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*Ministry of Infrastructure and the  
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## **ASCAT-A scatterometer wind product reprocessing**



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IOVWST meeting Miami, May 2026



# Outline

- Introduction
- NWP Ocean calibration
- Anomalies
- Cone Metrics
- Results
- Conclusions and outlook



# Introduction

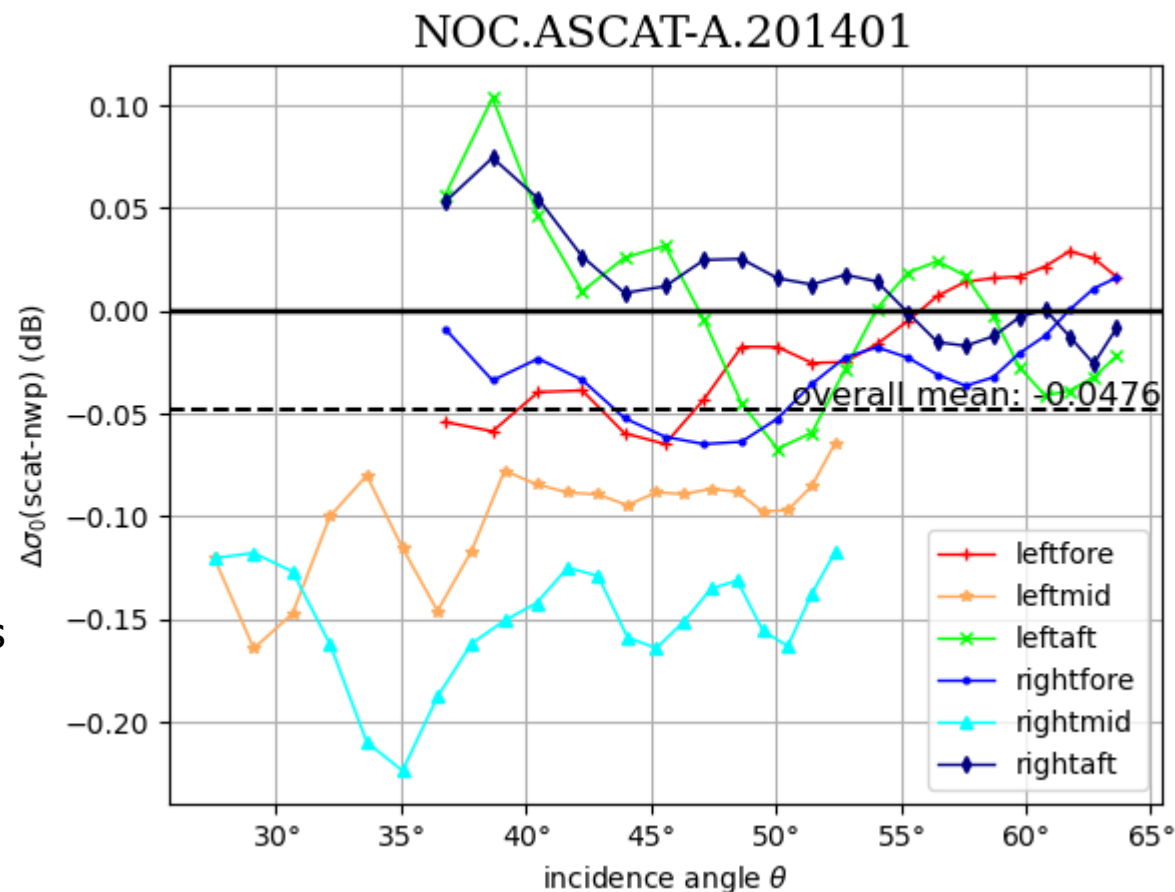
- ASCAT-A scatterometer was operational from October 2006 to November 2021
- Reprocessing planned with ERA5 stress-equivalent 10 m background winds
- First ASCAT-A is reprocessed, later ASCAT-B and ASCAT-C will follow
- The level1b data has been reprocessed by EUMETSAT
- Several instrument events and anomalies have occurred during the ASCAT-A lifetime



# NWP Ocean calibration

- Backscatter  $\sigma^0$  above sea is dependent on wind speed and wind direction  $\sigma^0 = \text{GMF}(V, \phi)$  for a given WVC
- NWP winds are transformed into backscatter values with the geophysical model function:  

