



Koninklijk Nederlands  
Meteorologisch Instituut  
Ministerie van Verkeer en Waterstaat



# ERS1 Calibration and Re-processing

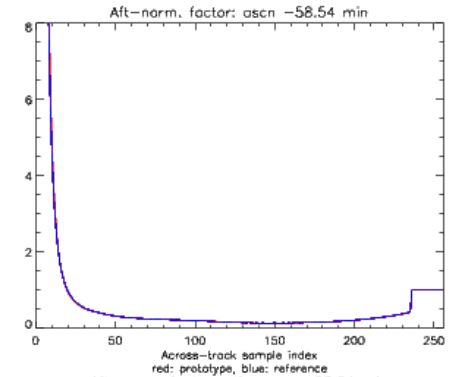
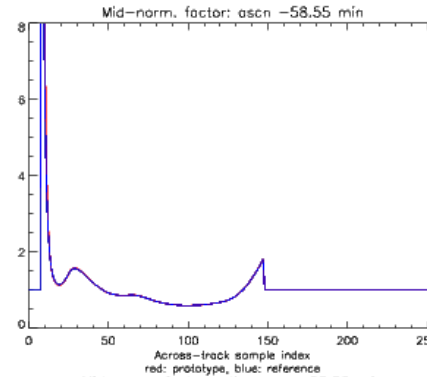
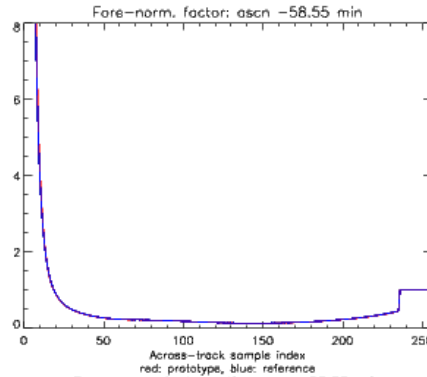
Presented by  
**Xavier Neyt/RMA**



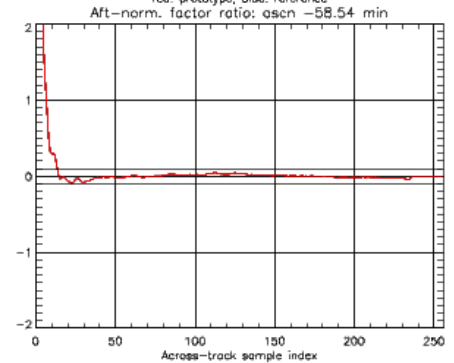
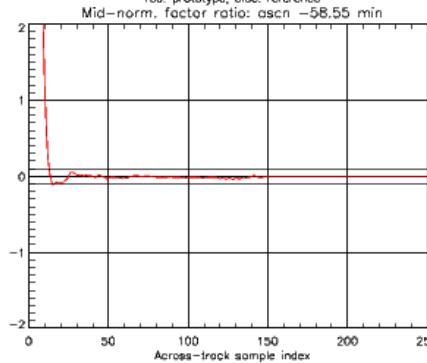
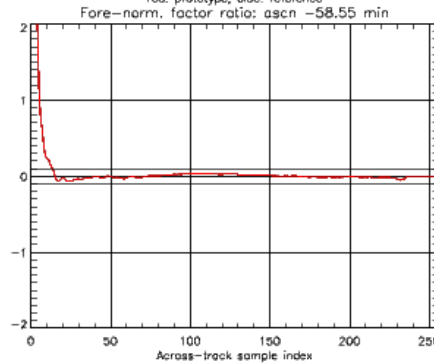
**scirocco**  
scatterometer instrument  
competence centre

