



CFOSAT NWP Ocean Calibration

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Outline

- NWP Ocean Calibration (NOC)
- NOC results
- Wind retrieval results comparison
- Summary and outlook

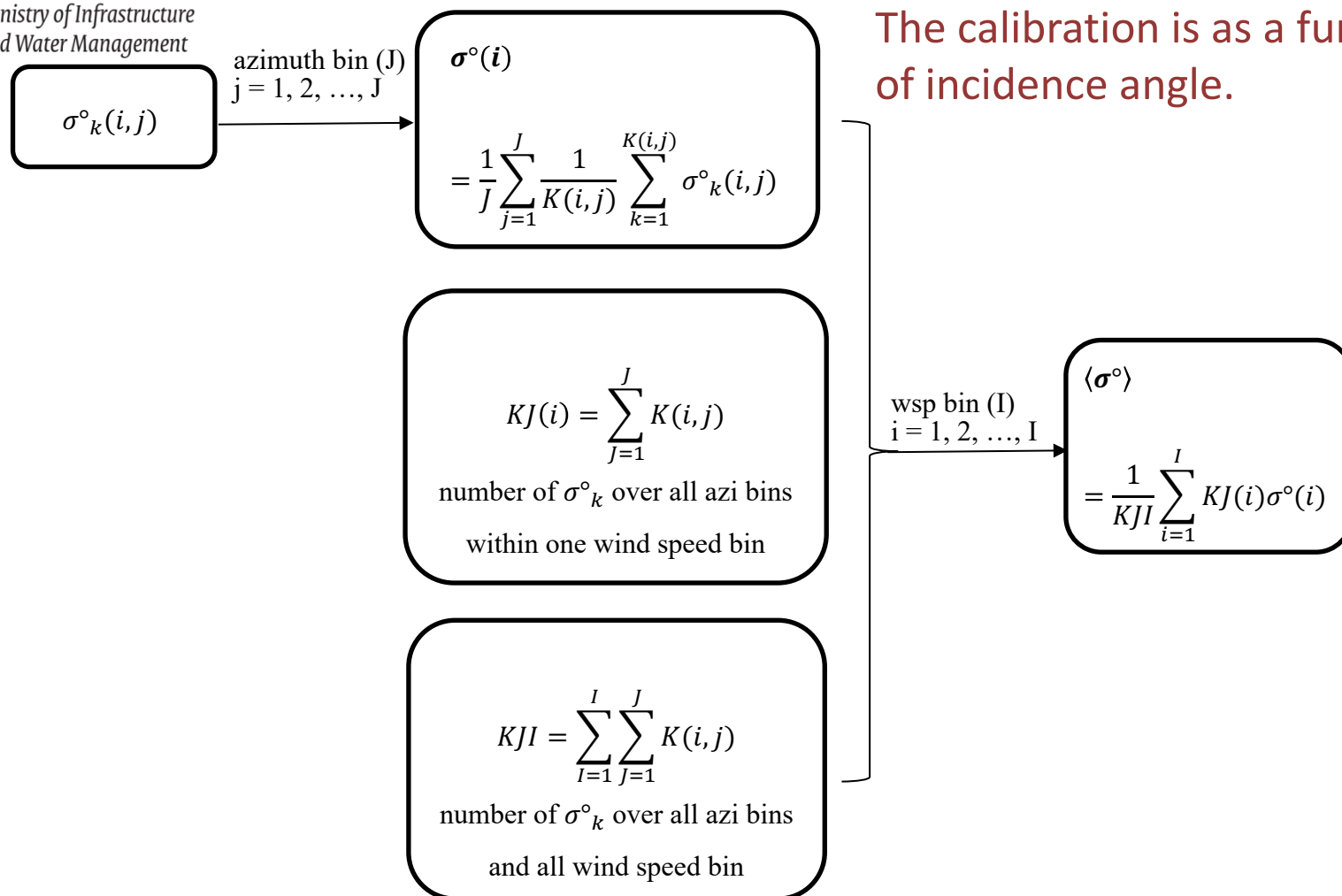


NWP Ocean Calibration

Backscatter σ^0 above sea is dependent on wind speed and wind direction for a given WVC.

NWP winds are transformed into backscatter values with the geophysical model function:
$$\text{NSCAT4DS}(V_{\text{NWP}}, \phi_{\text{NWP}}) \Rightarrow \sigma^0_{\text{NWP}}$$

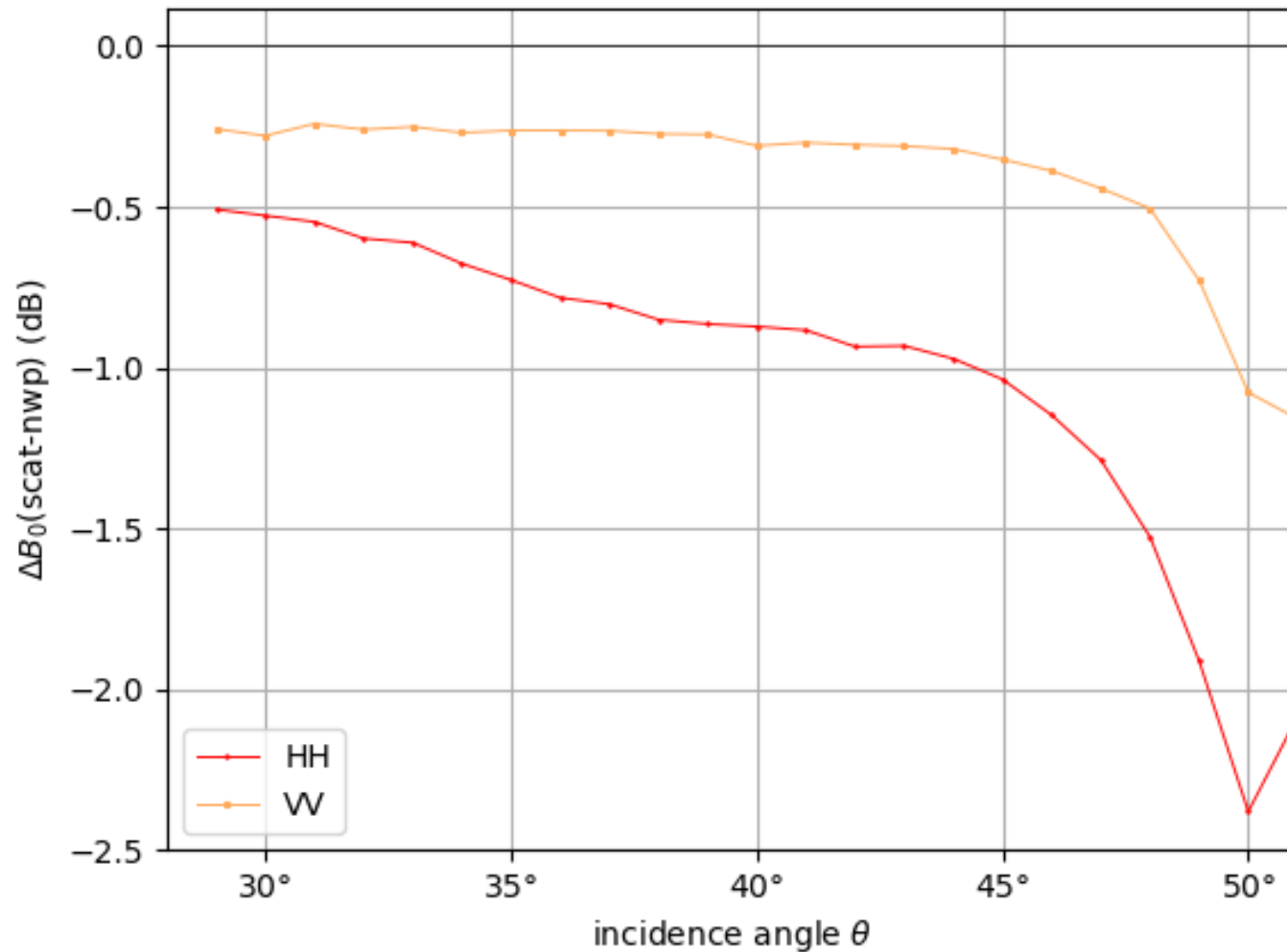
The residuals are used as backscatter corrections to improve the wind retrieval.



individual σ° → mean σ° over a uniform wind direction distribution



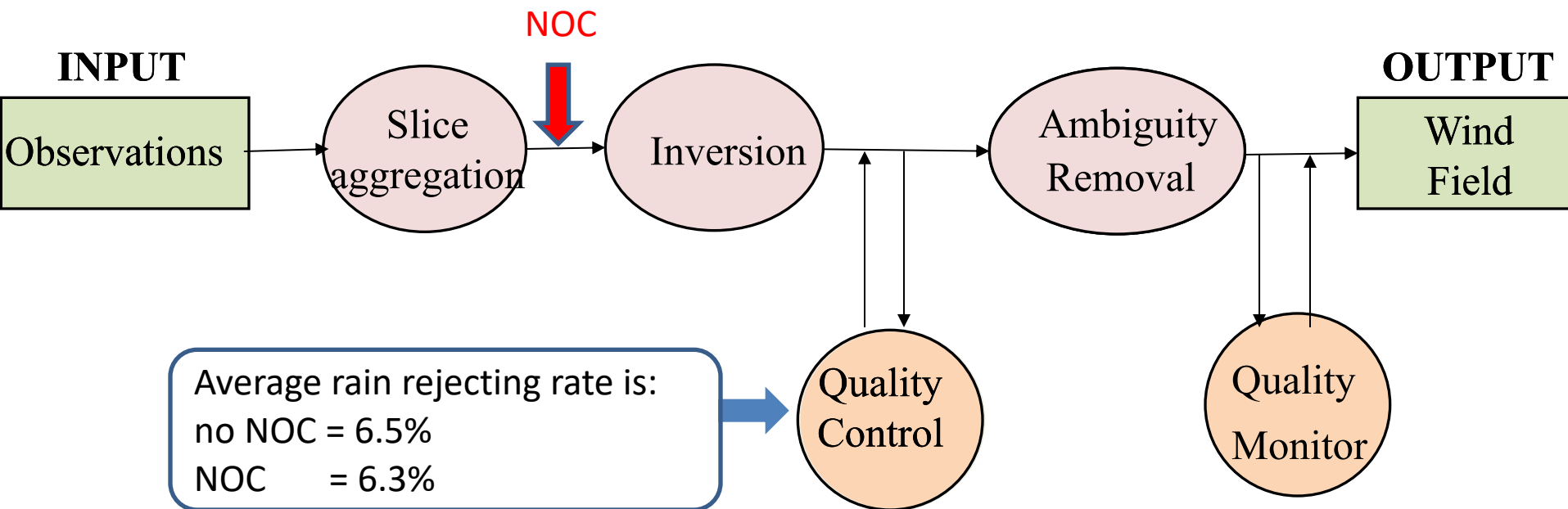
NWP Ocean Calibration result



Incidence angle:
[28, 51]



