VALIDATION OF QUIKSCAT-DERIVED COASTAL WINDS

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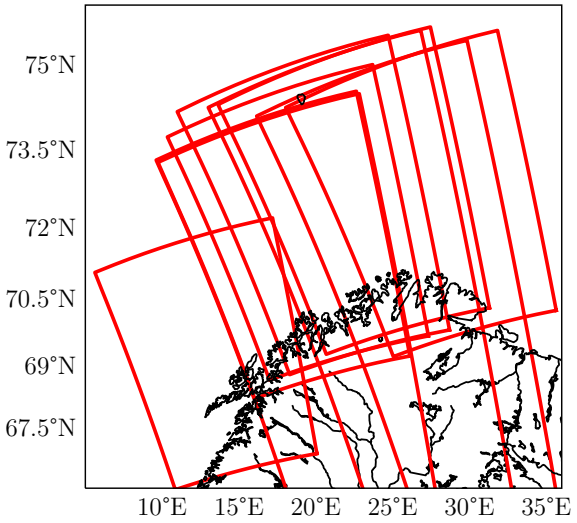
Area of interest and collocation criteria



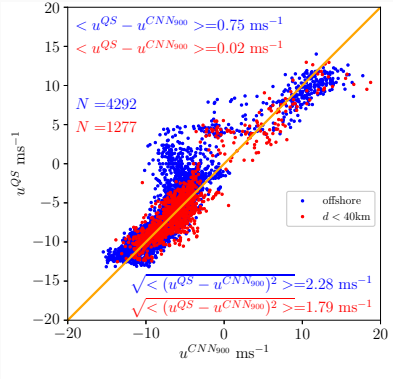
Collocation criteria:

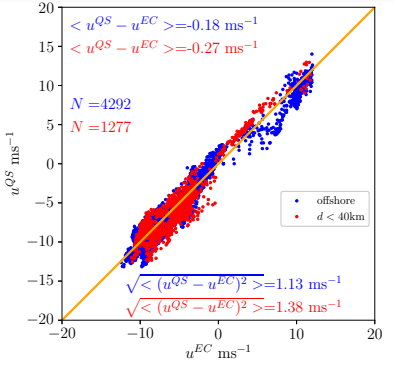
- QuikSCAT/ASAR overlap
- $\Delta t \leq 30'$

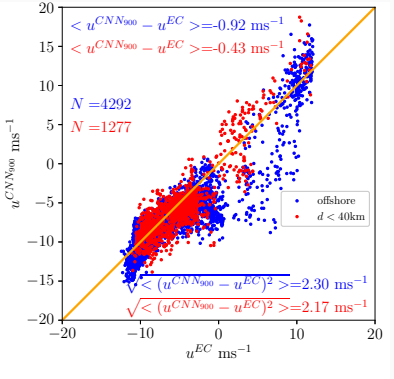
Methodology

- QuikSCAT (QS) σ_0 correction with **Noise Regularization** [1]
- Quality Control on QS-derived winds
- Comparisons among QS-derived, Convolutional Neural Network (CNN)-derived [2] and ECMWF winds
- Two CNN-derived winds:
  - nearest collocated
  - averaged on a 15-km radius area around WVC (not shown)
- Two areas of interest w.r.t. distance:
  - coastal winds: $d \leq 40$ km
  - offshore winds: $d > 40$ km

Zonal component. CNN_{900}







	U (ms^{-1})		ϕ (°)	
bias	-0.45	0.11	-0.7	4.3
RMSD	1.75	1.73	21.0	22.0
vRMSD	3.91		3.45	

	U (ms^{-1})		ϕ (°)	
bias	0.05	0.58	0.3	8.2
RMSD	1.18	1.56	10.3	16.2
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bias	0.51	0.77	1.0	4.3
RMSD	1.57	1.20	20.0	19.0
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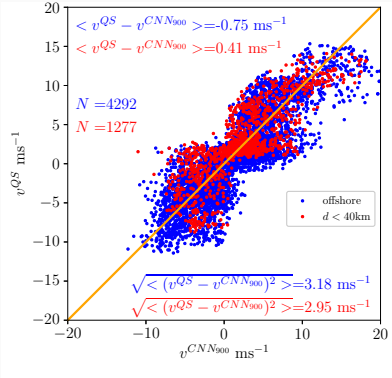
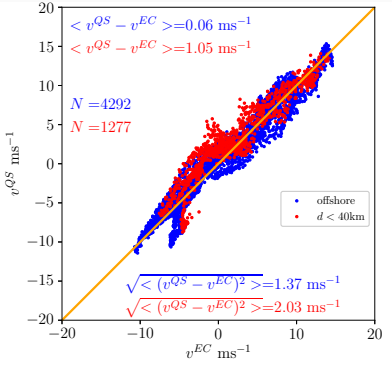
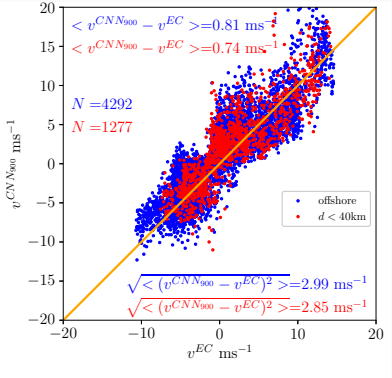
Meridional component. CNN_{900}







