

Supporting Information

Machine-learning bias correction of passive-microwave sea ice concentration against a SAR-derived product: impact on Arctic sea ice forecasts

S1. Coverage density of ML-SAR

Total ML-SAR observations (Dec 2024 - Jul 2025)

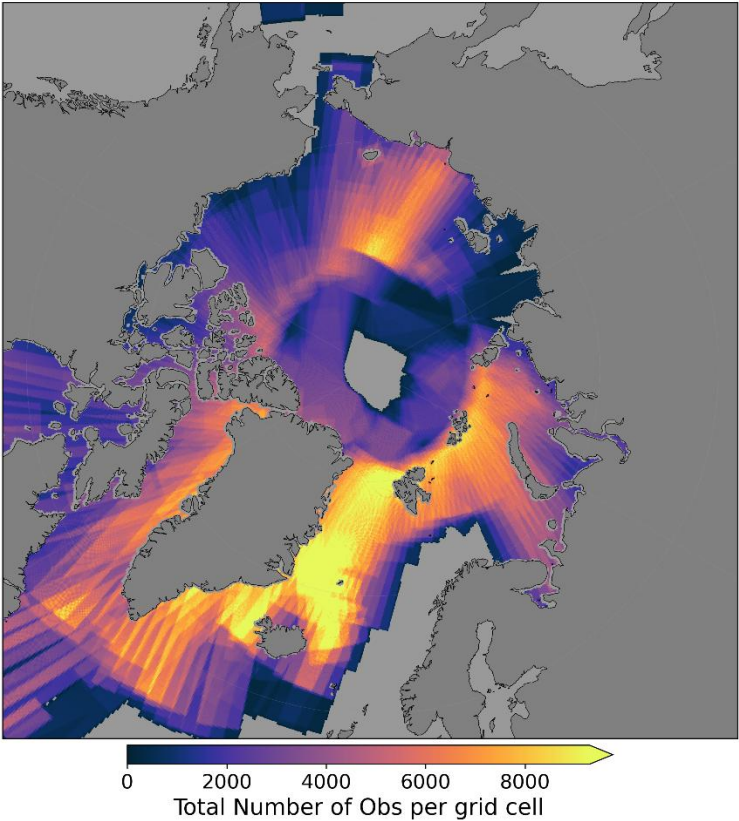
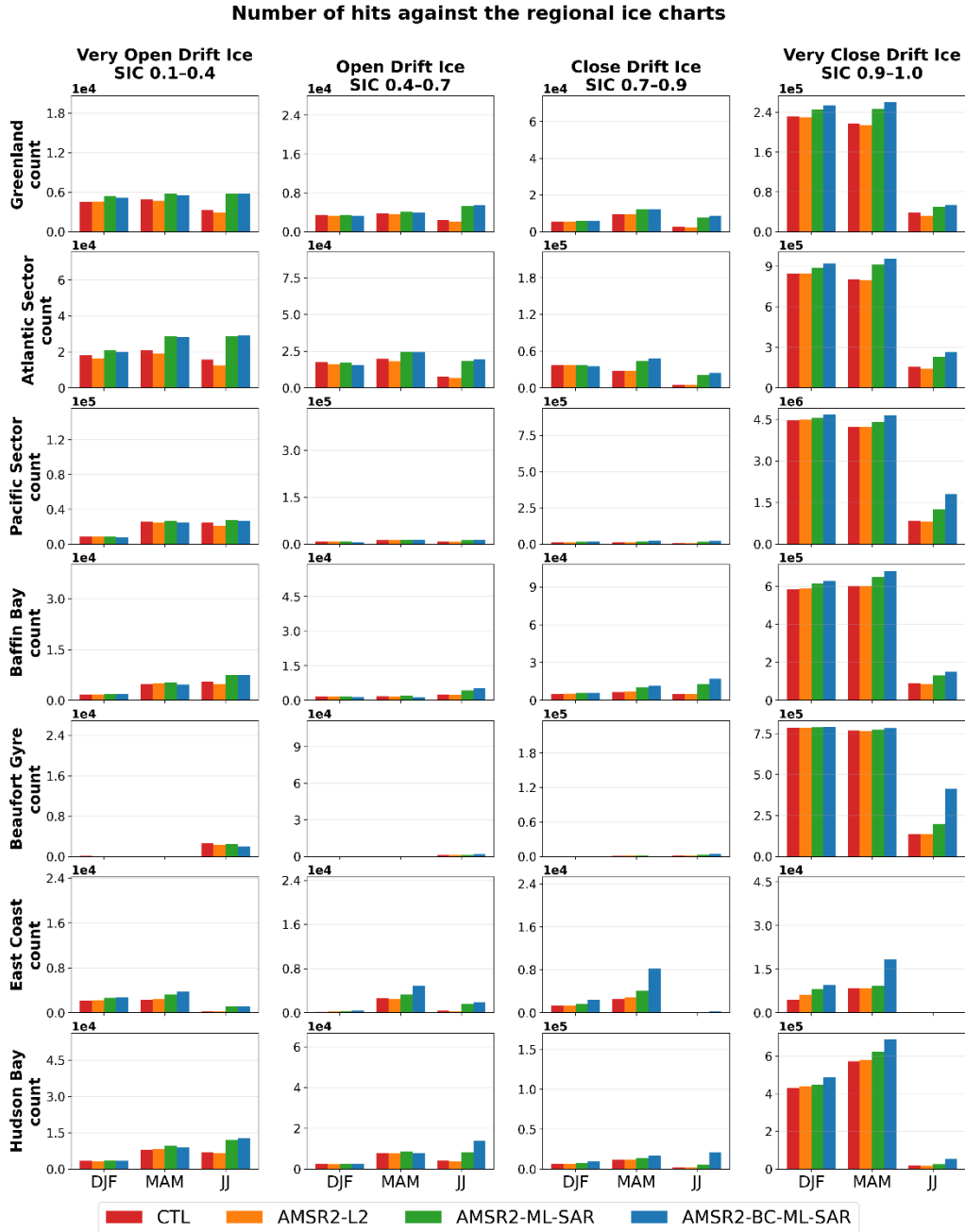
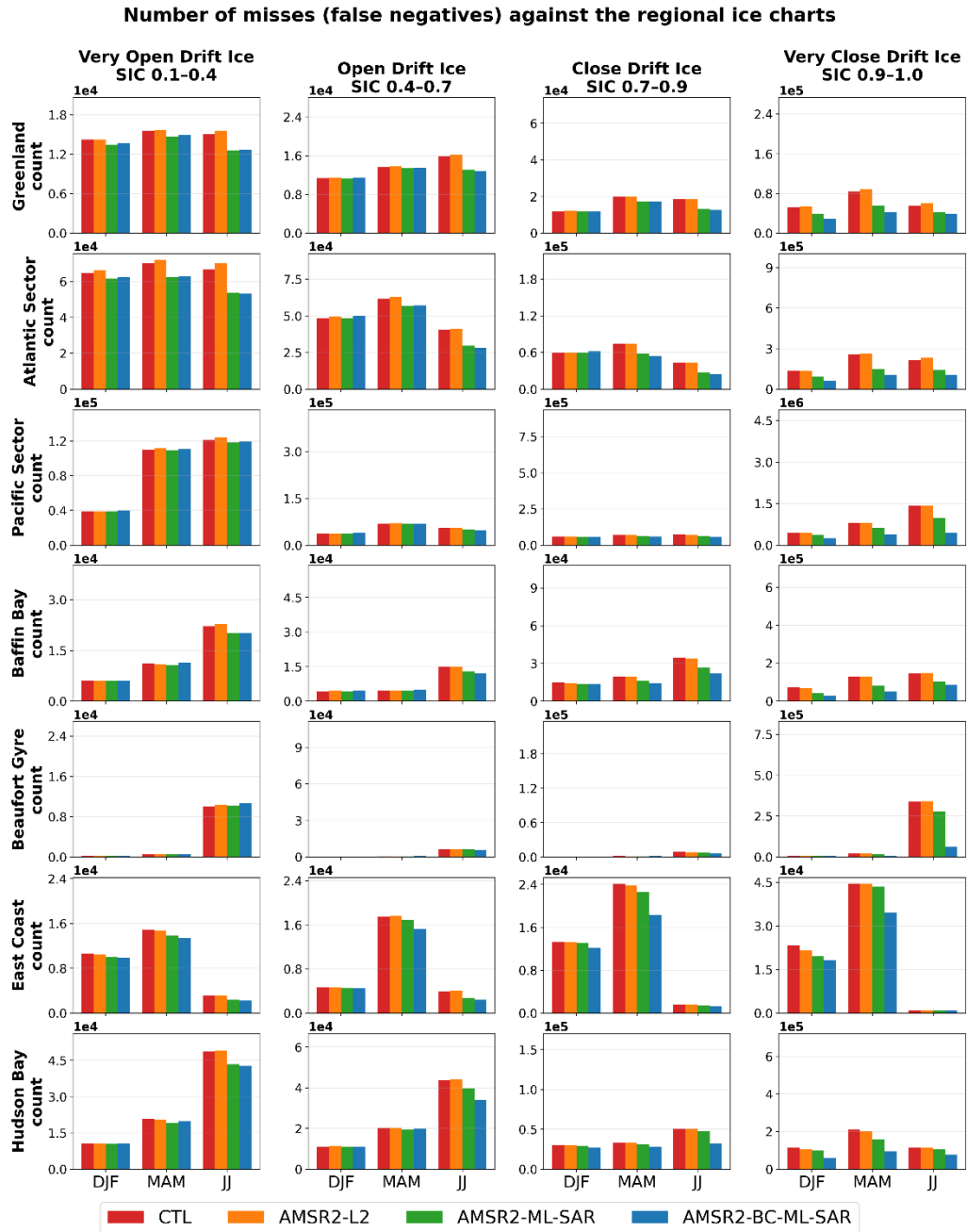