Wind retrieval work flow



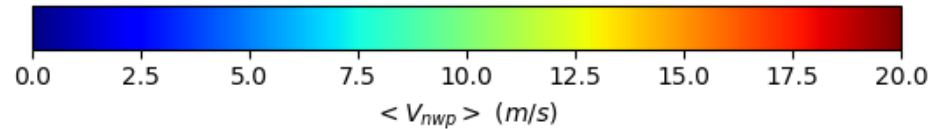
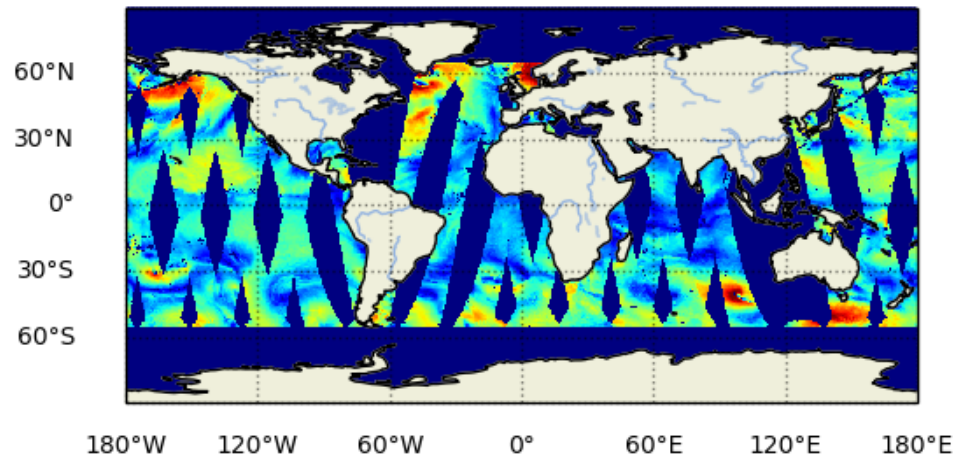


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wind speed

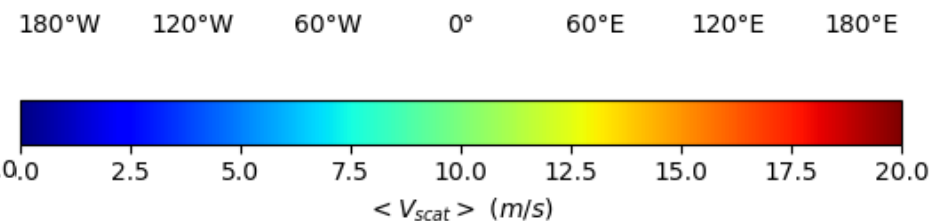
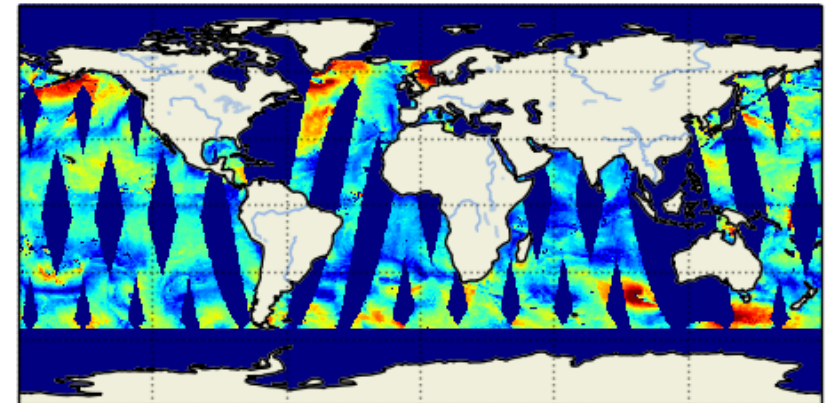
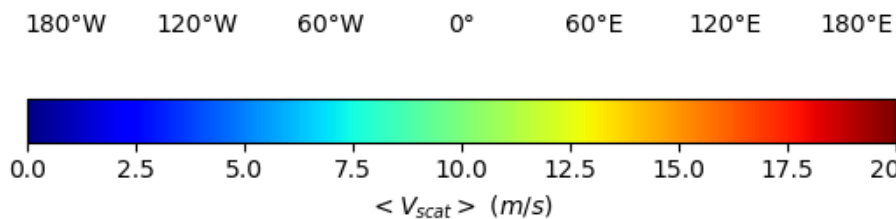
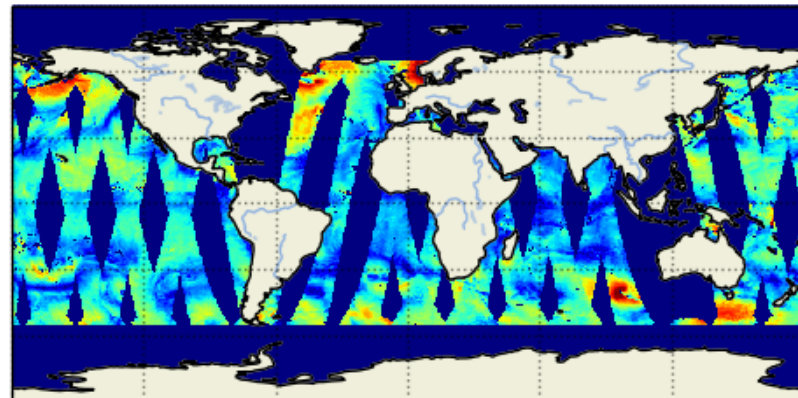
▷ Satellite Observations