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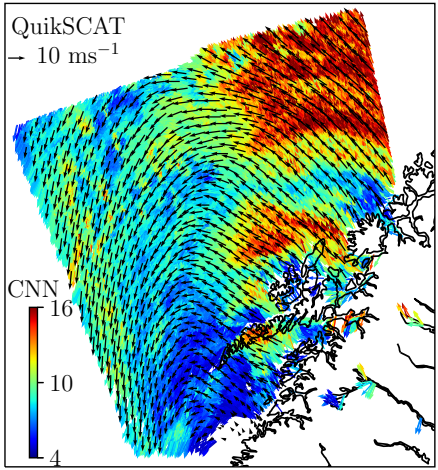
CNN vs QuikSCAT

- Colored arrows: CNN @ 900 m
- Black arrows: QuikSCAT @ 12.5 km
- Area: offshore Norway

- [1] G. Grieco, et al. "Coastal wind retrievals from corrected QuikSCAT Normalized Radar Cross Sections", *Remote Sensing of Environment*, 2024, 308, 114179, https://doi.org/10.1016/j.rse.2024.114179.
- [2] A. Zanchetta, et al., "Wind direction retrieval from Sentinel-1 SAR images using ResNet", *Remote Sensing of Environment*, 2021, 253, 112178, https://doi.org/10.1016/j.rse.2020.112178.

QuikSCAT time: 2008-Nov-24 20:07:13
ASAR time: 2008-Nov-24 20:16:27



Preliminary conclusions

- *CNN*-derived winds show more variability: what about noise?
- *QS vs CNN* seems to improve towards the coast
- *QS vs ECMWF* worsens towards the coast
- *CNN vs ECMWF* seems better towards the coast (significant?)

Future work

- Huge enlargement of the dataset
- triple collocation: $CNN - QS - ECMWF$
  - estimate of r^2_{QS} (scales resolved by CNN and QS)
- quadruple collocation: $buoy - CNN - QS - ECMWF$
  - estimate of r^2_{QS}
  - estimate of r^2_{CNN} (scales resolved by $buoy$ and CNN)

[3] Vogelzang, J.; Stoffelen, A. On the Accuracy and Consistency of Quintuple Collocation Analysis of In Situ, Scatterometer, and NWP Winds. Remote Sens. 2022, 14, 4552. https://doi.org/10.3390/rs14184552

Back-up slides

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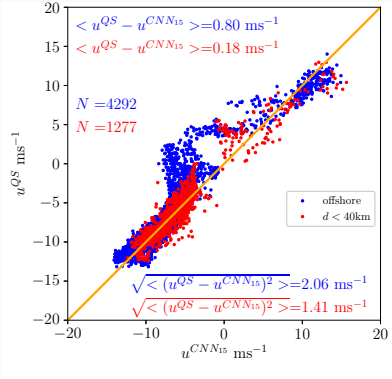
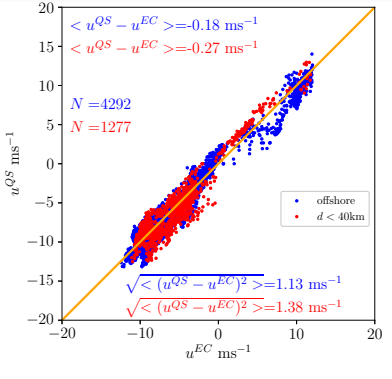
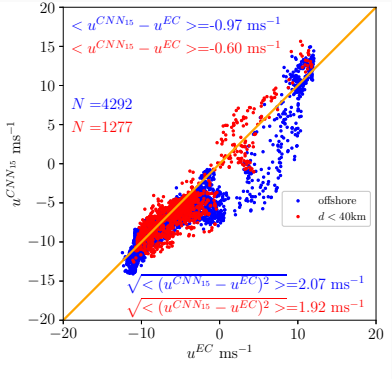
Zonal component. CNN_{15}







Meridional component. CNN_{15}