**APPENDIX A – Test set statistical analysis.**

**Table A.1** Statistical differences in surface reflectance between the MSI and OLI band value. Mean difference, and RMSD values for each pairwise band of the test set, comprising a total of 10,570 data points. The asterisk (\*) indicates the significance of the t-test, with a p-value < 0.05.

|  |  |  |
| --- | --- | --- |
| **Band** | ***Mean difference*** | ***RMSD*** |
| ***Blue*** | 0.0117\* | 0.0207 |
| ***Green*** | 0.0076\* | 0.0194 |
| ***Red*** | 0.0072\* | 0.0194 |
| ***NIR*** | 0.0025\* | 0.0356 |
| ***NIRa*** | 0.0109\* | 0.0367 |
| ***SWIR1*** | 0.0247\* | 0.0443 |
| ***SWIR2*** | 0.0308\* | 0.0456 |

**Table A.2** Statistical differences in surface reflectance between test set MSI and OLI band value after transformation function. Mean difference (a) and RMSD values (b) for each pairwise band of the training set subjected to OLS/RMA regression model coefficients in this study, Chastain et al. (2019) and HLS transformation function (Claverie et al.2018). The asterisk (\*) indicates the significance of the *t*-test, with *a p-value* < 0.05."*NA*" indicates the absence of a transformation coefficient between band 8 and band 5 of the MSI and OLI sensors respectively.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **a) Mean Difference MSI vs OLI adjusted TEST SET** | | | | |
| Band | **OLS** | **RMA** | **Chastain et al. Coeff.** | **HLS coeff.** |
| ***Blue*** | 1.06E-04 | 1.68E-04 | 0.0151\* | 0.0057\* |
| ***Green*** | 1.91E-04 | 1.77E-04 | 0.0044\* | 0.0072\* |
| ***Red*** | 2.51E-04 | -0.0092\* | 0.0053\* | 0.0106\* |
| ***NIR*** | 5.93E-05 | -0.0207\* | 0.0305\* | *NA* |
| ***NIRa*** | 1.88E-04 | 6.66E-05 | 0.0046\* | 0.0026\* |
| ***SWIR1*** | 1.77E-04 | 1.90E-04 | 0.0167\* | 0.0249\* |
| ***SWIR2*** | -0.0822\* | 1.03E-04 | 0.0261\* | 0.0289\* |
|  |  |  |  |  |
| **b) RMSD MSI vs OLI adjusted TEST SET** | | | | |
| Band | **OLS** | **RMA** | **Chastain et al. Coeff.** | **HLS coeff.** |
| ***Blue*** | 0.0162 | 0.0165 | 0.0222 | 0.0177 |
| ***Green*** | 0.0176 | 0.0177 | 0.0184 | 0.0194 |
| ***Red*** | 0.0225 | 0.0244 | 0.0232 | 0.0256 |
| ***NIR*** | 0.0354 | 0.0416 | 0.0471 | *NA* |
| ***NIRa*** | 0.0349 | 0.0356 | 0.0356 | 0.0356 |
| ***SWIR1*** | 0.0367 | 0.0371 | 0.0403 | 0.0444 |
| ***SWIR2*** | 0.0935 | 0.0323 | 0.0426 | 0.0443 |

**Table A.3** Statistical differences in surface reflectance between the MSI and ETM+ band value. Mean difference, and RMSD values for each pairwise band of the test set, comprising a total of 7,764 data points. The asterisk (\*) indicates the significance of the *t*-test, with *a p-value* < 0.05.

|  |  |  |
| --- | --- | --- |
| **Band** | ***Mean difference*** | ***RMSD*** |
| ***Blue*** | 0.0061\* | 0.0194 |
| ***Green*** | 0.0051\* | 0.0208 |
| ***Red*** | 0.0078\* | 0.0271 |
| ***NIR*** | 0.0153\* | 0.0421 |
| ***NIRa*** | 0.0232\* | 0.0458 |
| ***SWIR1*** | 0.0270\* | 0.0502 |
| ***SWIR2*** | 0.0326\* | 0.0493 |

**Table A.4** Statistical differences in surface reflectance between the MSI and ETM+ band value after transformation function. Mean difference (a) and RMSD values (b) for each pairwise band of the training set subjected to OLS/RMA regression model coefficients in this study and Chastain et al. (2019) transformation function. The asterisk (\*) indicates the significance of the *t*-test, with *a p-value* < 0.05.