NWP wind



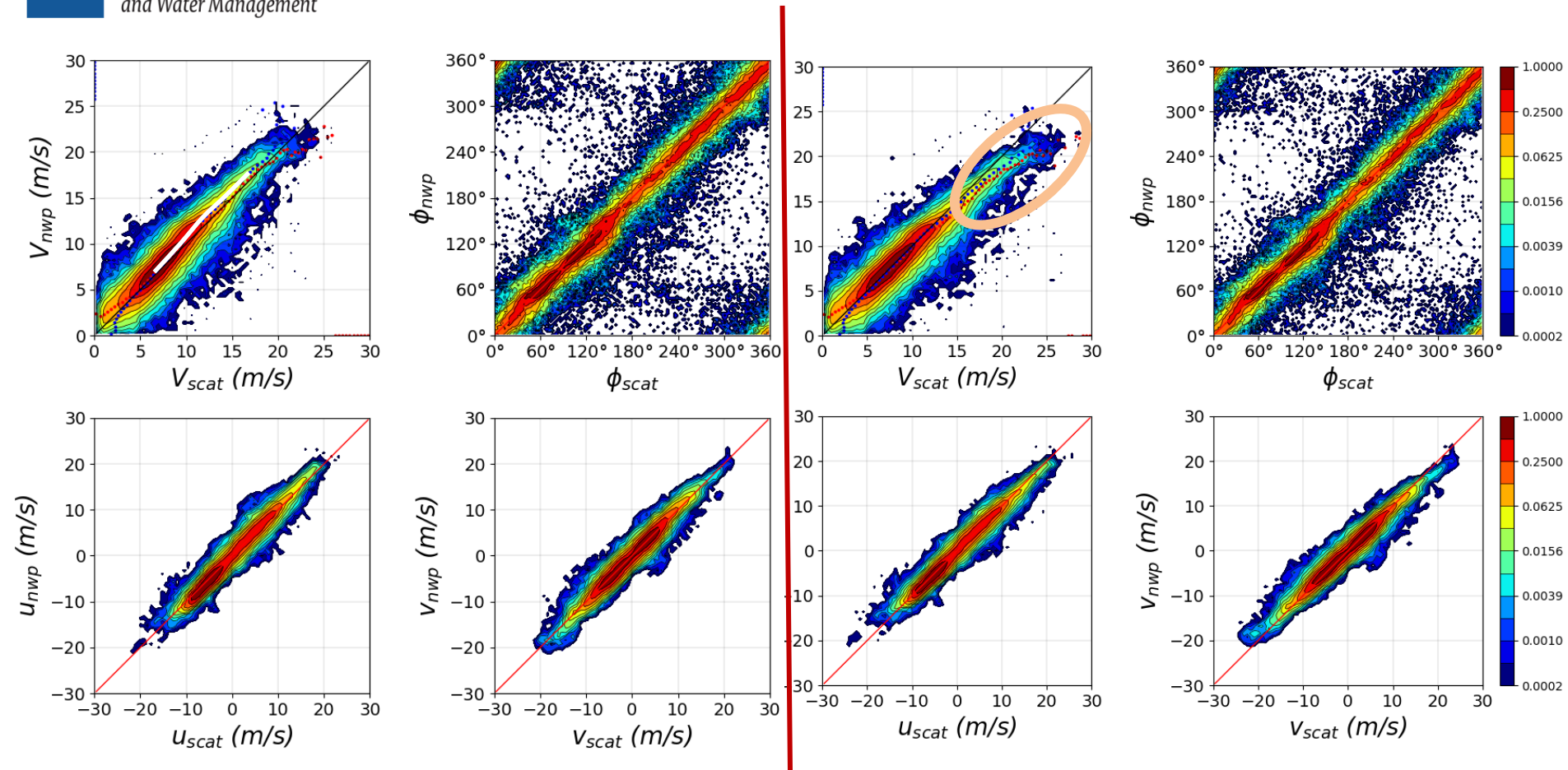
no NOC

with NOC





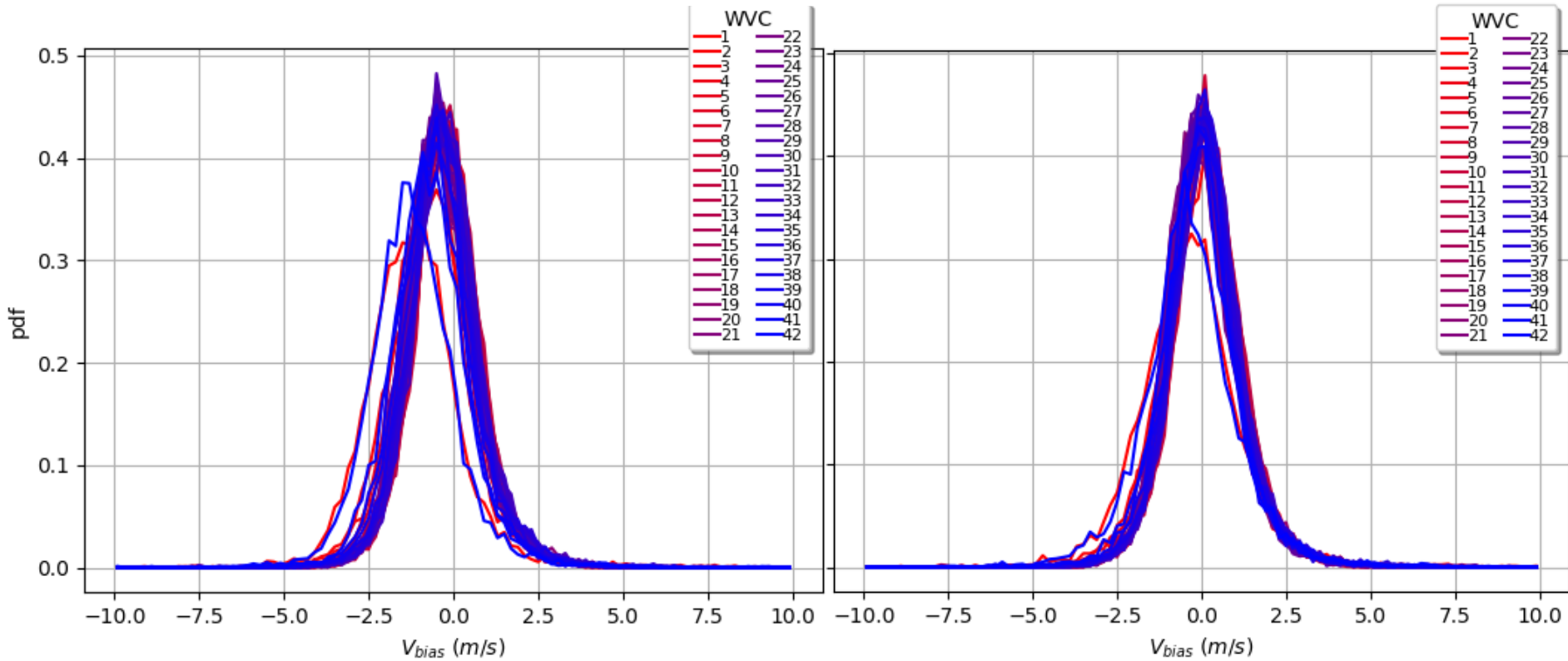
Wind retrieval results comparison



no NOC

with NOC

All WVCs

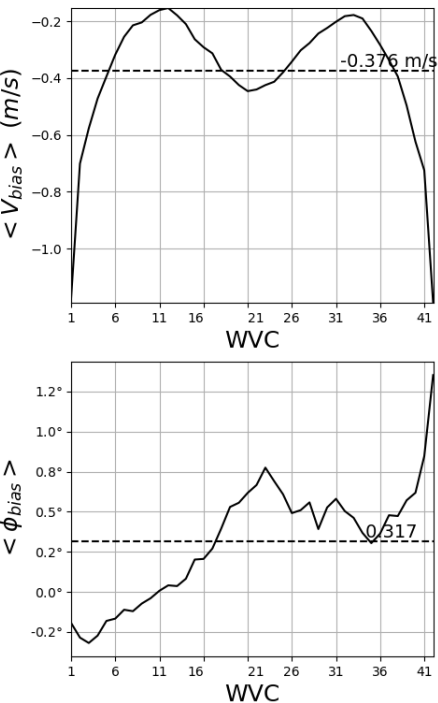


no NOC

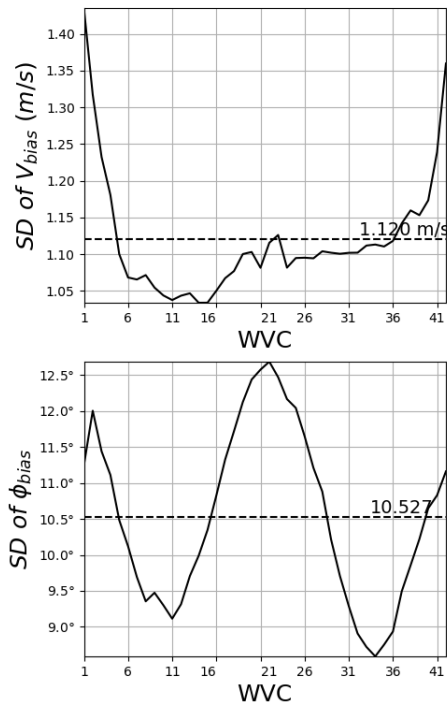
with NOC



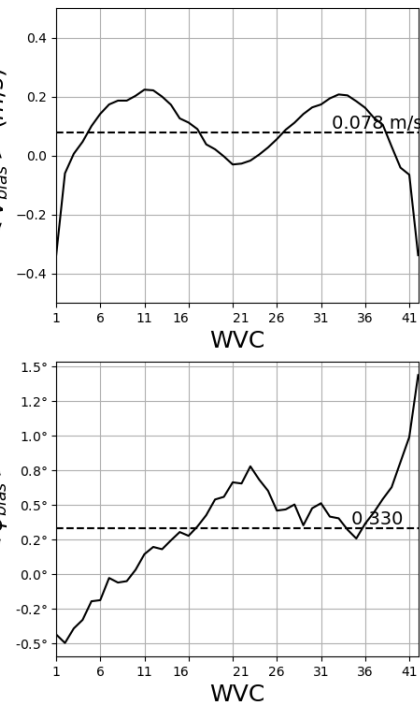
- Wind speed bias is reduced substantially (from **-0.376** to **0.078**), but not the SD.



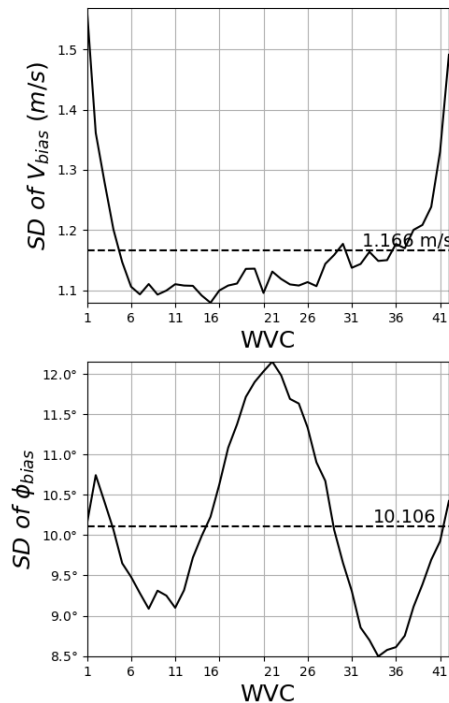
no NOC



$\langle V_{bias} \rangle$ (m/s)