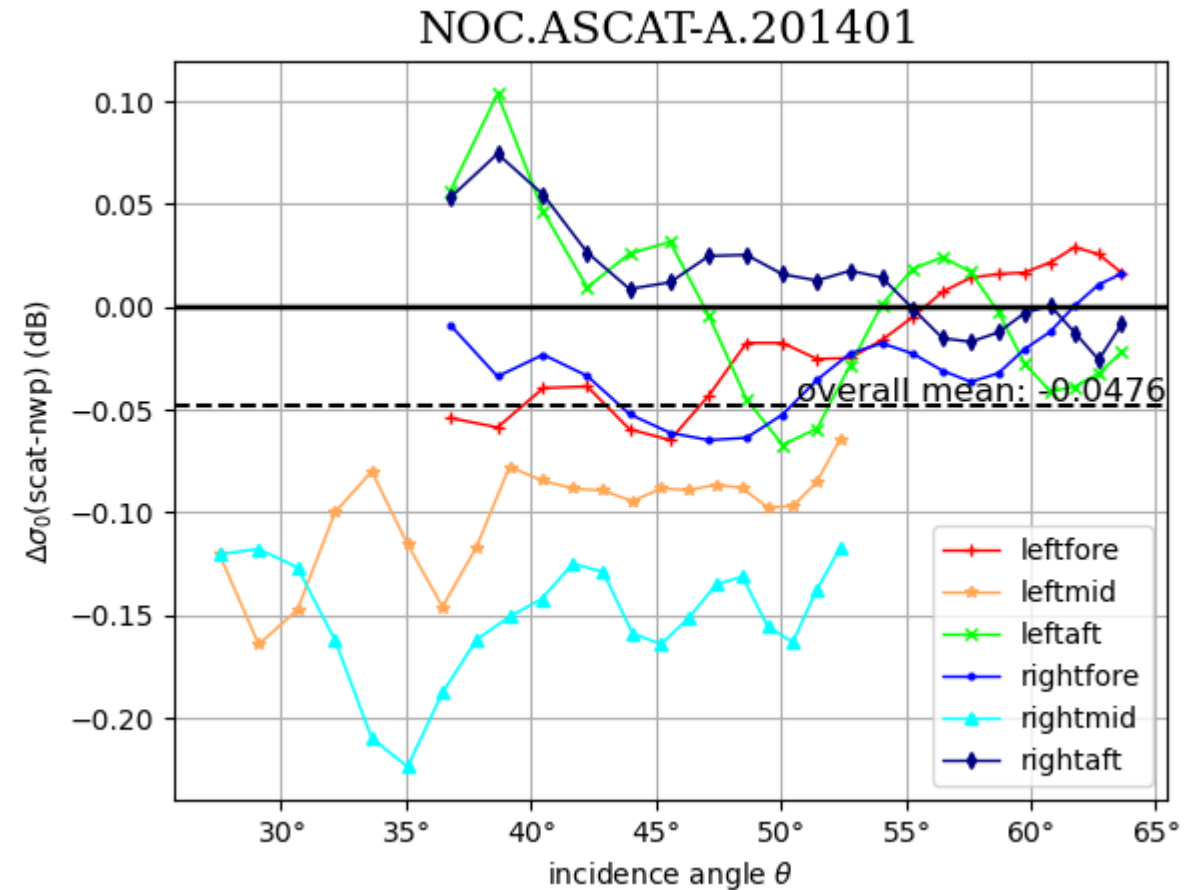
$$\text{CMOD7}(V_{\text{NWP}}, \phi_{\text{NWP}}) \Rightarrow (\sigma^0_{\text{fore}}, \sigma^0_{\text{mid}}, \sigma^0_{\text{aft}})_{\text{NWP}}$$
- Scatterometer backscatter and NWP derived backscatter triplets are compared for a large dataset over the oceans





# NWP Ocean calibration

- Residuals reveal information about instrument/measurement/model errors
- The residuals are used as backscatter corrections to improve the wind retrieval



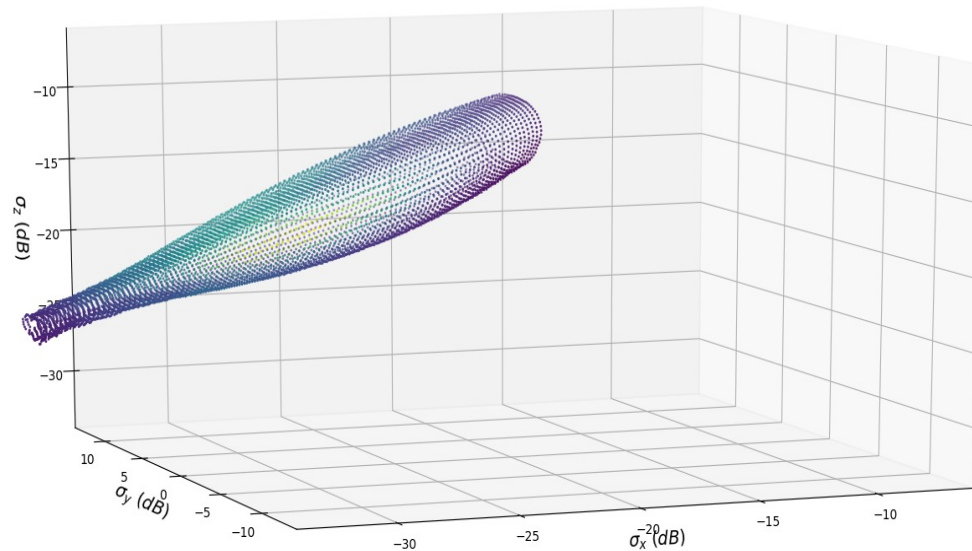


# Cone metrics

- As opposed to NOC, only measurements are used, there is (almost) no dependency on NWP winds or GMF models
- Cone metrics compares two datasets, e.g. two different time periods of ASCAT data

