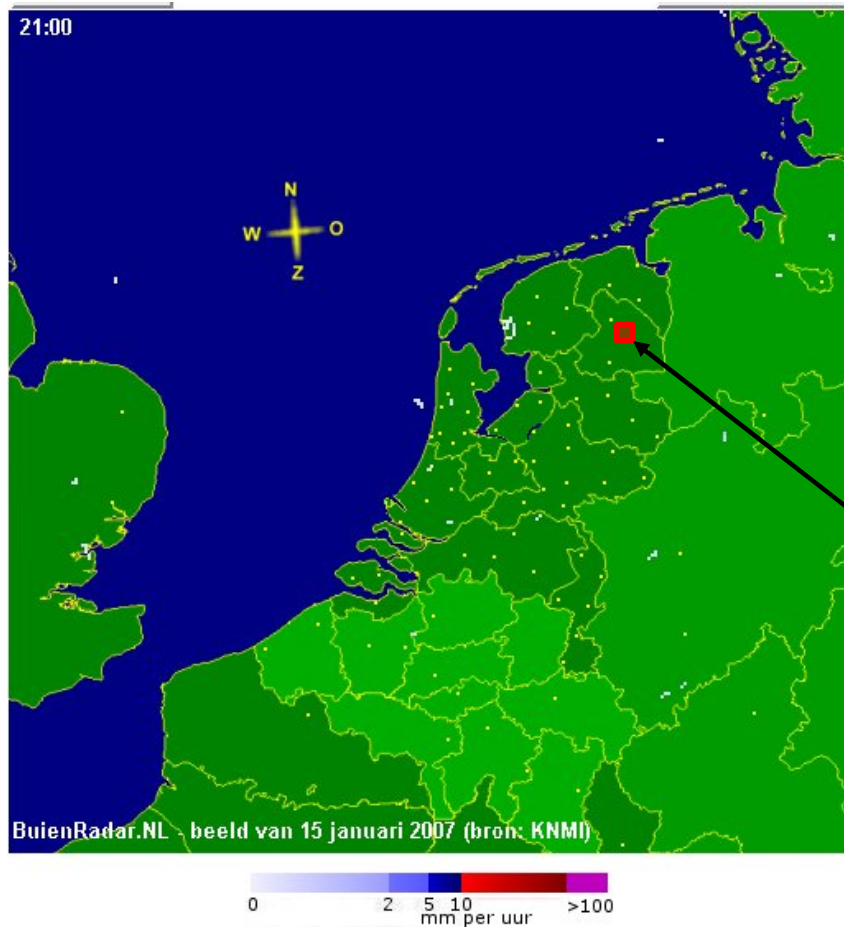
# Few Inferences

- After correction of polarisation flip (XX and YY) auto correlations of all 16 microstations peak at same time as expected.
- All antennas are affected by the level shifts
- All level shifts can be conclusively tracked down due to rain -> Lofar works as rain sensor??
- This includes MS 777, 770, 740, 712, 698, 693 etc..
- The drop in auto correlation occurs at the same time but the auto correlations are recovered back to original values at somewhat different rates for each microstation.
- suggests :-> must be depending on the draining rate/ground conditions??
- Most likely reason is change in reflection coefficient of tiles in presence of water.
- More quantitative information on climate (humidity, rain, temp etc.) may help to model it?
- Is it serious? Implications for calibration?
- We should look at its effect on cross correlations also.

# Few Inferences/ More to do/ Conclusions

- **Spurious increase in rms noise at few times ->? Common noise? Ionosphere? RFI? -> implications for calibration?**
- **CS1 Data MS740 tracked CasA successfully**
- **Images of CasA made (using AIPS++)**
- **BBS (Joris) also runs successfully on CS1 data (so format is o.k.)**
- **Need to look in more details on calibration aspects**
- **All subbands need to be looked into for all aspects including RFI**
- **Redundant Baselines -> comparison, closure phases etc. need to be looked into.**
- **A likely reason for the ratio of bandpasses on different days slightly different from 1 may be due to different effects of rain? Need to take data unaffected by rain and compare it.**

# Climate details - 15 Jan 21:00hrs



## Radar Image

<http://www.buienradar.nl/historie.aspx>

(Michiel Van Harlem)