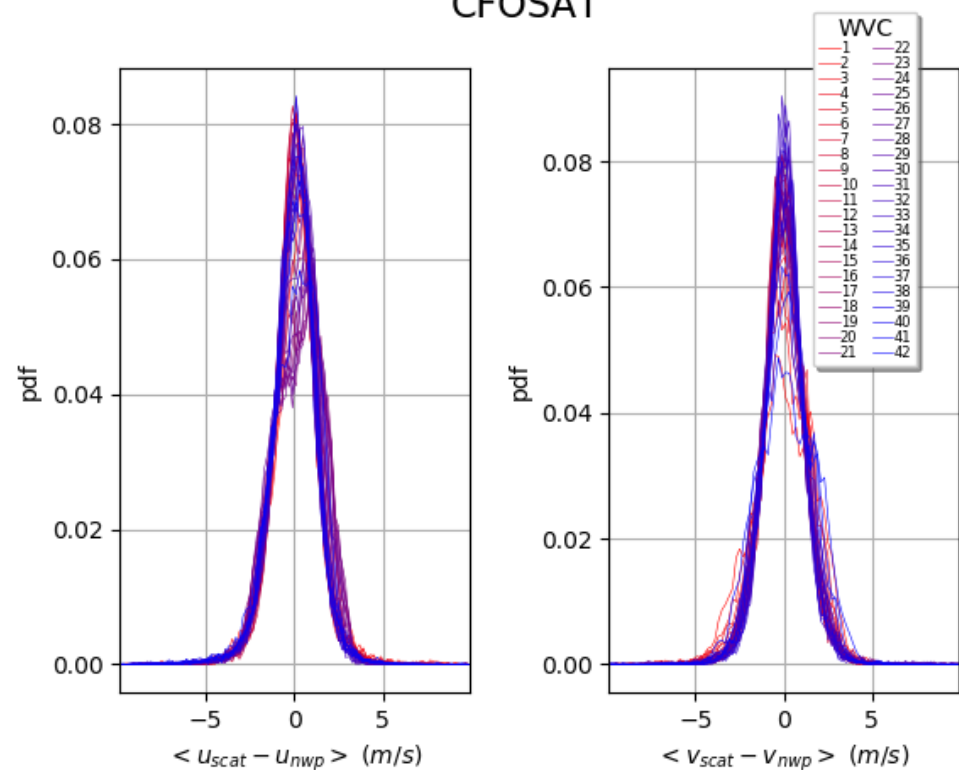
with NOC



- Wind direction bias is insignificant, SD is reduced. Nadir swath has the largest SD.

