**ATMOSPHERIC CORRECTION FOR LANDSAT 8 OVER CASE 2 WATERS**

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Abstract (250 words)

**Motivation**

Landsat 8 is a promising candidate to address the remote sensing of inland and coastal waters (Case 2 waters) due to its improved signal-to-noise ratio (SNR), spectral resolution, bit quantization, and high spatial resolution.

Atmospheric correction is essential for remote sensing of water since the signal from the water reaching the sensor is small compared to atmospheric scattering.

Standard atmospheric correction algorithms fail over highly turbid Case 2 waters because the *black pixel assumption*, i.e. the signal leaving the water is zero beyond near infrared (NIR), is not always satisfied.

**Methods**

We develop a new atmospheric correction algorithm for Landsat 8 imagery based on the empirical line method (ELM) that does not rely on the black pixel assumption.

This algorithm uses pseudo-invariant features (PIF) from the image, ground-truth data, and water-leaving reflectances from an in-water radiative transfer model to determine reflectance and radiance values of the bright and dark pixels used in the ELM method.

We compare the results with in situ remote sensing reflectance measurements for different water bodies that exhibit a range of optical properties.

We calculate reflectance errors for each band taking the in situ data as ground-truth, and then compare them to results from standard atmospheric correction algorithms.

**Results**

These reflectance errors are small in all the visible bands for a wide range of concentrations.

**Conclusions**

These results show that our atmospheric correction algorithm allows one to use Landsat 8 to study Case 2 waters as an alternative to traditional ocean color satellites (e.g. MODIS, SeaWiFS).

Abstract (100 words)

We develop a new atmospheric correction algorithm for Landsat 8 imagery based on the empirical line method (ELM) that does not rely on the black pixel assumption. This algorithm uses pseudo-invariant features (PIF) from the image, ground-truth data, and water-leaving reflectances from an in-water radiative transfer model to determine reflectance and radiance values of the bright and dark pixels used in the ELM method. We compare the results with in situ remote sensing reflectance measurements for different water bodies that exhibit a range of optical properties.

**VALIDATION OF THE MOB-ELM ATMOSPHERIC CORRECTION ALGORITHM FOR LANDSAT 8 OVER CASE 2 WATERS**

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Landsat 8 is a promising candidate to address the remote sensing of inland and coastal waters (Case 2 waters) due to its improved signal-to-noise ratio (SNR), spectral resolution, bit quantization, and high spatial resolution. Atmospheric correction is essential for remote sensing of water since the signal from the water reaching the sensor is small compared to atmospheric scattering. Standard atmospheric correction algorithms fail over highly turbid Case 2 waters because the *black pixel assumption*, i.e. the signal leaving the water is zero beyond near infrared (NIR), is not always satisfied. We developed a new atmospheric correction algorithm, the model-based ELM (MoB-ELM), for Landsat 8 imagery based on the empirical line method (ELM) that does not rely on the black pixel assumption. This algorithm uses pseudo-invariant features (PIF) from the image, ground-truth data, and water-leaving reflectances from an in-water radiative transfer model (Hidrolight) to determine reflectance and radiance values of the bright and dark pixels used in the ELM method. We compare the results with in situ remote sensing reflectance measurements for different water bodies that exhibit a range of optical properties. We calculate reflectance errors for each band taking the in situ data as ground-truth, and then compare them to results from standard atmospheric correction algorithms. These reflectance errors are small in all the visible bands for a wide range of concentrations.These results show that our atmospheric correction algorithm allows one to use Landsat 8 to study Case 2 waters as an alternative to traditional ocean color satellites (e.g. MODIS, SeaWiFS).