# Sanity check of processor for ERS-1: Normalization factors validation

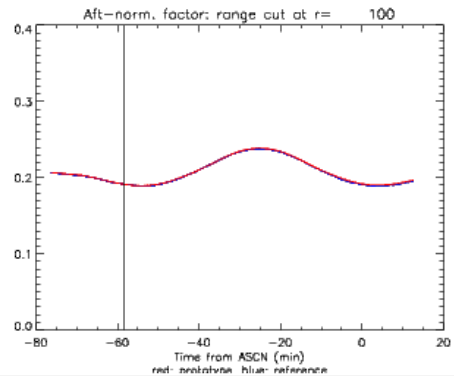
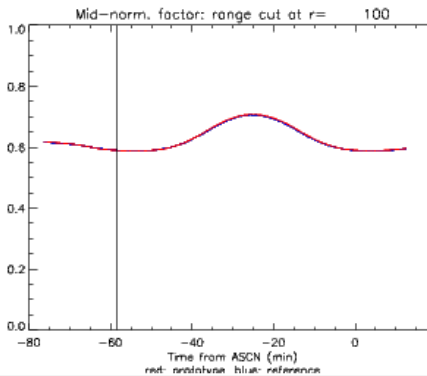
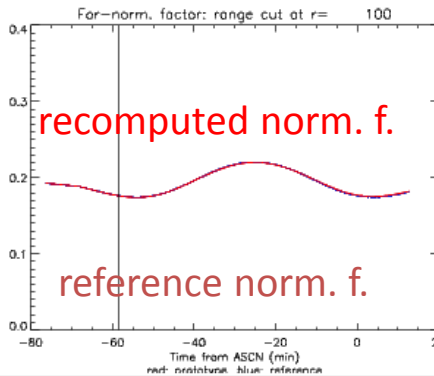
Normalization factors across-track