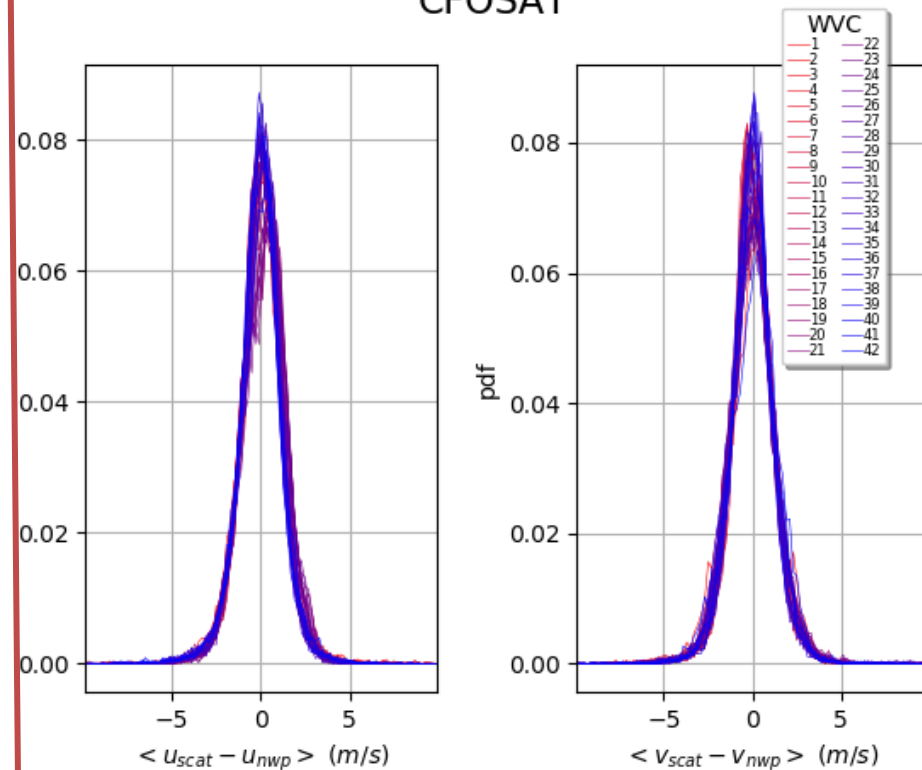


CFOSAT



no NOC

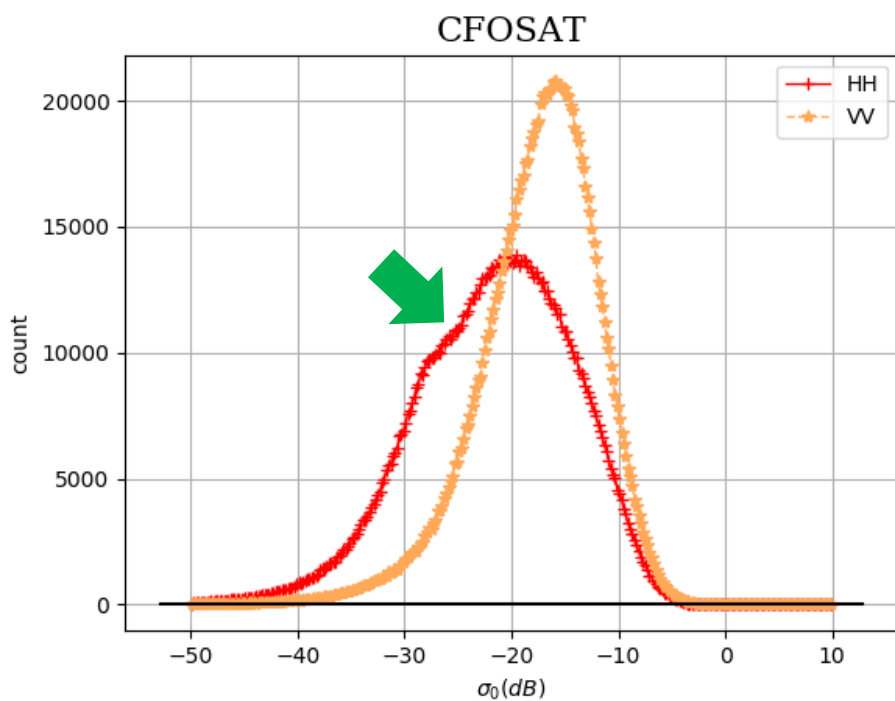
CFOSAT



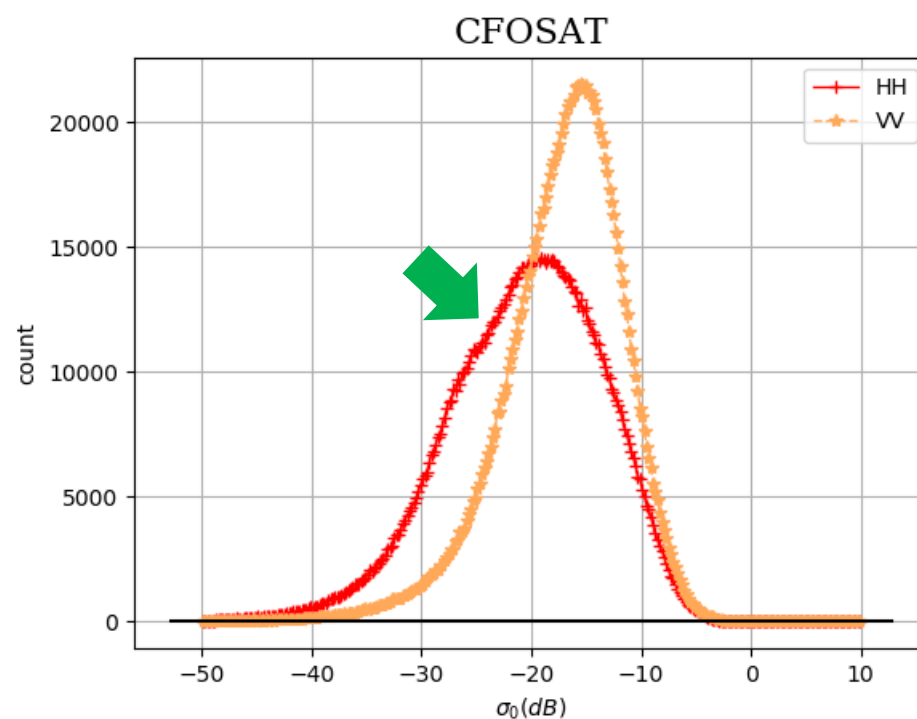
with NOC



Sigma0 PDF



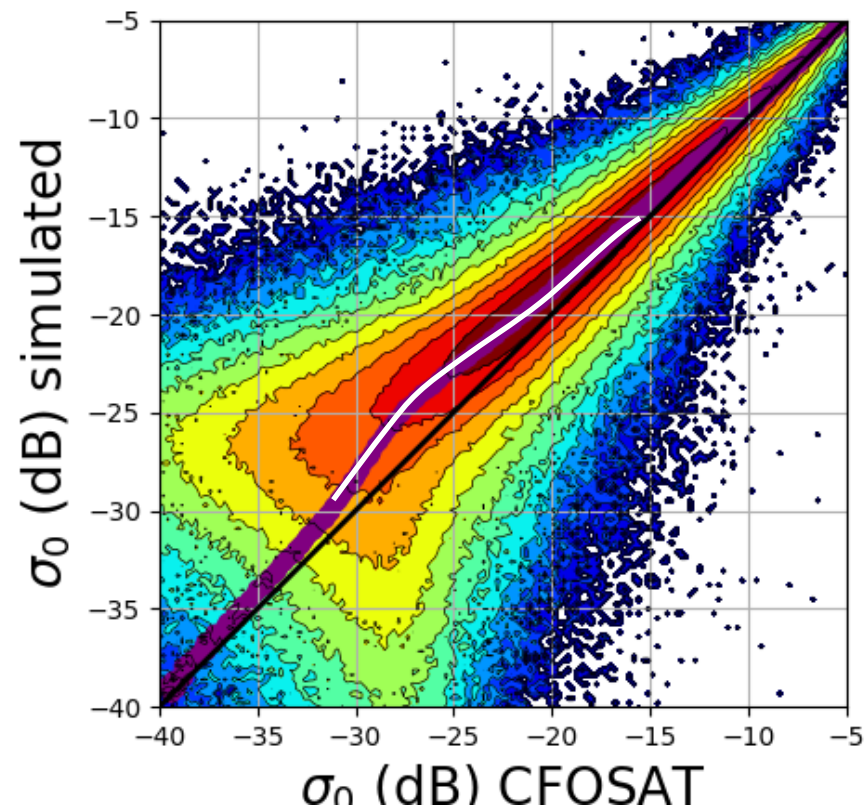
no NOC



with NOC

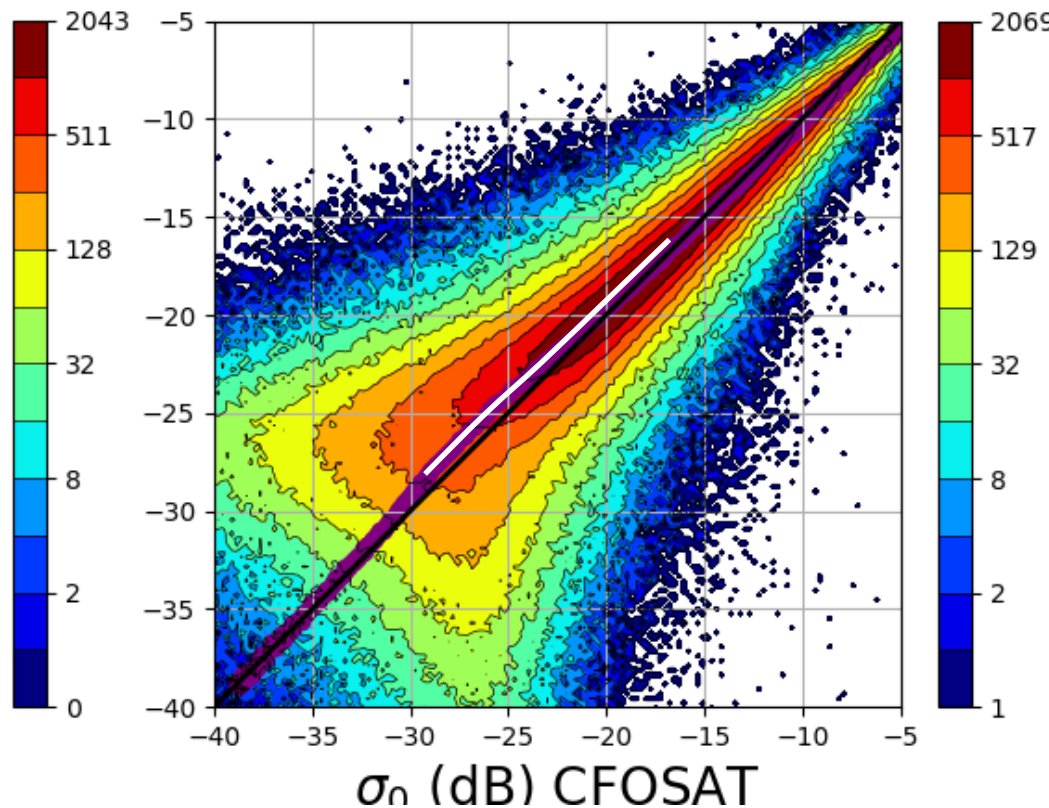


sigma0 (CFOSAT-simulated) HH



no NOC

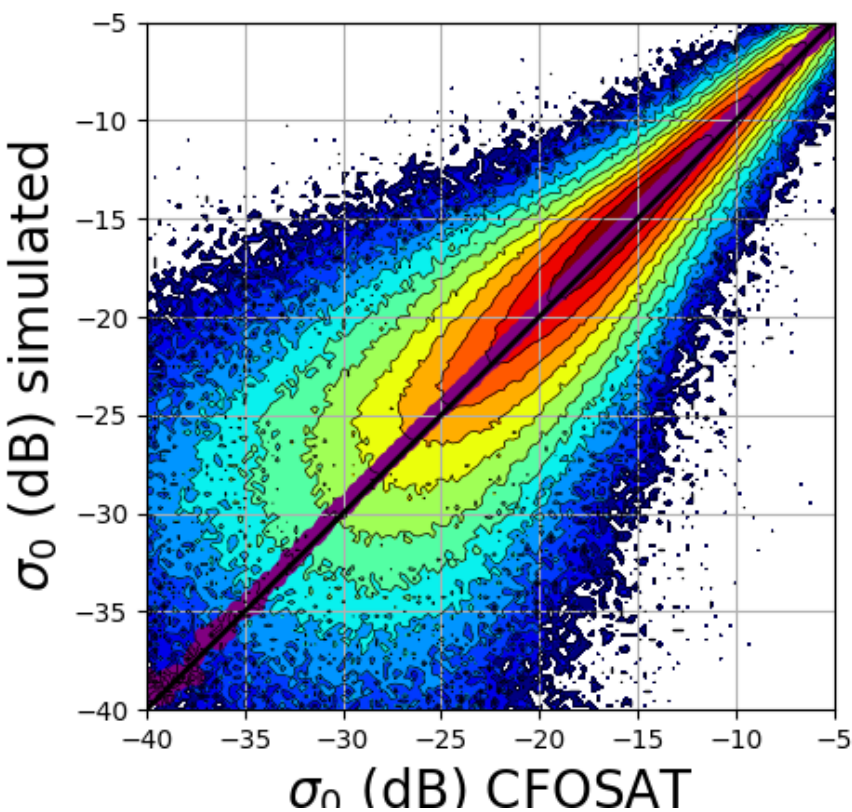
