Retrieval of Melt Pond Fraction over Arctic Sea Ice during 2000-2019 Using An Ensemble-Based Deep Neural Network

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Figure S1. Cases of the observed MPF from NSIDC overlaid on NASA Team SIC.
Figure S2. Cases of the observed MPF from PRIC-Lei overlaid on NASA Team SIC.

Figure S3. Cases of the observed MPF from NPI overlaid on NASA Team SIC.
Figure S4. Cases of the observed MPF from TransArc overlaid on NASA Team SIC.

Figure S5. Cases of the observed MPF from HOTRAX overlaid on NASA Team SIC.
Figure S6. Cases of the observed MPF from DLUT overlaid on NASA Team SIC.

Figure S7. Cases of the observed MPF from IceWatch overlaid on NASA Team SIC.
Figure S8. Cases of the observed MPF from JOIS overlaid on NASA Team SIC.

Figure S9. Observed MPF from (a) MEDEA and (b) WorldView against the Observed SIC.
Table S1. Correlation coefficients and RMSE in total, training, validation and test dataset for each observation in 500 m grid.

| Source     | Total R | Total RMSE | Training R | Training RMSE | Validation R | Validation RMSE | Test R | Test RMSE |
|------------|---------|------------|------------|---------------|--------------|-----------------|--------|-----------|
| NSIDC      | 0.70    | 0.066      | 0.70       | 0.066         | 0.70         | 0.066           | 0.70   | 0.067     |
| PRIC-Lei   | 0.39    | 0.086      | 0.39       | 0.086         | 0.39         | 0.084           | 0.38   | 0.086     |
| NPI        | 0.03    | 0.092      | 0.03       | 0.092         | 0.03         | 0.093           | 0.02   | 0.092     |
| TransArc   | -0.39   | 0.078      | -0.40      | 0.078         |              |                 |        |           |
| HOTRAX     | 0.35    | 0.079      | 0.39       | 0.077         | 0.36         | 0.079           | 0.32   | 0.079     |
| DLUT       | 0.43    | 0.074      | 0.43       | 0.074         | 0.43         | 0.074           | 0.41   | 0.075     |
| IceWatch   | 0.20    | 0.149      | 0.22       | 0.145         | 0.19         | 0.149           | 0.19   | 0.149     |
| JOIS       | 0.28    | 0.171      | 0.28       | 0.170         | 0.27         | 0.171           | 0.26   | 0.172     |

Table S2. RMS of the observed MPF and RMSE of the DNN_MPF against the observed MPF.

| Source          | 500 m grid cell RMS | 12.5 km grid cell RMS |
|-----------------|---------------------|-----------------------|
| NSIDC           | 0.097               | 0.078                 |
| PRIC-Lei        | 0.108               | 0.088                 |
| NPI             | 0.111               | 0.092                 |
| TransArc        | 0.151               | 0.087                 |
| HOTRAX          | 0.092               | 0.083                 |
| DLUT            | 0.122               | 0.067                 |
| IceWatch        | 0.169               | 0.136                 |
| JOIS            | 0.183               | 0.116                 |
| TransArc independent | 0.197            | 0.182                 |
| IceWatch independent | 0.106            | 0.094                 |
| MEDEA independent | 0.103             | 0.085                 |
| WorldView independent | 0.093             | 0.084                 |

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