**Table A1**. Statistics for ground-based *a*440 data within 30 days of satellite images for calibration/validation.\*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sensor** | **Use** | **N** | **Mean** | **Min** | **Max** | **Std. Dev.** | **Range** |
| L8/OLI | Calibration | 250 | 4.5 | 0.2 | 32.5 | 6.0 | 32.3 |
| L8/OLI | Validation | 62 | 2.3 | 0.5 | 10.9 | 2.3 | 10.4 |
| S2/MSI | Validation | 95 | 1.8 | 0.3 | 10.9 | 2.0 | 10.7 |

­­­­­­­­­­­­­­­­­\*All statistics for *a*440 in m-1.

**Table A2**. Statistics for *a*440 models for Landsat 8 OLI bands.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **AC** | **Term 1\*** | **Term 2\*** | **R2** | **R2 range** | **RMSE** | **RMSE range** | **N** |
| This paper | MAIN | 655/560 | 865/560 | 0.85 | 0.85-0.86 | 0.487 | 0.479-0.493 | 250 |
| This paper | EROS SR | 655/560 | 865/560 | 0.83 | 0.83-0.85 | 0.517 | 0.499-0.530 | 250 |
|  |  |  |  |  |  |  |  |  |
| Kutser et al. 2005 | MAIN | Ln(560/655) |  | 0.46 |  | 0.926 |  | 250 |
| Menken et al. 2006 | MAIN | 655/560 |  | 0.51 |  | 0.883 |  | 250 |
| Griffin et al. 2011 | MAIN | 560/480 | 655 | 0.04 |  | 1.239 |  | 250 |

\*Landsat 8 band center wavelength in nm.

**Table A3.** Summary statistics and quantile information for 2015 and 2016 CDOM (*a*440, m-1) in lakes and reservoirs of Minnesota’s six main ecoregions.

a) **2015**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ecoregion** | | | | | | |
| **Statistic** | **All** | **NLF** | **NMW** | **NCHF** | **WCBP** | **NGP** | **LAP** |
| Mean | 3.42 | 4.65 | 5.31 | 1.75 | 2.40 | 2.60 | 2.43 |
| Std dev | 4.26 | 5.20 | 5.13 | 1.44 | 1.97 | 2.09 | 2.51 |
| Std err mean | 0.50 | 0.08 | 0.65 | 0.03 | 0.13 | 0.15 | 0.18 |
| Minimum | 0.17 | 0.17 | 0.71 | 0.30 | 0.41 | 0.55 | 0.30 |
| Quantiles:  10% | 0.72 | 0.67 | 1.08 | 0.74 | 0.90 | 1.01 | 0.86 |
| 25% | 1.05 | 1.10 | 2.02 | 0.99 | 1.29 | 1.41 | 1.14 |
| Median (50%) | 1.75 | 2.35 | 4.11 | 1.40 | 1.85 | 2.00 | 1.52 |
| 75% | 3.68 | 6.35 | 6.23 | 2.04 | 2.76 | 3.01 | 2.65 |
| 90% | 8.49 | 12.15 | 12.68 | 2.94 | 4.42 | 4.73 | 4.60 |
| Maximum | 25.50 | 25.50 | 25.50 | 25.50 | 20.12 | 14.91 | 18.18 |
| N | 7,790 | 4,268 | 62 | 2,837 | 231 | 183 | 188 |

b) **2016**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ecoregion** | | | | | | |
| **Statistic** | **All** | **NLF** | **NMW** | **NCHF** | **WCBP** | **NGP** | **AP** |
| Mean | 4.91 | 7.21 | 8.76 | 2.02 | 2.07 | 2.13 | 1.79 |
| Std dev | 6.88 | 8.27 | 8.26 | 2.68 | 1.73 | 1.70 | 2.27 |
| Std err mean | 0.08 | 0.12 | 1.02 | 0.05 | 0.10 | 0.13 | 0.17 |
| Minimum | 0.10 | 0.10 | 0.51 | 0.28 | 0.42 | 0.35 | 0.20 |
| Quantiles:  10% | 0.62 | 0.66 | 1.09 | 0.58 | 0.76 | 0.60 | 0.46 |
| 25% | 0.95 | 1.15 | 2.04 | 0.81 | 1.04 | 0.94 | 0.68 |
| Median (50%) | 1.81 | 3.04 | 4.74 | 1.26 | 1.55 | 1.62 | 1.18 |
| 75% | 4.79 | 10.69 | 15.17 | 2.10 | 2.45 | 2.83 | 2.12 |
| 90% | 17.85 | 23.16 | 24.07 | 3.77 | 3.67 | 4.97 | 3.52 |
| Maximum | 25.50 | 25.50 | 25.50 | 25.50 | 13.52 | 8.38 | 23.70 |
| N | 8,658 | 4,442 | 65 | 2,907 | 277 | 184 | 188 |

**Table A4**. Distribution statistics for change in *a*440 between 2016 and 2015 for all lakes and reservoirs with data in both years and sorted by ecoregion.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ecoregion** | | | | | | |
| **Statistic** | **All** | **NLF** | **NMW** | **NCHF** | **WCBP** | **NGP** | **LAP** |
| Mean | 1.47 | 2.60 | 3.06 | 0.17 | -0.49 | -0.48 | -0.64 |
| Std dev | 4.47 | 5.41 | 5.50 | 2.21 | 2.07 | 1.88 | 2.04 |
| Std err mean | 0.05 | 0.08 | 0.70 | 0.04 | 0.14 | 0.14 | 0.15 |
| Minimum | -24.74 | -20.38 | -5.71 | -24.74 | -18.86 | -9.04 | -11.86 |
| Quantiles:  10% | -1.25 | -1.17 | -1.31 | -1.18 | -2.13 | -2.21 | -2.29 |
| 25% | -0.46 | -0.19 | -0.58 | -0.62 | -0.95 | -1.07 | -0.99 |
| Median (50%) | 0.11 | 0.34 | 1.22 | -0.05 | -0.25 | -0.42 | -0.45 |
| 75% | 1.34 | 4.08 | 5.29 | 0.43 | 0.15 | 0.15 | 0.13 |
| 90% | 8.04 | 12.06 | 12.89 | 1.39 | 1.05 | 1.72 | 1.06 |
| Maximum | 23.09 | 23.09 | 18.54 | 20.35 | 6.56 | 4.31 | 6.14 |
| N | 7,766 | 4,249 | 62 | 2834 | 229 | 183 | 188 |