sigma0 (CFOSAT-simulated) HH



with NOC

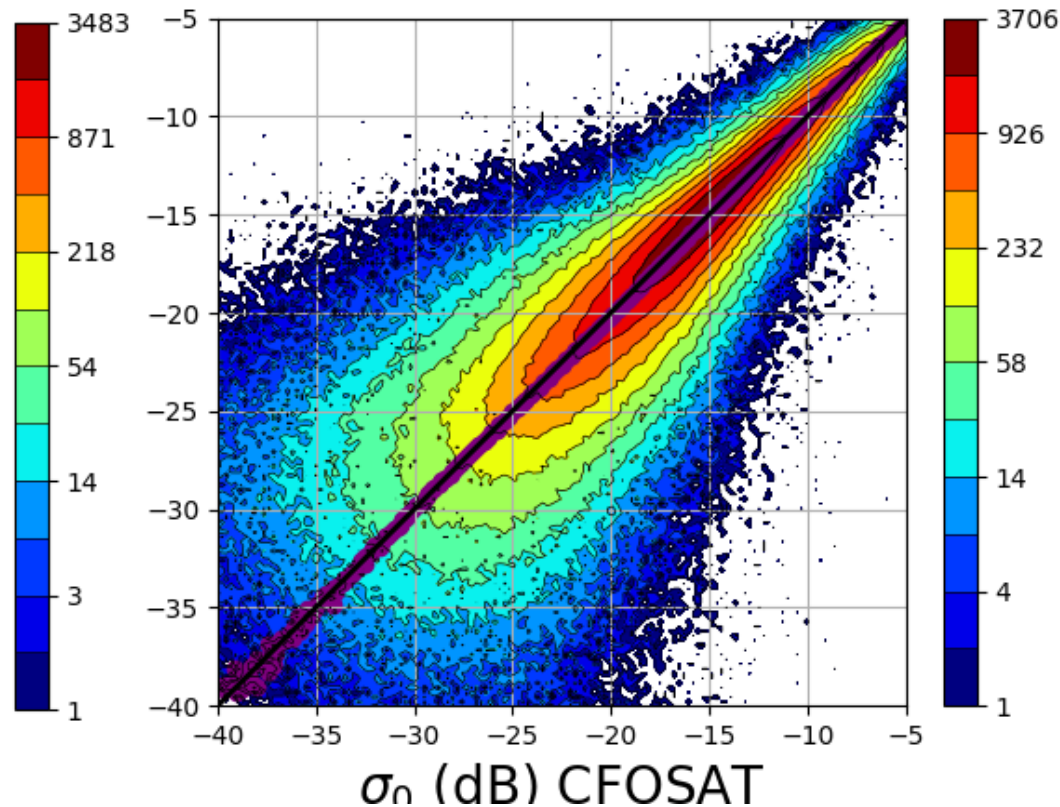


sigma0 (CFOSAT-simulated) VV



no NOC

sigma0 (CFOSAT-simulated) VV

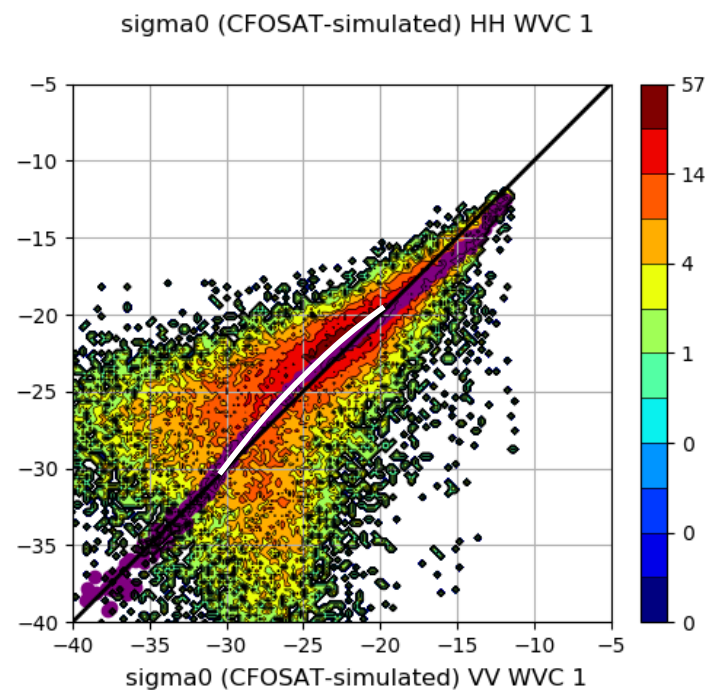
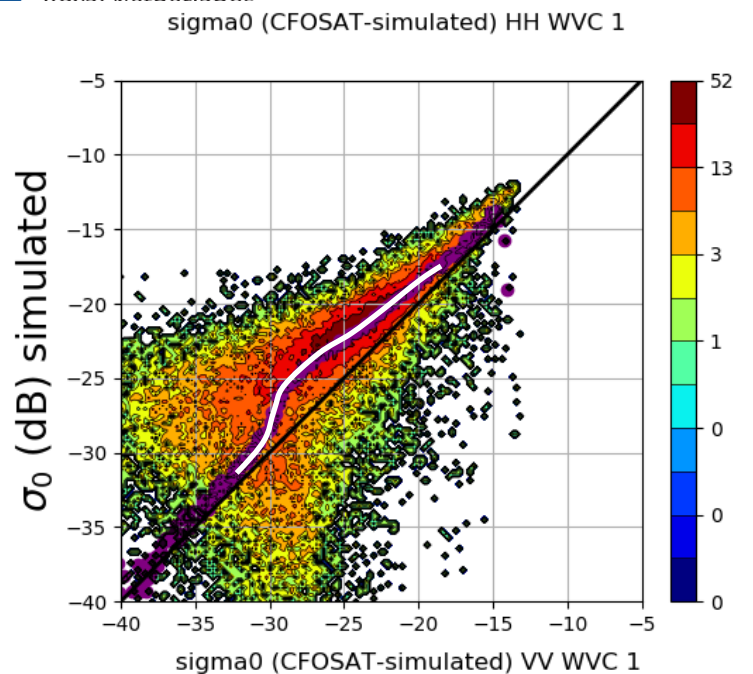


with NOC

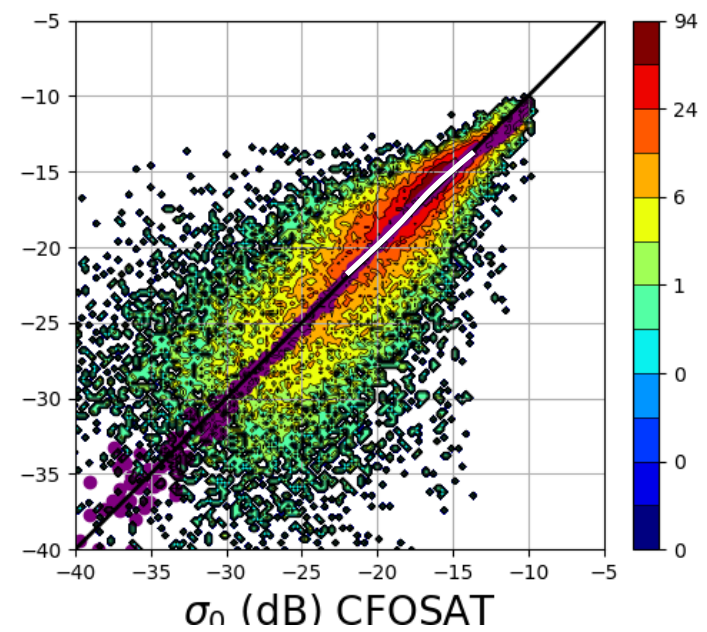
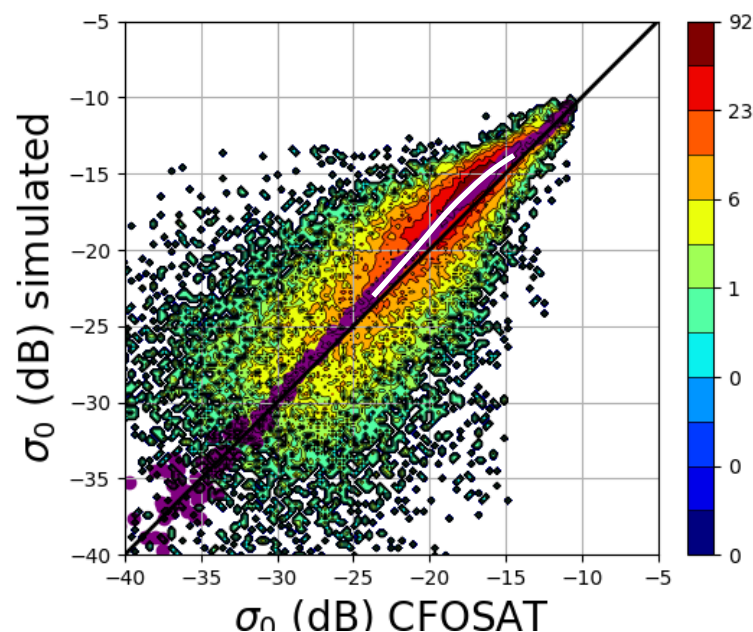
no NOC