Climate : every 5 minutes

Exloo

At start: Sky is Clear

BACK

# Climate details - 16 Jan 05:30hrs

Next



Rain at same time when sudden level shift in total power happens

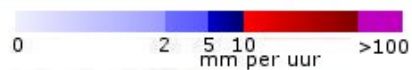
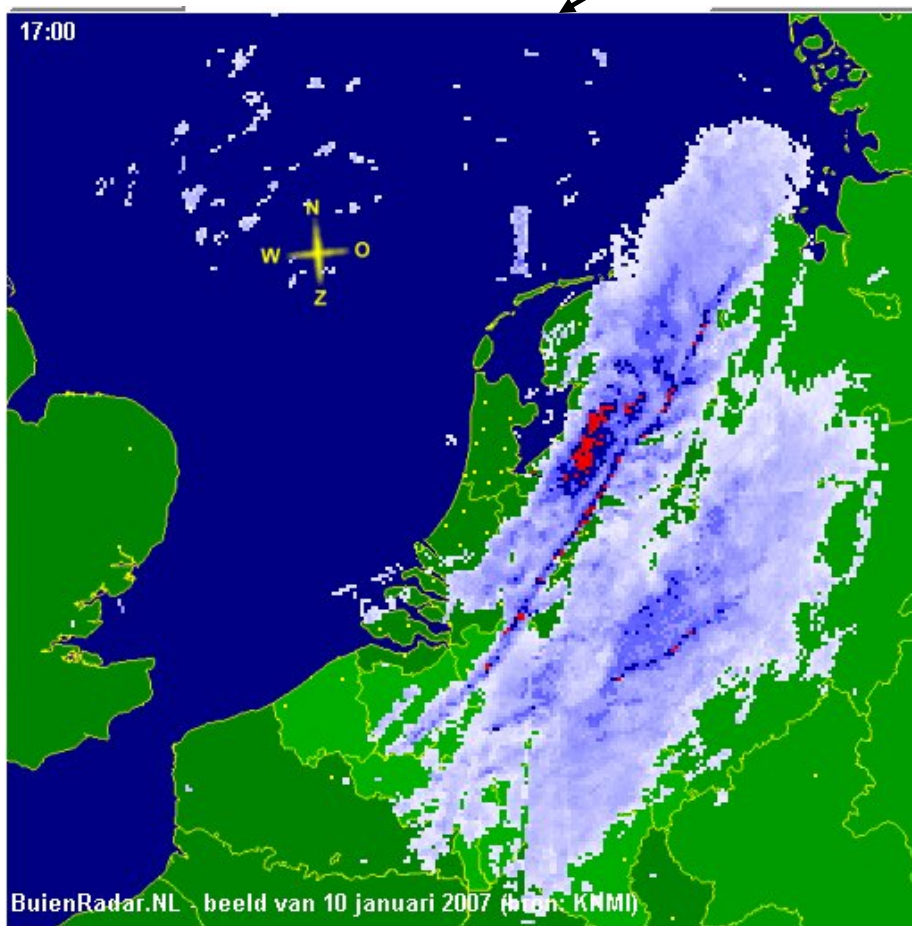