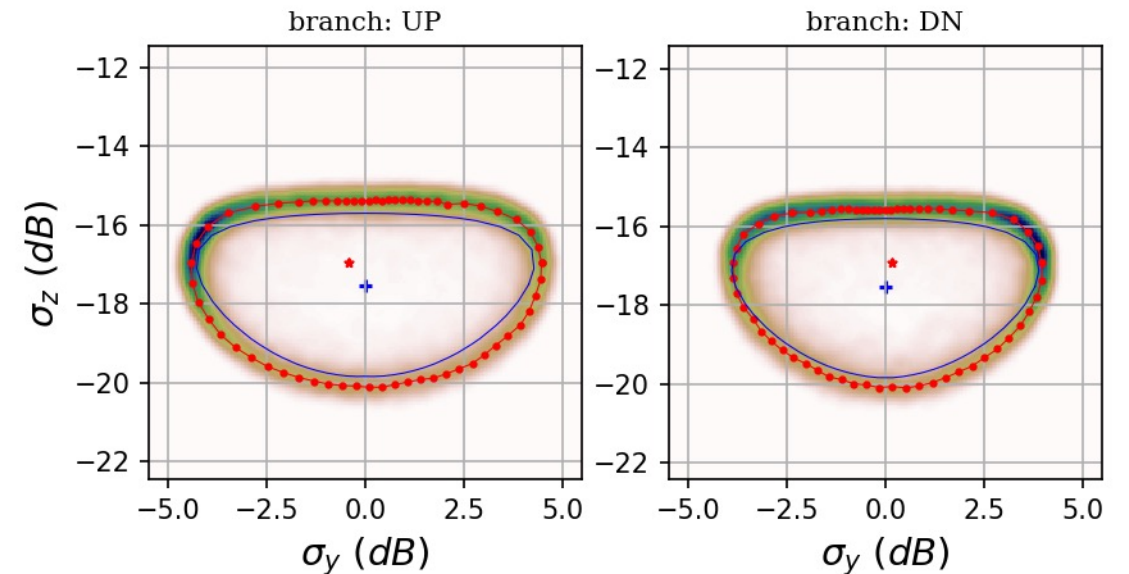
• 201

ASCAT, wvc=032 branch=UP, gmf\_version=cmod7



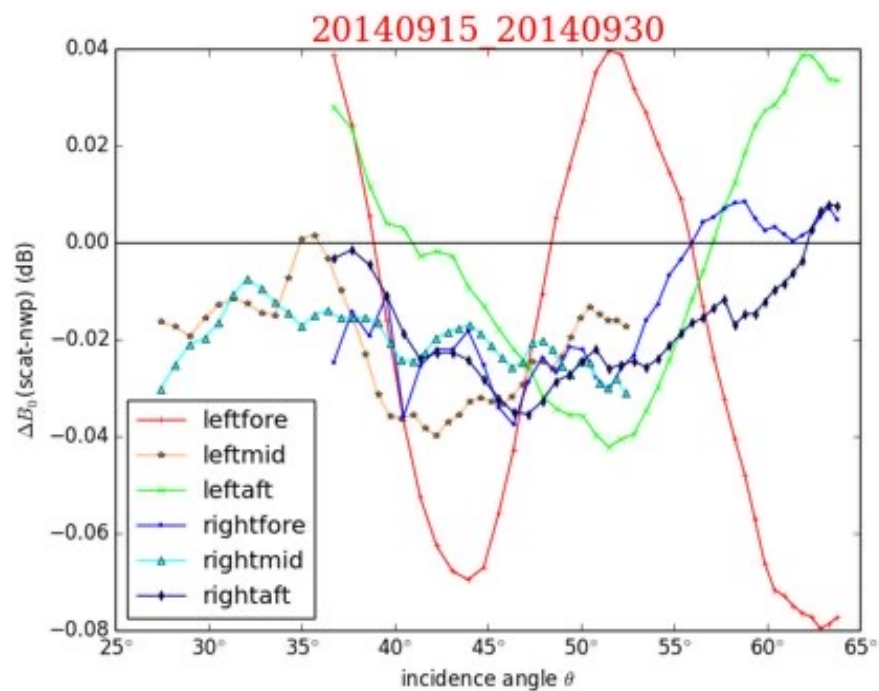
2013.b, 2013.b\_density  
wvc: 032, x: -29.200 dB  
Vplane: 7.89 m/s, C\_mid: -17.534 dB  
max\_distance: 0.10 dB