|  |  |  |  |
| --- | --- | --- | --- |
| **a) Mean Difference MSI vs ETM+ adjusted TEST SET** | | | |
| Band | **. OLS** | **RMA** | **Chastain et al. Coeff.** |
| ***Blue*** | -4.83E-04 | -4.38E-04 | 0.0112\* |
| ***Green*** | -3.51E-04 | -3.00E-04 | 0.0022\* |
| ***Red*** | -4.75E-04 | -4.79E-04 | 0.0006 |
| ***NIR*** | -2.15E-04 | -3.24E-04 | 0.0216\* |
| ***NIRa*** | -7.36E-05 | -9.69E-05 | -0.0061\* |
| ***SWIR1*** | -2.36E-04 | -2.56E-04 | 0.0118\* |
| ***SWIR2*** | -2.49E-04 | -2.94E-04 | 0.0146\* |
|  |  |  |  |
| **b) RMSD MSI vs ETM adjusted TEST SET** | | | |
| Band | **OLS** | **RMA** | **Chastain et al. Coeff.** |
| ***Blue*** | 0.0172 | 0.0176 | 0.0206 |
| ***Green*** | 0.0199 | 0.0202 | 0.0203 |
| ***Red*** | 0.0252 | 0.0254 | 0.0252 |
| ***NIR*** | 0.0392 | 0.0401 | 0.0448 |
| ***NIRa*** | 0.0395 | 0.0404 | 0.0426 |
| ***SWIR1*** | 0.0423 | 0.0429 | 0.0443 |
| ***SWIR2*** | 0.0367 | 0.0371 | 0.0395 |

**Table A.5** Statistical differences in surface reflectance between the OLI and ETM+ band value. Mean difference, and RMSD values for each pairwise band of the test set, comprising a total of 7,692 data points. The asterisk (\*) indicates the significance of the *t*-test, with *a p-value* < 0.05.

|  |  |  |
| --- | --- | --- |
| **Band** | ***Mean difference*** | ***RMSD*** |
| ***Blue*** | -0.0142\* | 0.0188 |
| ***Green*** | -0.0132\* | 0.0197 |
| ***Red*** | -0.0137\* | 0.0202 |
| ***NIR*** | -0.0063\* | 0.0271 |
| ***NIRa*** | -0.0162\* | 0.0374 |
| ***SWIR1*** | -0.0133\* | 0.0332 |
| ***SWIR2*** | -0.0142\* | 0.0188 |

**Table A.6** Statistical differences in surface reflectance between the OLI and ETM+ band value after transformation function. Mean difference (a) and RMSD values (b) for each pairwise band of the training set subjected to OLS/RMA regression model coefficient in this study and Chastain et al. (2019) transformation function. The asterisk (\*) indicates the significance of the *t*-test, with *a p-value* < 0.05.

|  |  |  |  |
| --- | --- | --- | --- |
| **a) Mean Difference OLI vs ETM+ adjusted TEST SET** | | | |
| Band | **OLS** | **RMA** | **Chastain et al. Coeff.** |
| ***Blue*** | *-1.01E-04* | -1.18E-04 | -0.0120 |
| ***Green*** | *-6.78E-05* | -1.13E-04 | -0.0137 |
| ***Red*** | *-9.40E-06* | -4.98E-05 | -0.0186 |
| ***NIR*** | *-3.36E-04* | -2.60E-04 | -0.0327 |
| ***NIRa*** | *-4.07E-04* | -3.27E-04 | -0.0263 |
| ***SWIR1*** | *-3.84E-04* | -2.95E-04 | -0.0296\* |
| ***SWIR2*** | *-1.01E-04* | -1.18E-04 | -0.0120 |
|  |  |  |  |
| **b) RMSD OLI vs ETM adjusted TEST SET** | | | |
| Band | **OLS** | **. RMA** | **Chastain et al. Coeff.** |
| ***Blue*** | *0.0121* | 0.0122 | 0.0175 |
| ***Green*** | *0.0141* | 0.0141 | 0.0202 |
| ***Red*** | *0.0182* | 0.0182 | 0.0276 |
| ***NIR*** | *0.0261* | 0.0264 | 0.0449 |
| ***NIRa*** | *0.0326* | 0.0326 | 0.0443 |
| ***SWIR1*** | *0.0286* | 0.0288 | 0.0448 |
| ***SWIR2*** | *0.0121* | 0.0122 | 0.0175 |

**APPENDIX B**

**Table B.1** ODR slope values of OLI and ETM+ comparison after transformation function application.

|  |  |  |
| --- | --- | --- |
| **OLI vs ETM ODR adjusted** | | |
| Band | **OLS** | **RMA** |
| ***Blue*** | 1.0026 | 1.0026 |
| ***Green*** | 0.9760 | 0.9989 |
| ***Red*** | 0.9842 | 0.9999 |
| ***NIR*** | 0.9564 | 1.0001 |
| ***SWIR1*** | 0.9701 | 0.9990 |
| ***SWIR2*** | 0.9753 | 0.9986 |