Outer swath

with NOC R&D Satellite Observations



HH



VV

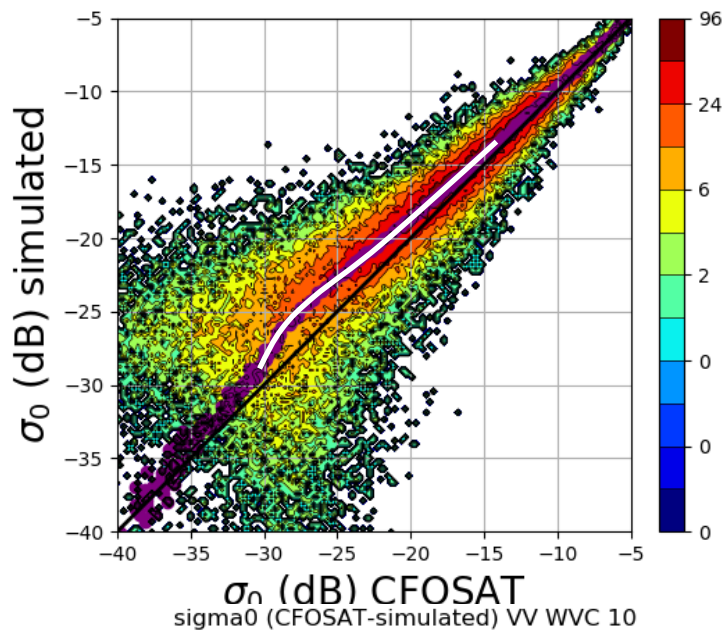
no NOC

Sweet swath

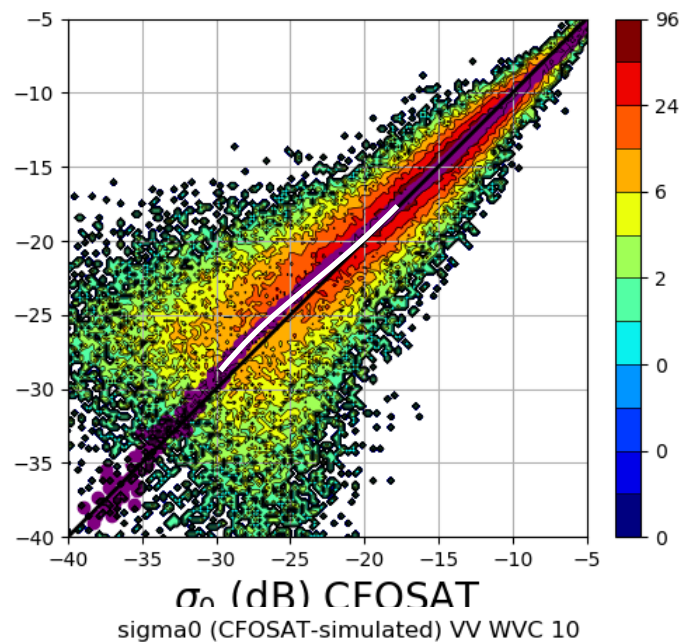
with NOC R&D Satellite Observations

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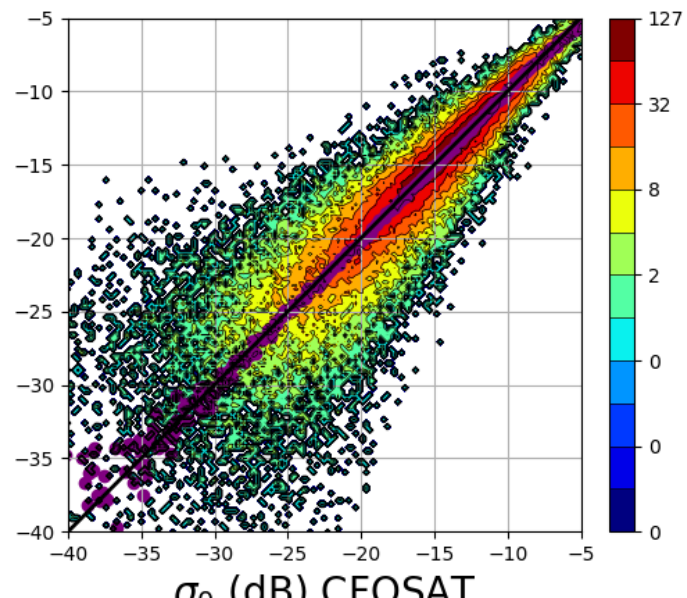
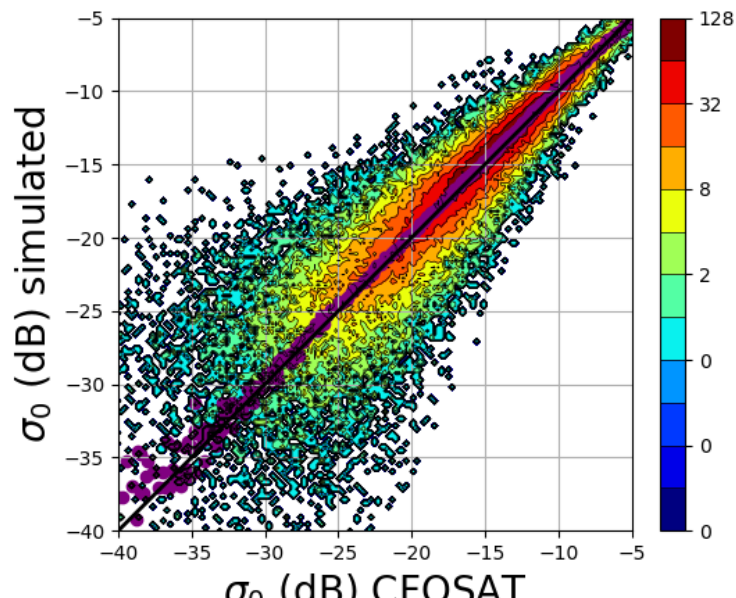
sigma0 (CFOSAT-simulated) HH WVC 10



sigma0 (CFOSAT-simulated) HH WVC 10



HH



VV



no NOC

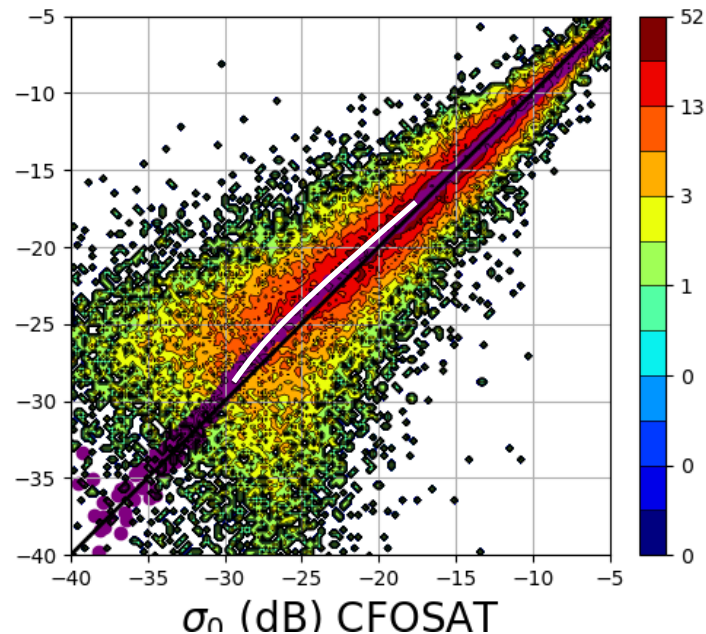
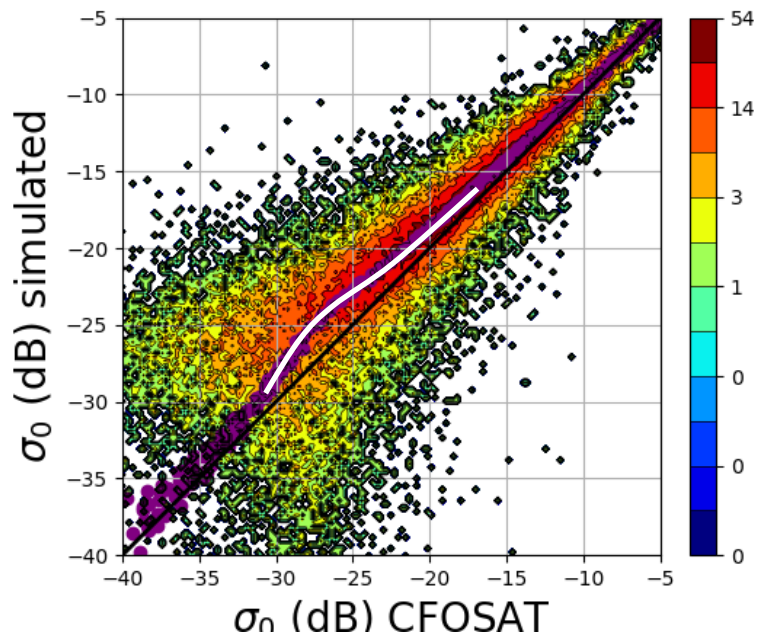
Nadir swath

with NOC

R&D Satellite Observations

sigma0 (CFOSAT-simulated) HH WVC 20

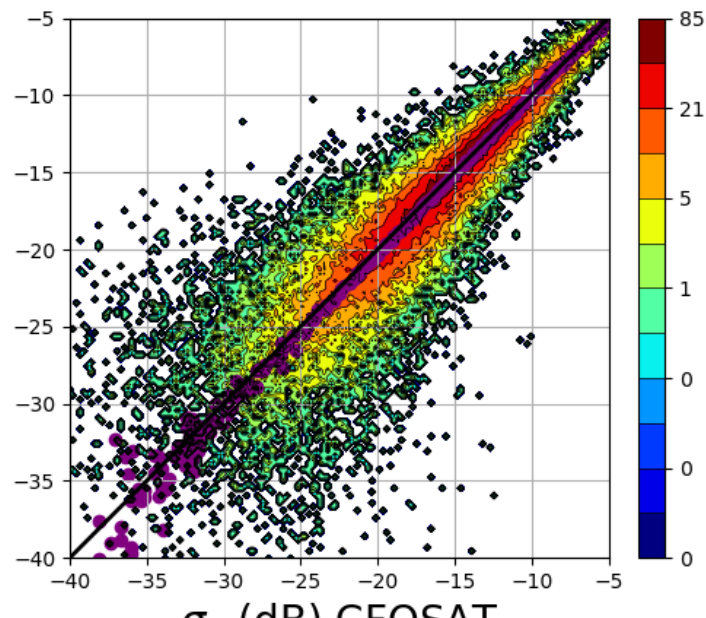
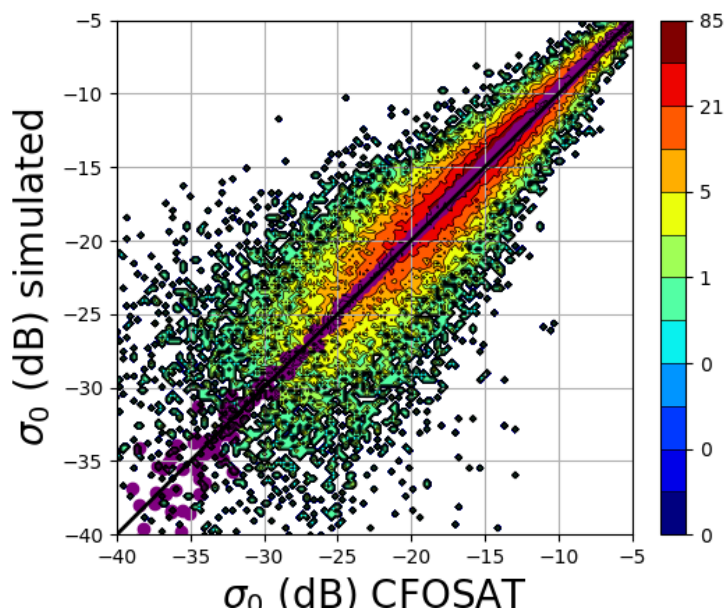
sigma0 (CFOSAT-simulated) HH WVC 20