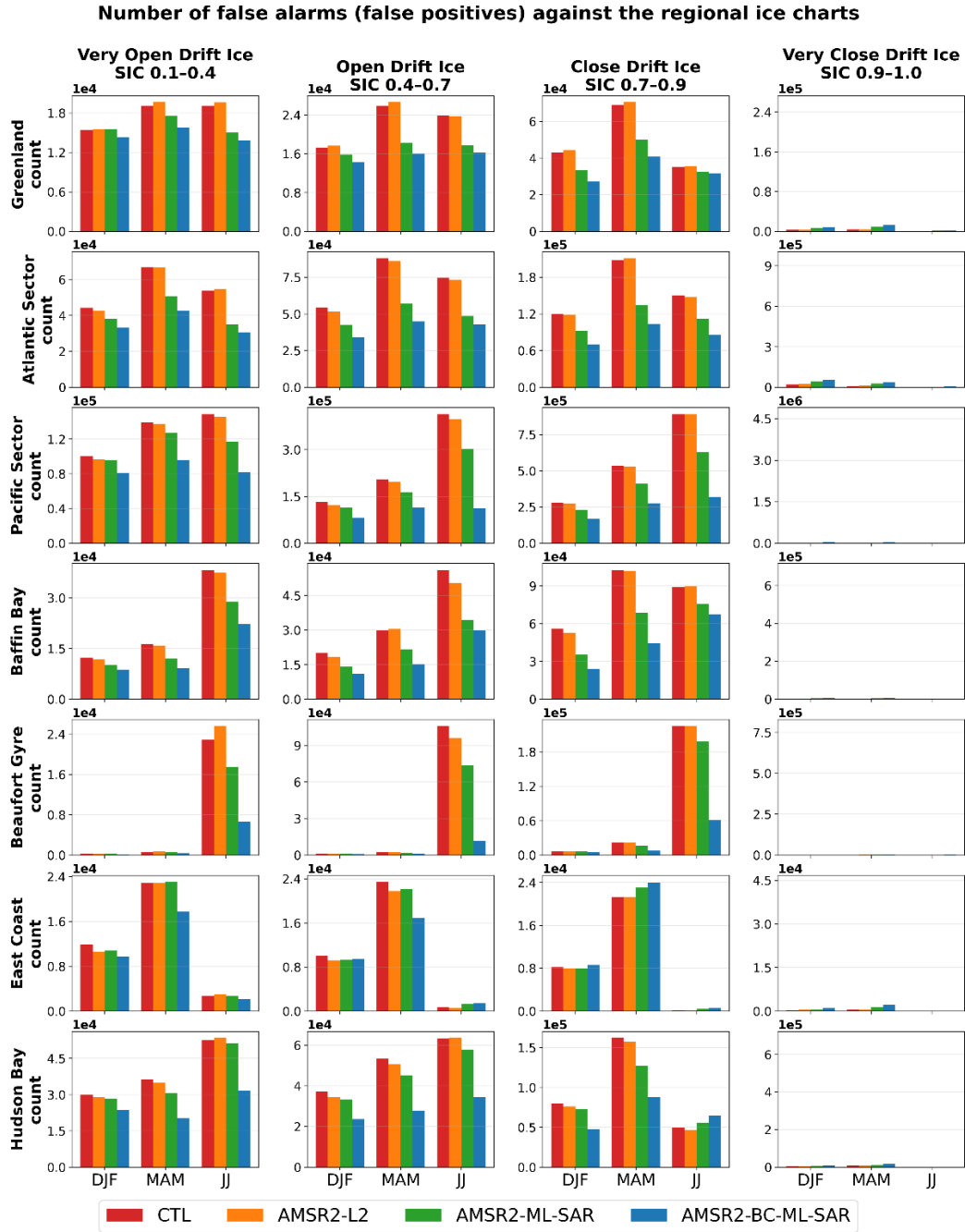
Figure S1. Spatial coverage of the ML-SAR product corresponding to the total number of ML-SAR observations accumulated in each ORCA025 grid cell between December 2024 and July 2025.