• 2013.b  
— cmod7

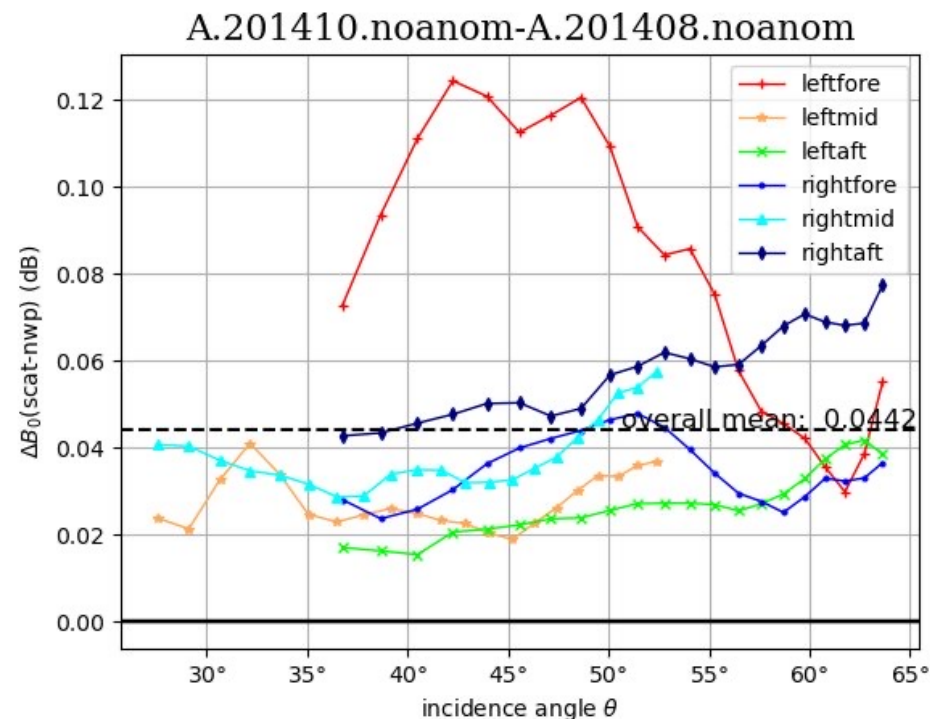


# Anomaly 13 September 2014

- A oscillation as function of incidence angle appears in the leftfore beam
- The shape and amplitude is different for near-real time data and for reprocessed data
- The effect on the averaged wind speed bias will be very small