Difference across-track



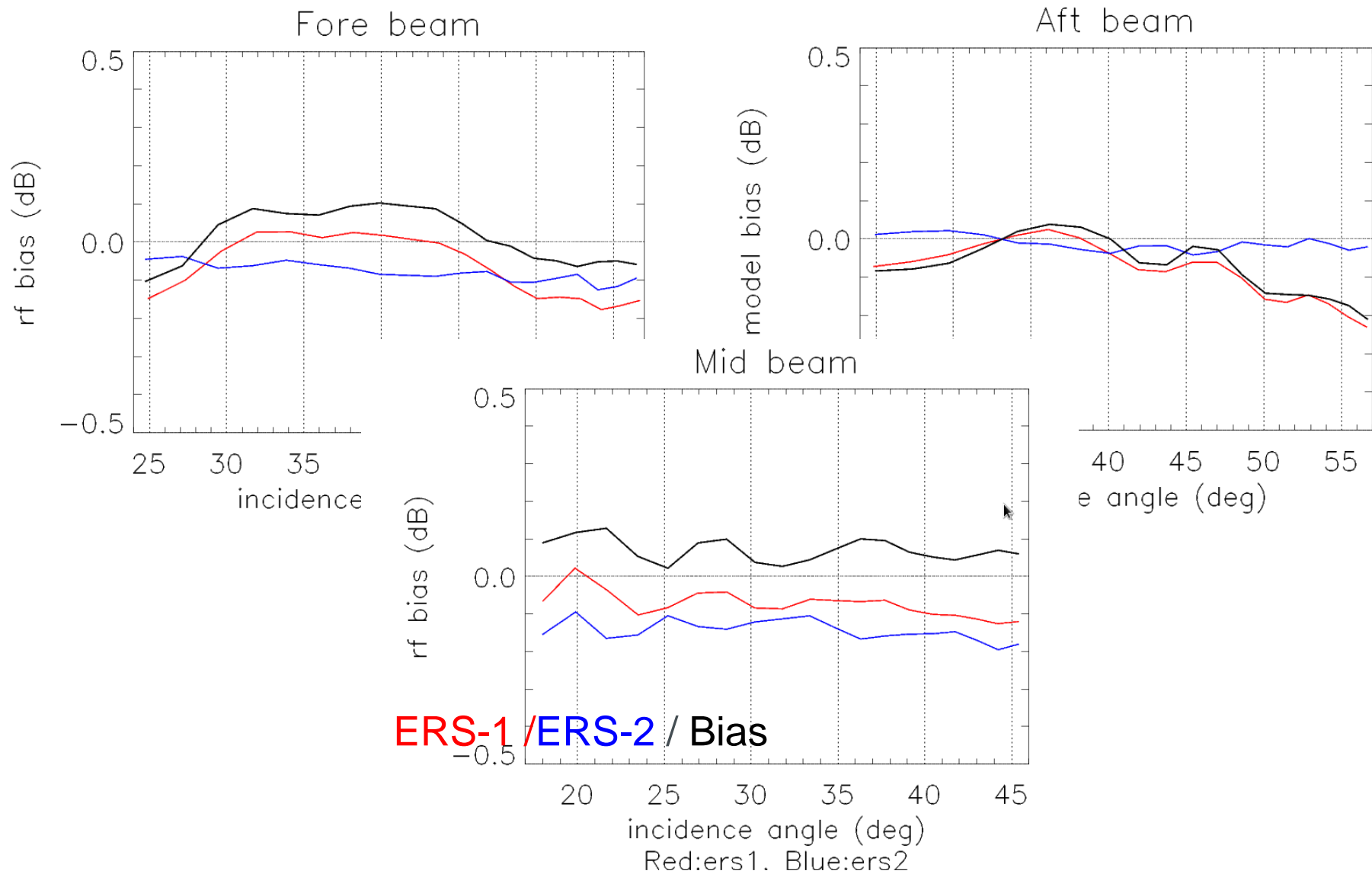
Difference along-track