# Climate details - 16 Jan 07:00hrs



BACK

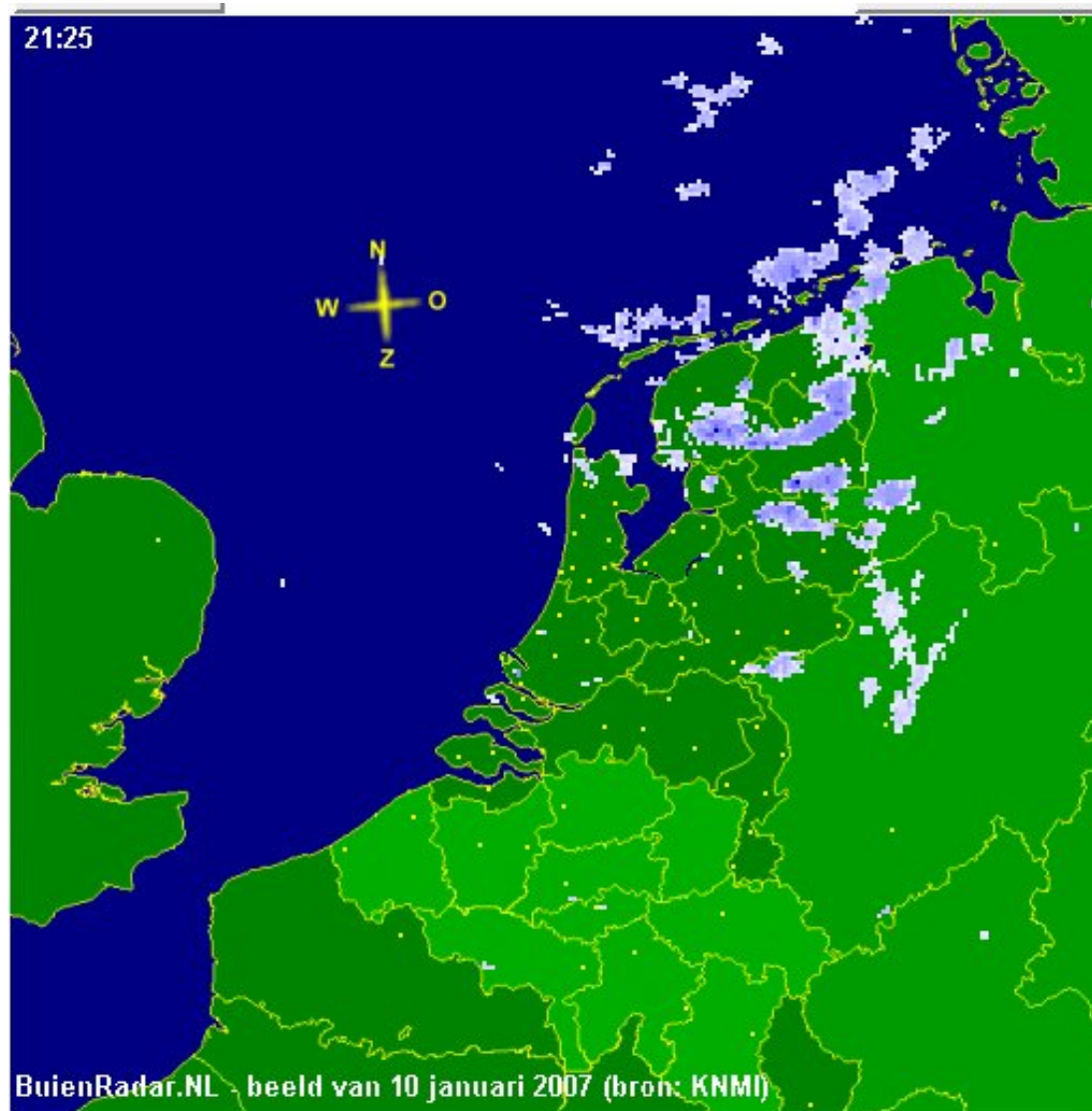
# Climate Jan 10, 17:00hrs, Jan 10, 18:00 hrs