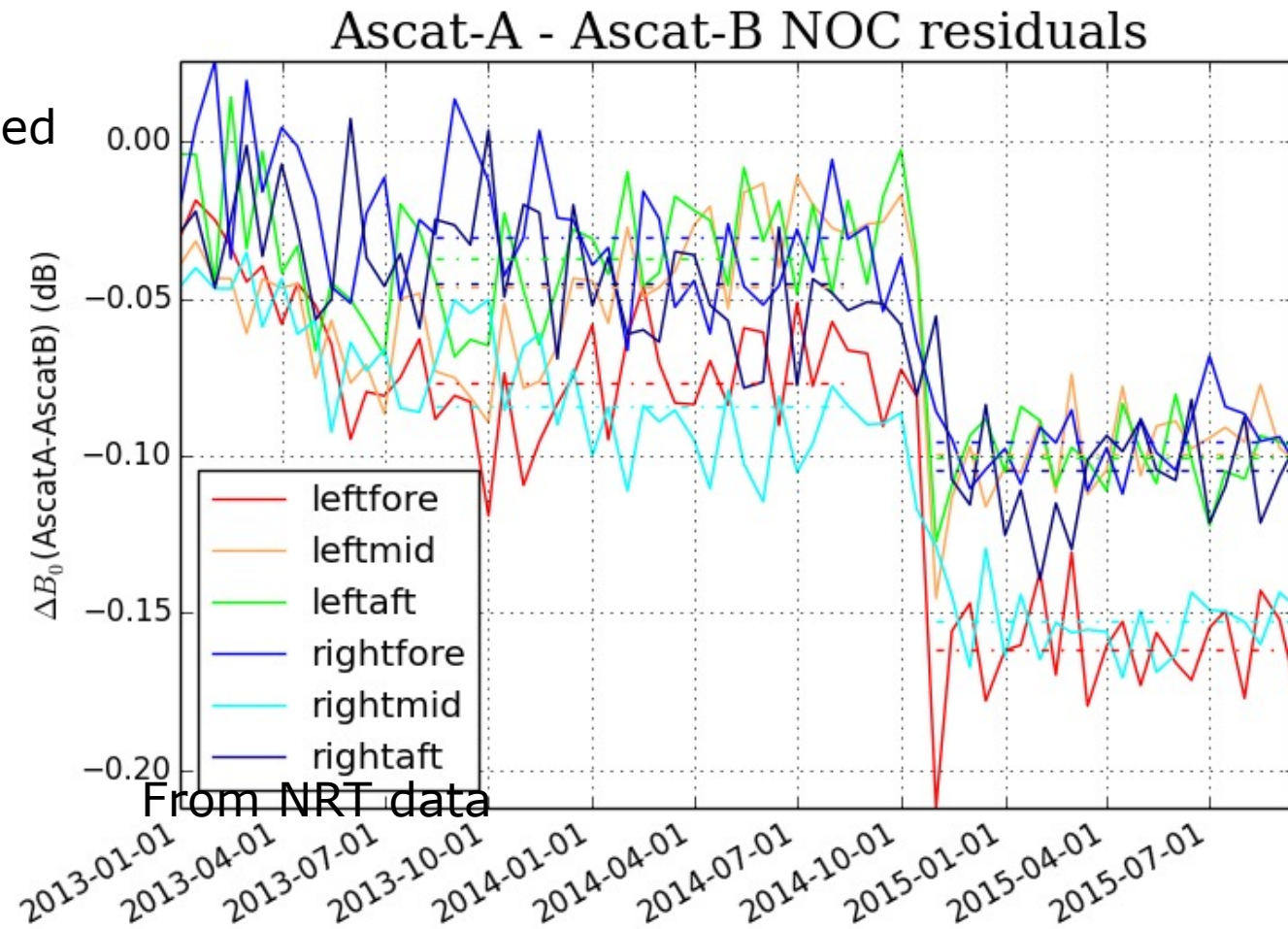
from NRT data



from reprocessed data

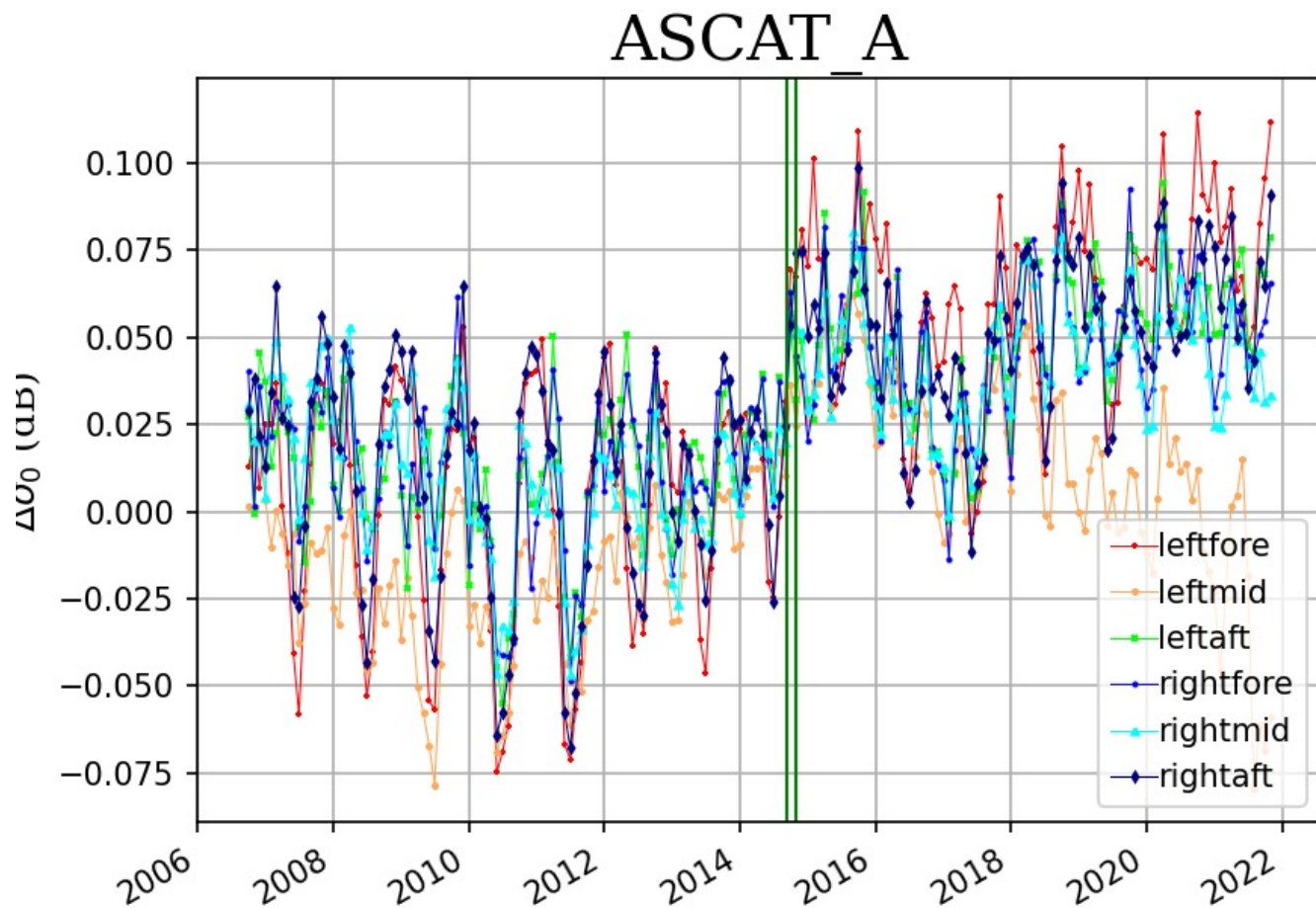
# Anomaly 29 October 2014

- A small jump in backscatter
- Will have effect on the wind speed bias
- Need to be accounted for