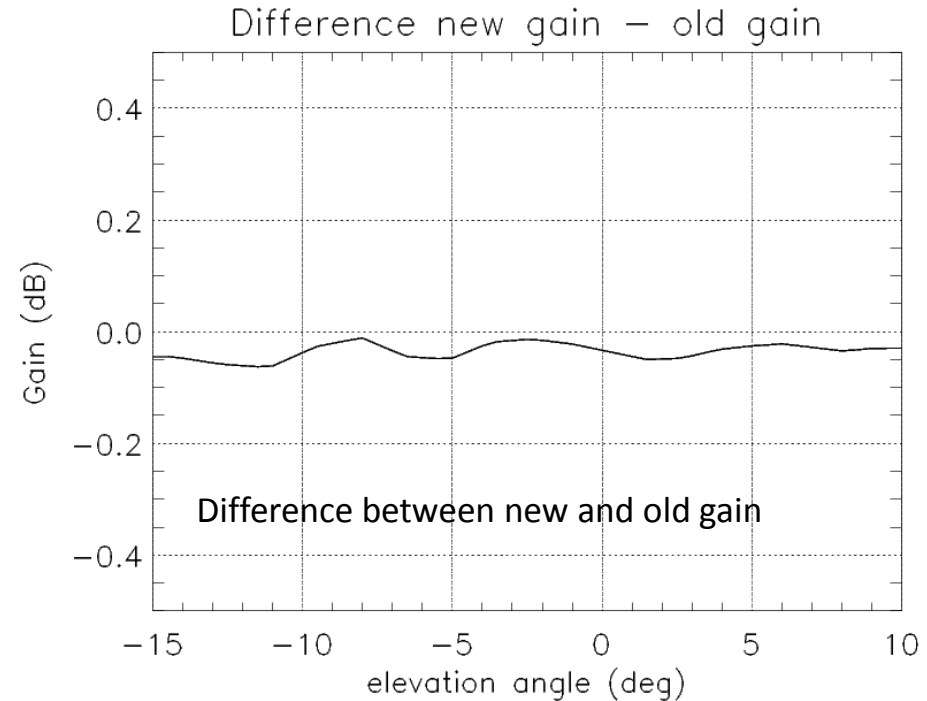
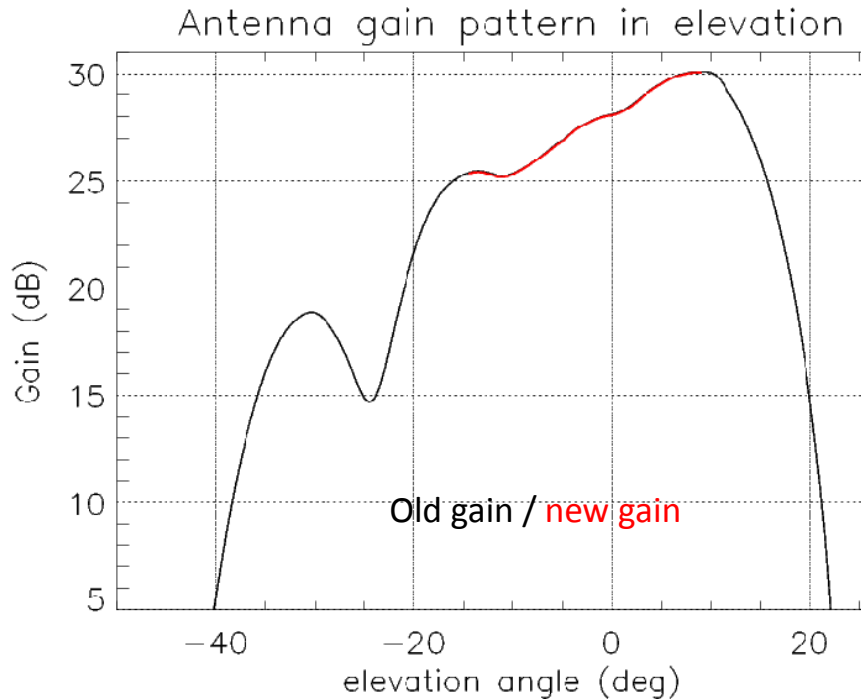
# ERS-1 UWI (CCSDS) / ERS-2 ASPS