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19 **Figure S2. Number of hits from 1-day forecasts of the DA experiments evaluated against the regional ice charts, broken down by**
20 **SIC category, region and season. Rows correspond to the seven ice chart regions and columns to the four SIC categories following**
21 **the WMO convention. Y-axes are kept exactly with the same range in Fig. S3 and Fig. S4 for the sake of comparing the number of**
22 **hits with the number of misses and false alarms, respectively.**



25
26 **Figure S3. Number of misses from 1-day forecasts of the DA experiments evaluated against the regional ice charts, broken down by**
27 **SIC category, region and season. Rows correspond to the seven ice chart regions and columns to the four SIC categories following**
28 **the WMO convention. Y-axes are kept exactly with the same range in Fig. S2 and Fig. S4 for the sake of comparing the number of**
29 **misses with the number of hits and false alarms, respectively.**

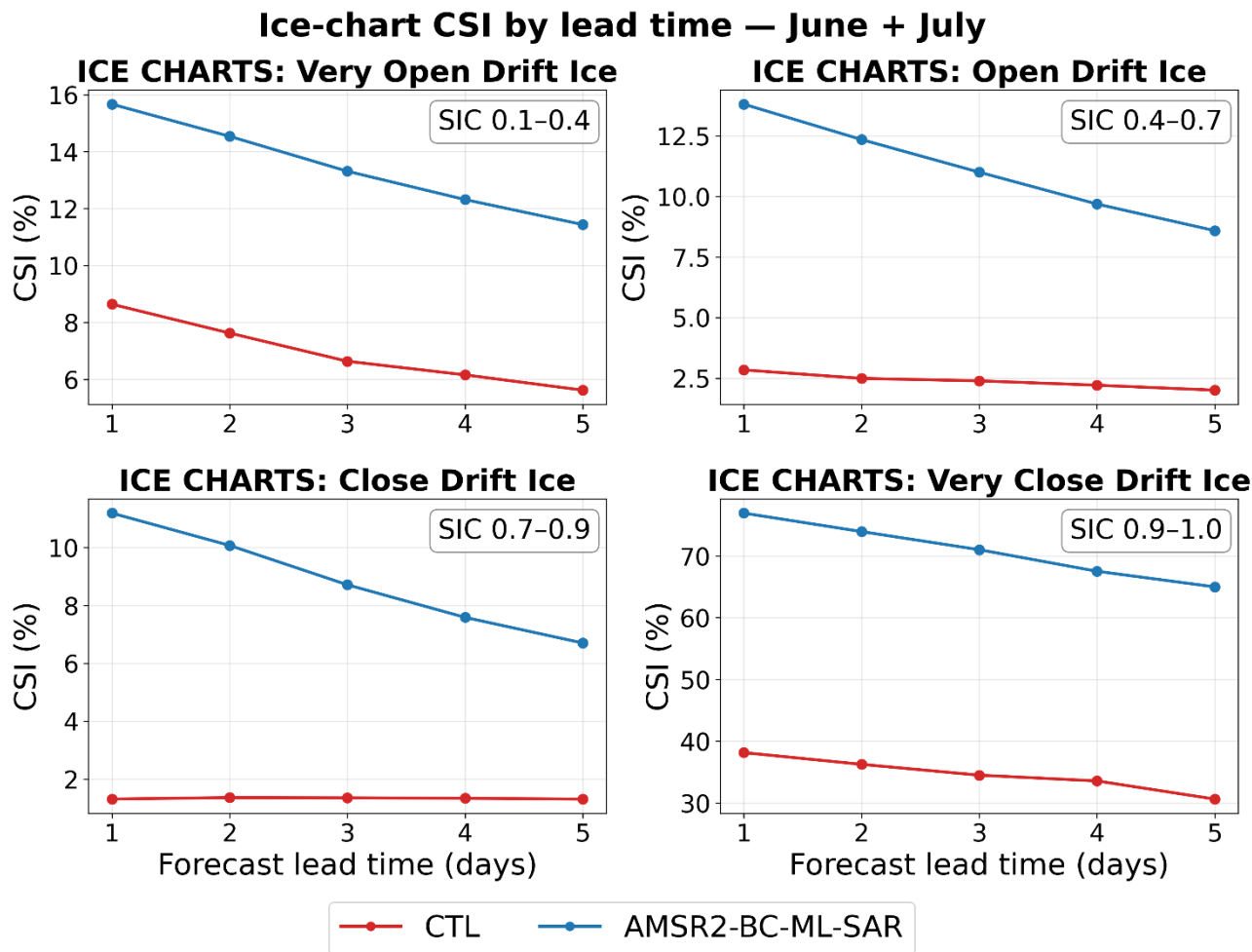


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33 Figure S4. Number of false alarms from 1-day forecasts of the DA experiments evaluated against the regional ice charts, broken
34 down by SIC category, region and season. Rows correspond to the seven ice chart regions and columns to the four SIC categories
35 following the WMO convention. Y-axes are kept exactly with the same range in Fig. S2 and Fig. S3 for the sake of comparing the
36 number of false alarms with the number of hits and misses, respectively.

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38 **S5. Critical Success Index (CSI) per lead time for summer months**

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41 **Figure S5. SIC CSI (%) as a function of lead time (1–5 days) for CTL (red) and AMSR2-BC-ML-SAR (blue), over June–July 2025.**

42 **CSI is computed against the combined pan-Arctic ice chart for the four WMO SIC categories.**