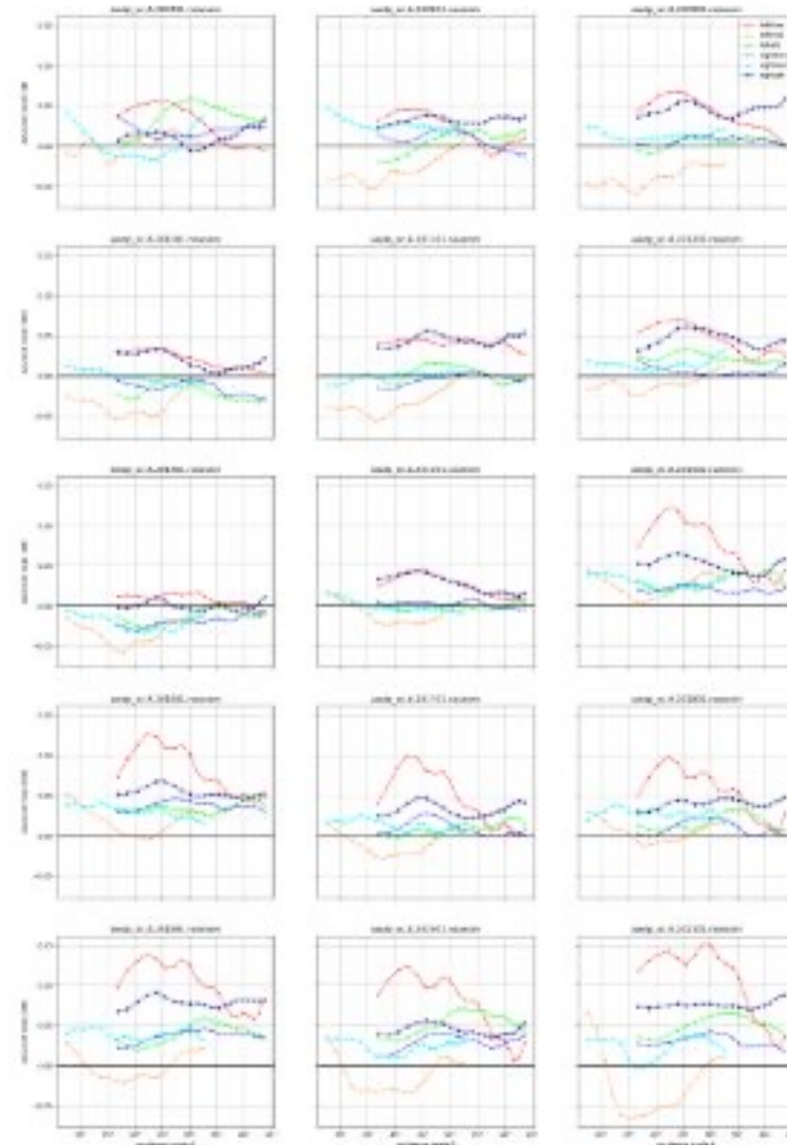
# NOC residual time series



ASCAT-A reprocessed data



# NOC residuals

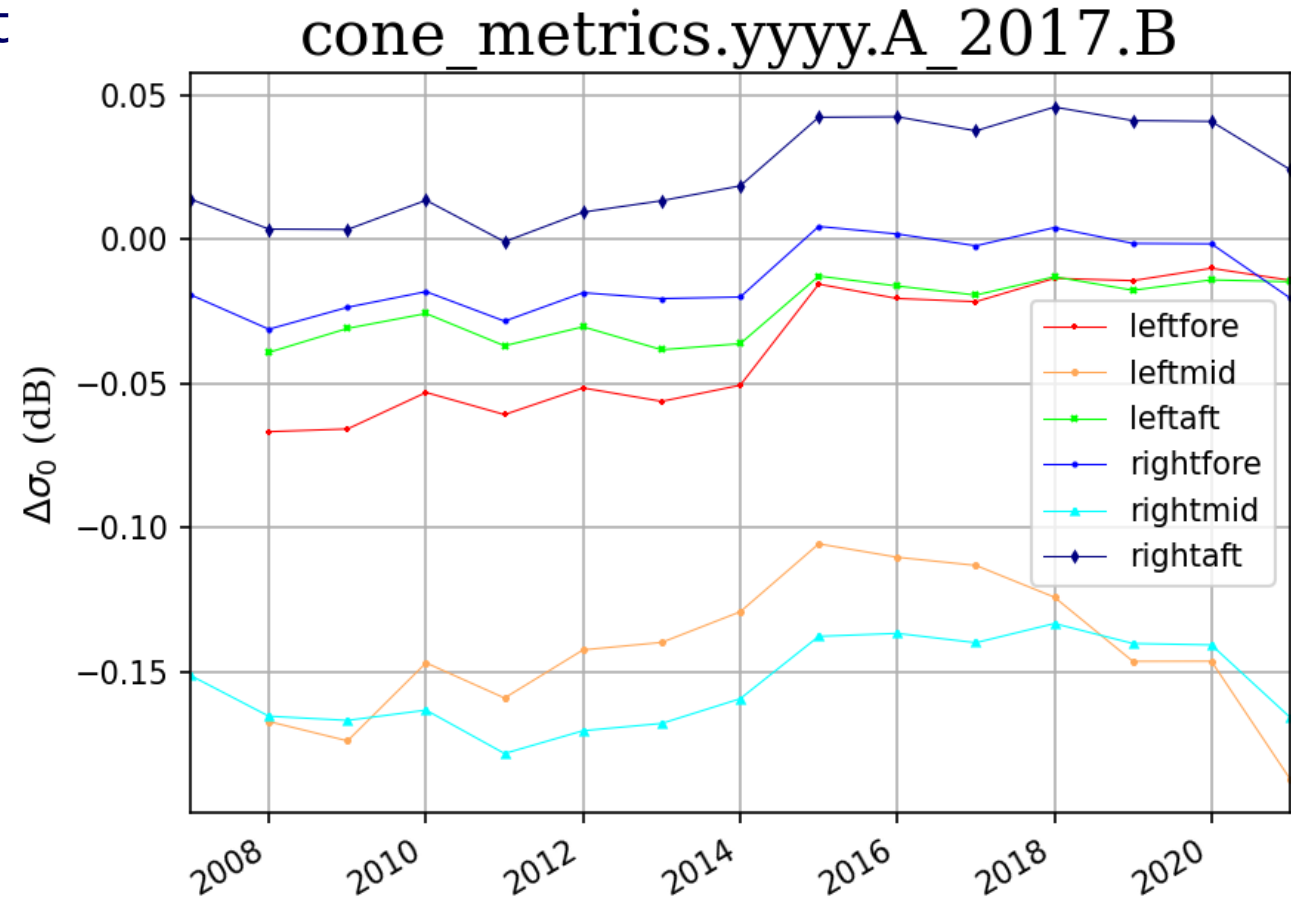