- Comparison of
  - ERS-1 UWI (CCSDS) (Cycle 155)
  - ERS-2 ASPS (Cycle 10)
  - Over the rainforest
  - At the same time (tandem mission)
- Difference is deemed due to difference in antenna pattern
  - Will match ERS-1 ASPS to ERS-2 ASPS

# ERS-1 UWI (CCSDS) / ERS-2 ASPS



# ERS-1 UWI (CCSDS) / ERS-2 ASPS



- New antenna gain is synthesized from the bias
  - Interpolation is used

# Estimation of the external rescale factor

What is the external rescale factor?

- Radar equation

$$\sigma_0 = (P_r - P_n) \frac{R^3 L_{atm} \sin \theta}{G^2(\theta)} \frac{k}{C}$$

$$G(\theta) = A(\theta) g$$

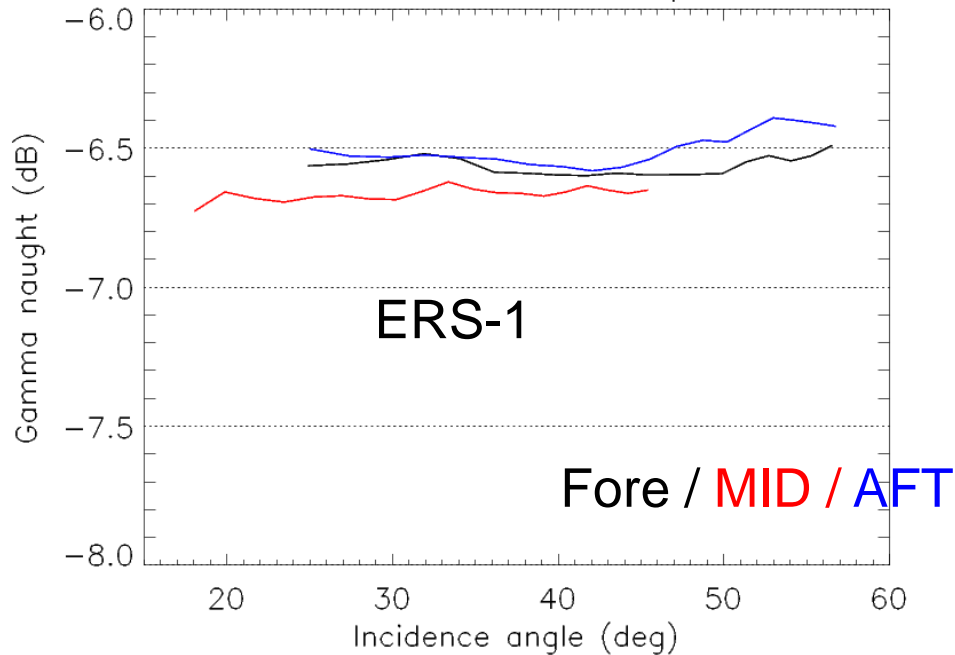
- $k$  = external rescale factor
- $C$  = internal calibration factor
- $g$  = absolute antenna gain (in reference direction – ABAGR D)
  - $k$  and  $g$  have a similar role
    - Separation will be arbitrary (based on  $\sigma_0$  measurements)

# Estimation of the external rescale factor

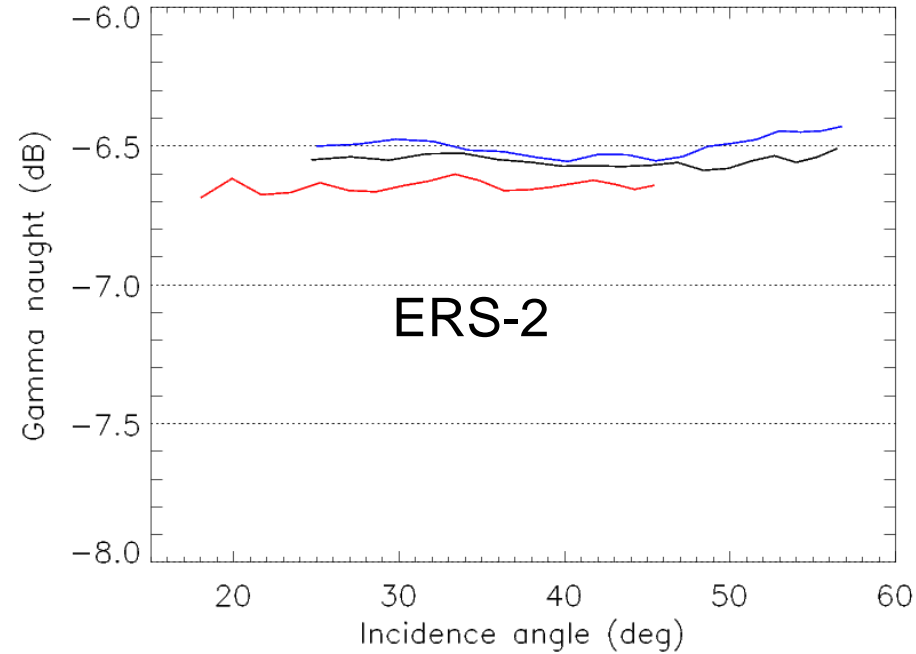
- An antenna pattern is only valid if the external rescale factor used is known
  - Was not the case for ERS-1
- Solution:
  - Use gPOD-reprocessed data (with wrong external rescale factor) to estimate the rescale factor
- Re-reprocess the data
  - This reprocessed data is denoted “ERS-2 ASPS”