BACK

# Climate Jan 10, 21:25hrs

Next

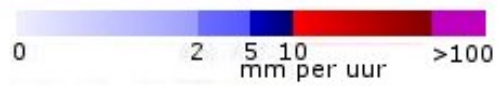




# Climate Jan 10, 22:00hrs



Next



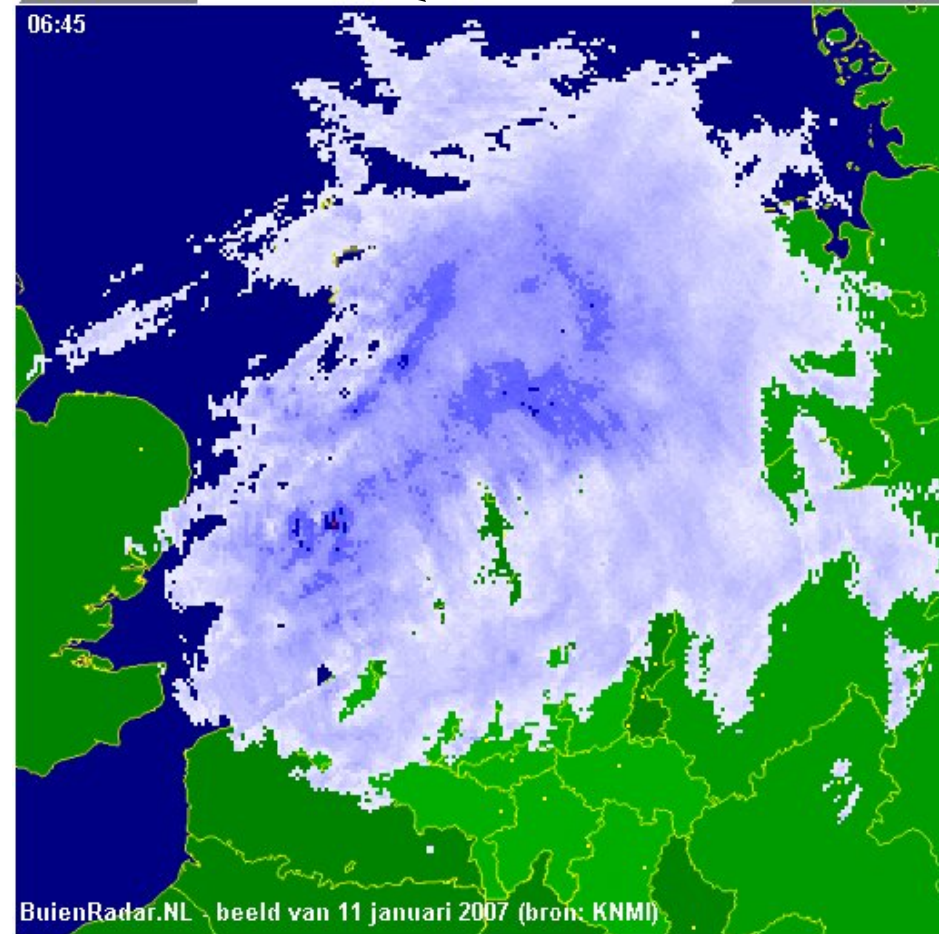
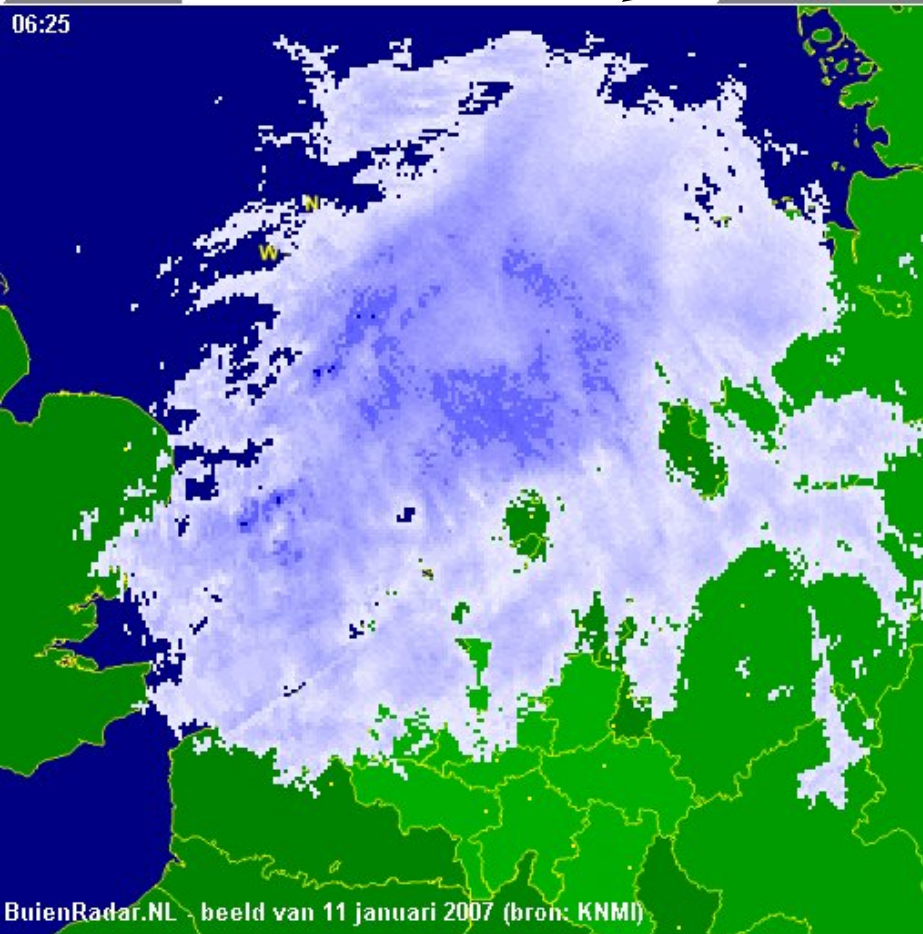
# Climate Jan 10, 23:00hrs



BACK



# Climate: Jan 11, 06:25, Jan 11 06:45 hrs



BACK

# MS777 - Avg(all channels) all microstns

Auto Correlation (ALL Channels averaged 6:250) L2007\_00777\_S6.MS\_LT All micro stations