January of each year



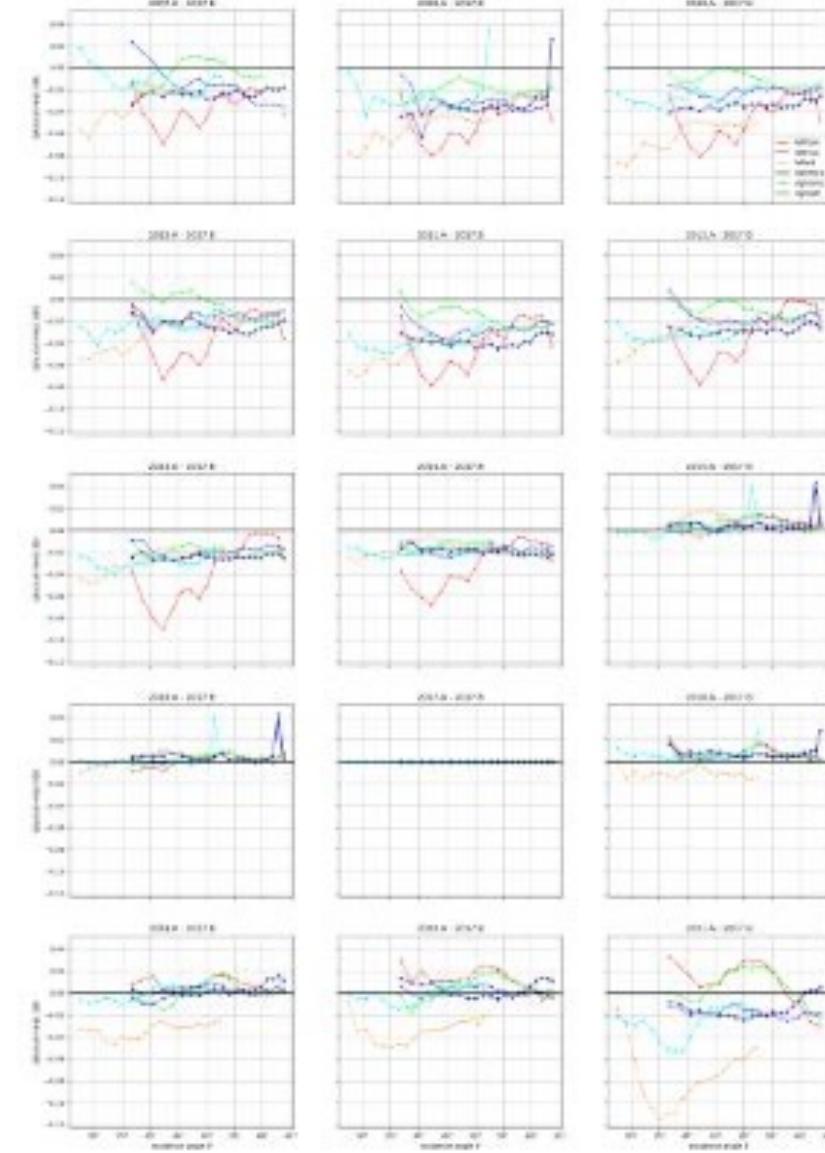
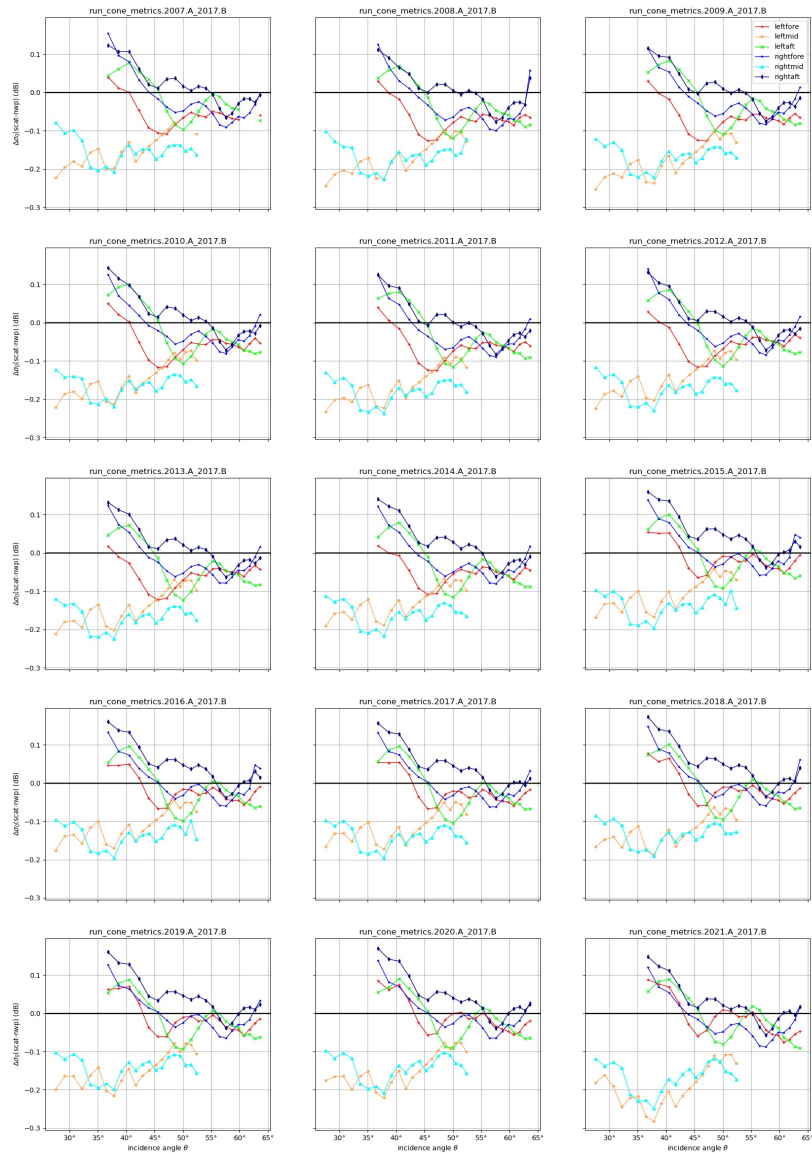
# Cone Metrics residuals