# Validation: ERS-1 ASPS / ERS-2 ASPS

ERS-1 – Asc & Desc passes



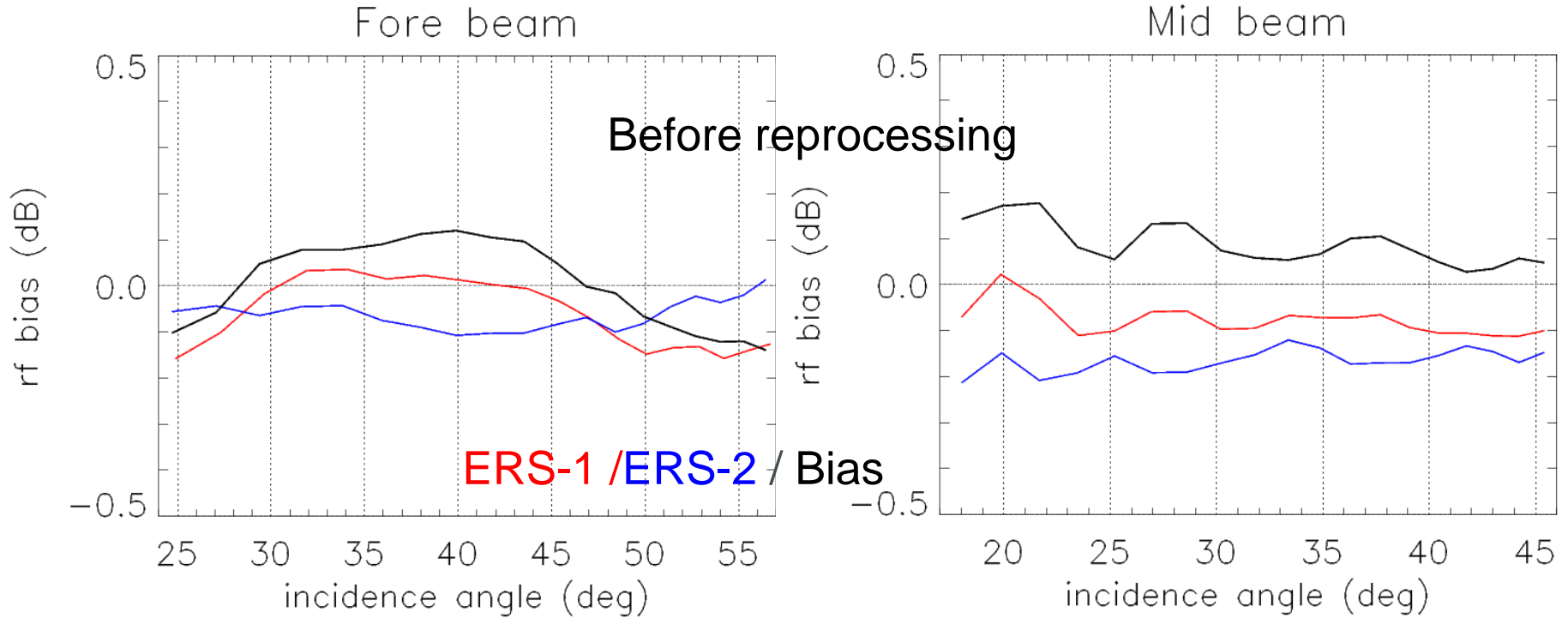
ERS-2 – Asc & Desc passes



- Very similar (flat) pattern
- Inter-beam bias between mid and side

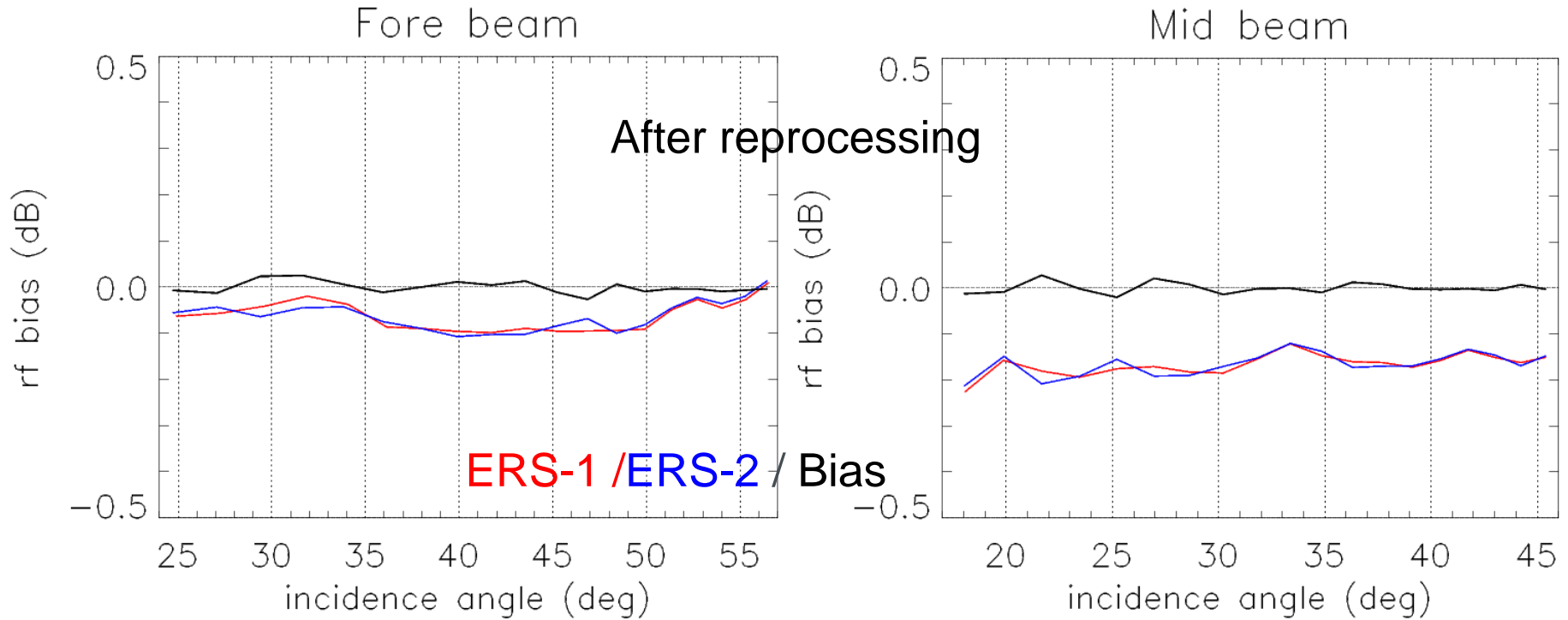


# Validation: ERS-1 (UWI/CCSDS) / ERS-2 ASPS



- Side beam: Incidence-angle-dependent bias (up to 0.2 dB)
- Mid beam: shift + Incidence-angle-dependent bias (up to 0.2 dB)

# Validation: ERS-1 ASPS / ERS-2 ASPS



- Negligible bias (within 0.03 dB)

# Summary

- Estimation of ERS-1/ERS-2 bias from the rainforest data
- Based on the derived bias
  - Correction of the constant gain difference
  - Correction of ERS-1 antenna gain pattern
- Reprocessed ERS-1 EWIC (cycle 155)
  - Gamma pattern consistent with ERS-2
    - Bias is negligible
  - ERS-1 cycle 155 corresponds to ERS-2 cycle 10 which contains only 253 orbits (~half cycle)
    - ERS-1 EWIC cycle 156 is desirable
  - **Can be delivered today! (including the “calibration coefficients”)**

# Future work

- Same procedure with ERS-1 cycle 155-156 and ERS-2 cycles 10-11
  - i.e., all available data in tandem phase
- Deliver ERS-1 ASPS data to partners for geophysical validation
  - Reprocessed ERS-1 cycle 155 (in UWI and ASPS format) is ready to be delivered
  - ERS-1 cycle 156 is desirable to validate the calibration
- Calibration of ERS-1 and ERS-2 to CMOD6 (ASCAT)
  - Match ERS-1/ERS-2 to ASCAT