HH

sigma0 (CFOSAT-simulated) VV WVC 20

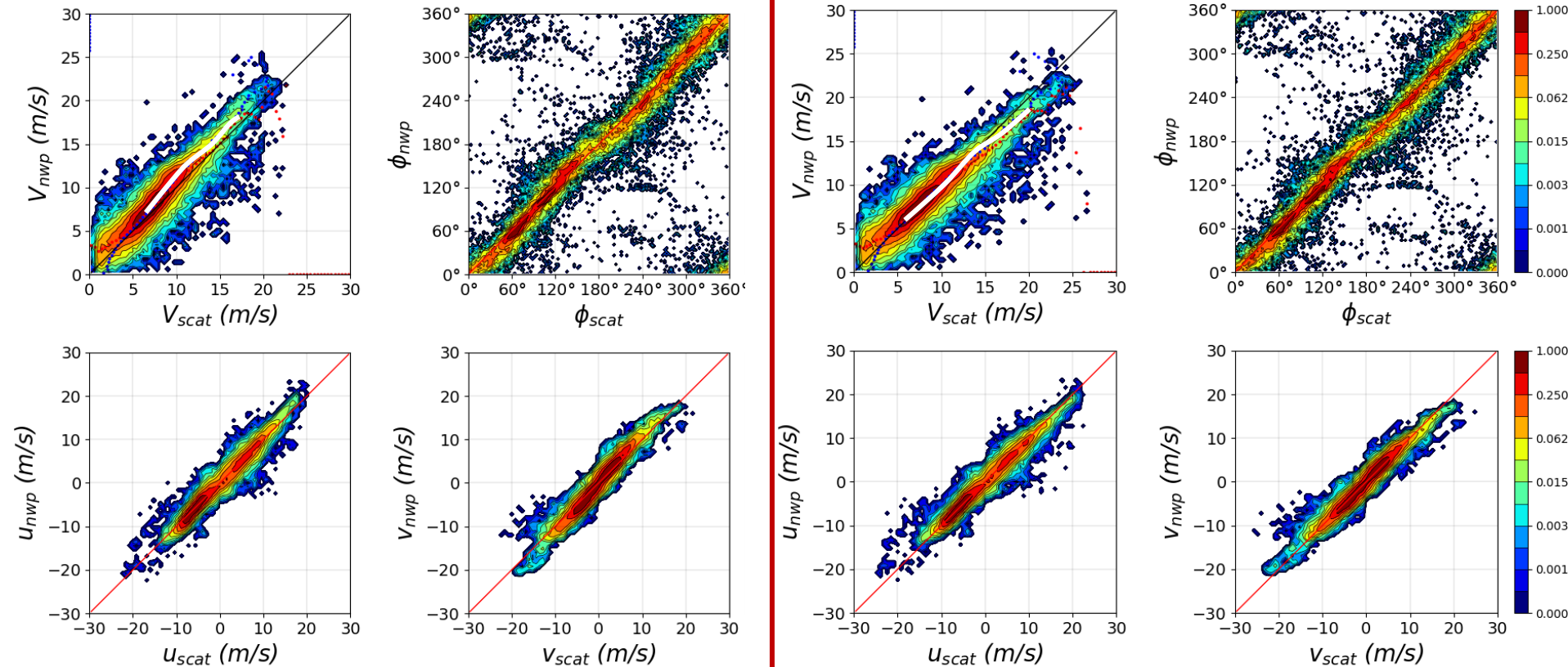
sigma0 (CFOSAT-simulated) VV WVC 20



VV



Outer swath

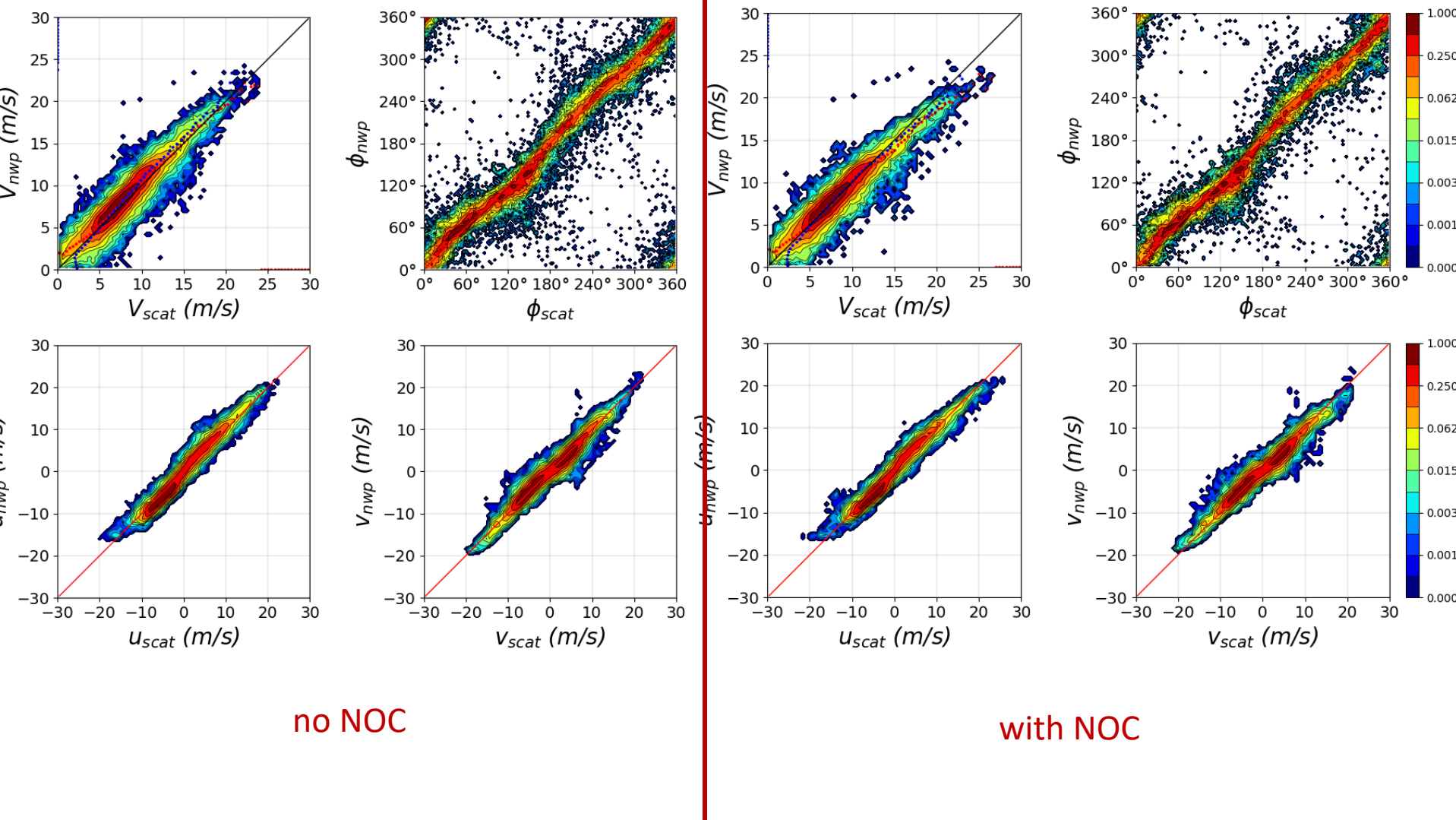


no NOC

with NOC

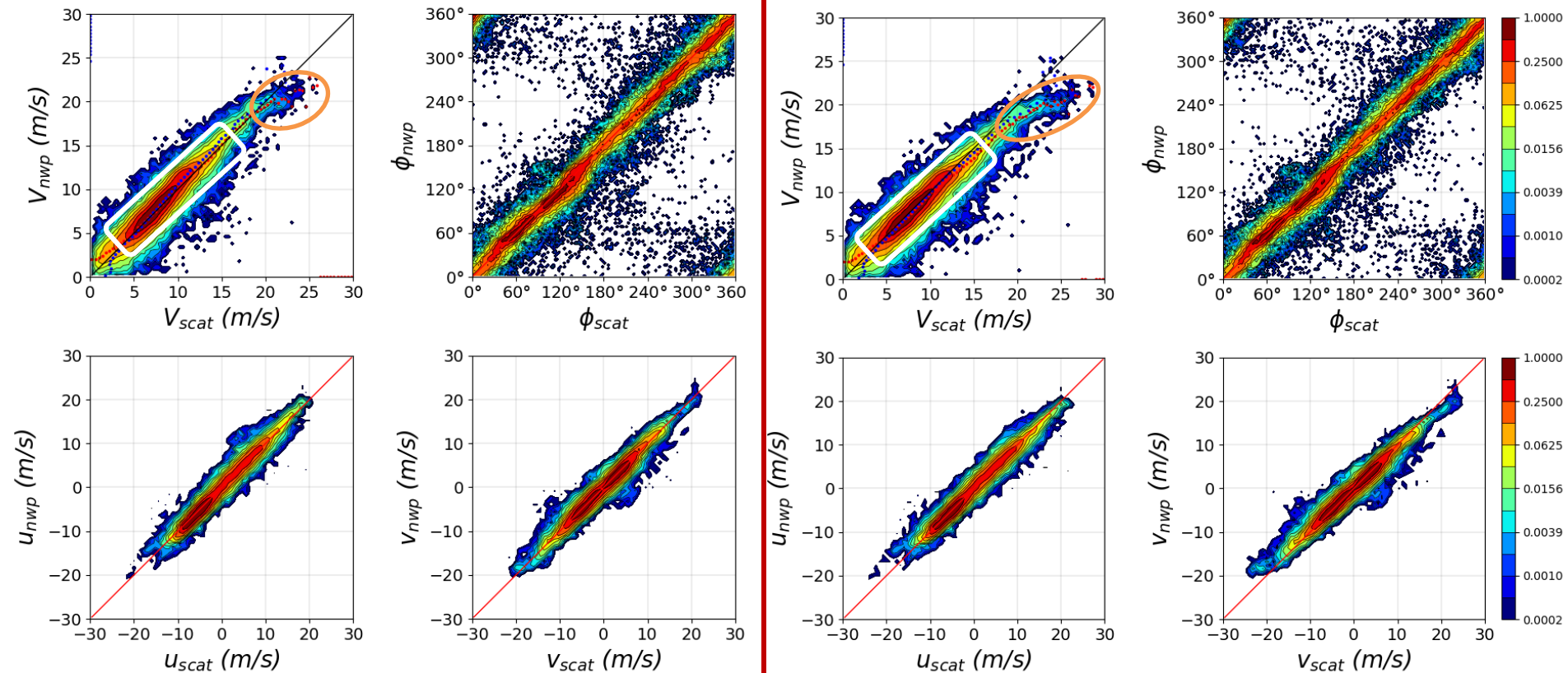


Nadir swath





Sweet swath



no NOC

with NOC



Summary and outlook

- NOC correction is able to improve the wind retrieval result.
- It corrected the deviation of the measured σ_0 from the simulated σ_0 .
- It corrects the wind speed bias, while there is still bias at the wind speed larger than 15 m/s.
- Rain flagging needs to be further toned with more data as well as NOC calculation.
- Next test of NOC will be as a function of azimuth and incidence angle instead of only as a function of incidence angle.



Thank you for your attention!