- ASCAT-A for each year against ASCAT-B 2017 as reference





# CM ASCAT-A $\leftrightarrow$ ASCAT-B



CM ASCAT-A  $\leftrightarrow$  ASCAT-B 2017

CM relative to CM from 2017



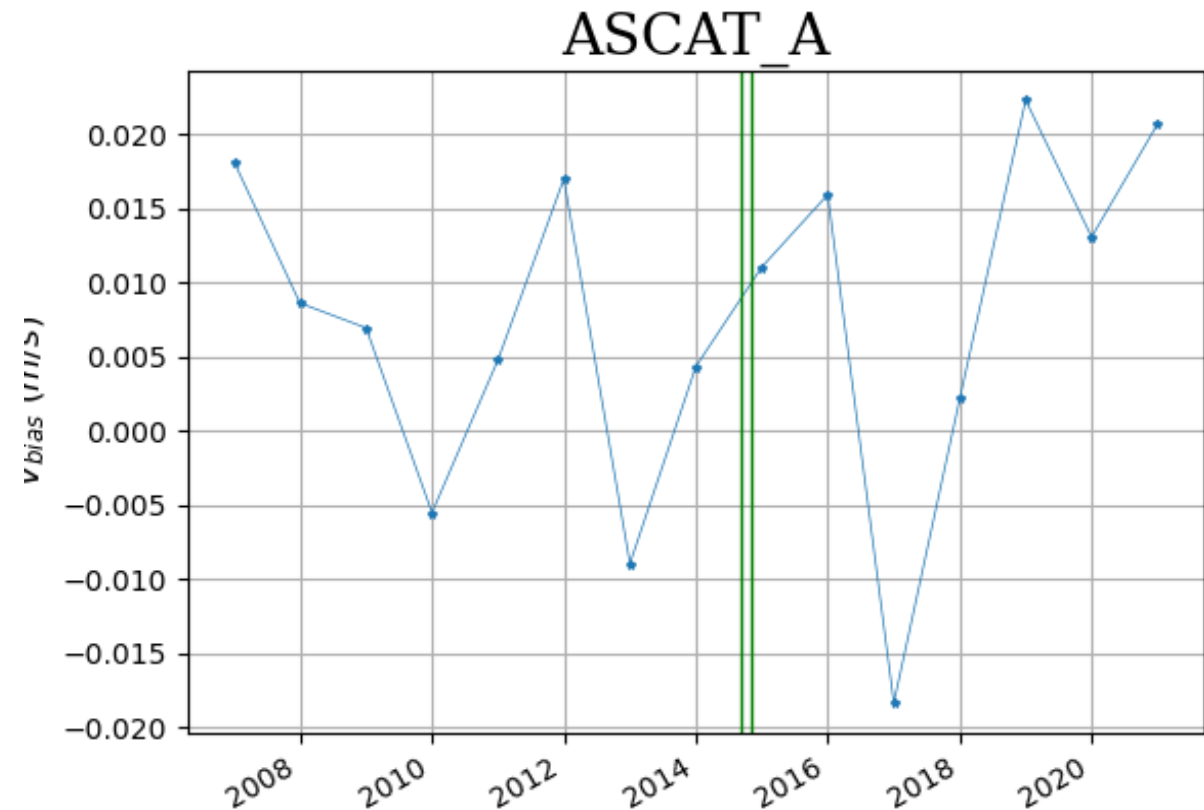
# TOC

- Total Ocean Calibration is a combination of NOC and CM
- A NOC correction table is calculated
- A CM is performed for each year. The CM corrections are taken relative to the CM corrections from ASCAT-A 2017 against ASCAT-B 2017
- The sum of both NOC and CM corrections are applied (TOC)



# ASCAT-A wind speed bias

- Wind speed bias for ASCAT-A against ERA5, January of each year
- Very stable over time
- But seasonal effects are not included here
- The vertical green lines indicate the anomalies
- Wind speed bias before and after the anomalies is comparable





# Conclusions

- The ASCAT-A wind product will be reprocessed over the entire life span
- With the EUMETSAT reprocessed level1b backscatter data
- The known anomalies will be taken into account in the reprocessing
- Wind speed bias show a stable pattern over time
- TOC as a combination of NOC and CM will be used in the reprocessing