

Land/Water-Sat: Landsat's New Potential to Monitor Case 2 Waters

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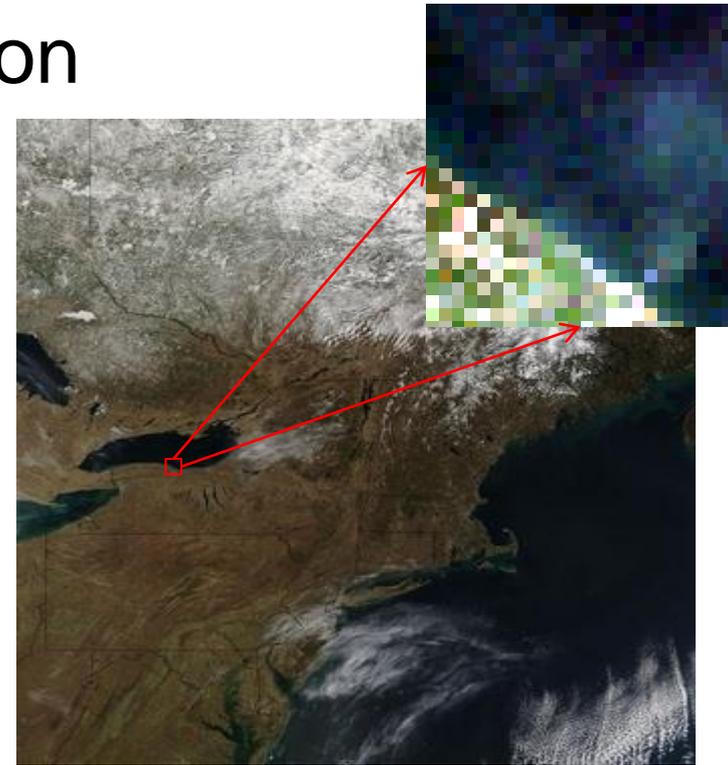
Rochester, NY 14623

Sponsor:

United States Geological Survey (USGS)

Research Motivation

	MODIS	SeaWiFS
Spatial Resolution	×	×
Radiometric Fidelity	✓	✓
Repeat Coverage	✓	✓
Free Data	✓	✓



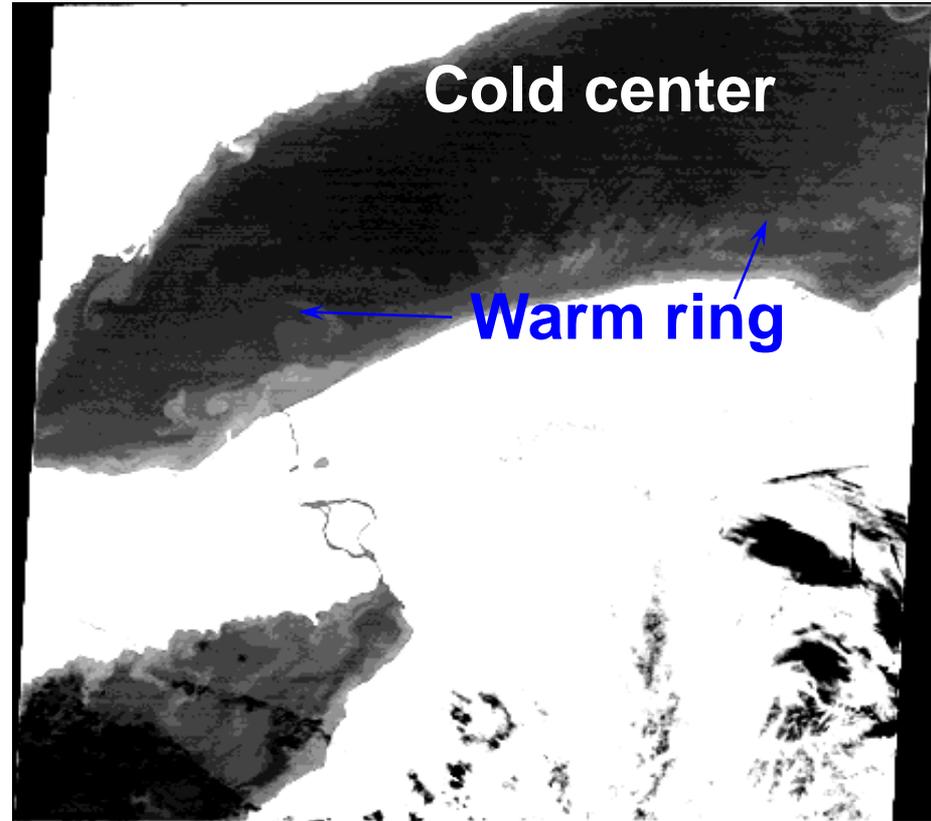
	Landsat	OLI
Spatial Resolution	✓	✓
Radiometric Fidelity	×	✓
Repeat Coverage	✓	✓
Free Data	✓	✓

Thermal and Reflective data both very important for water resources studies

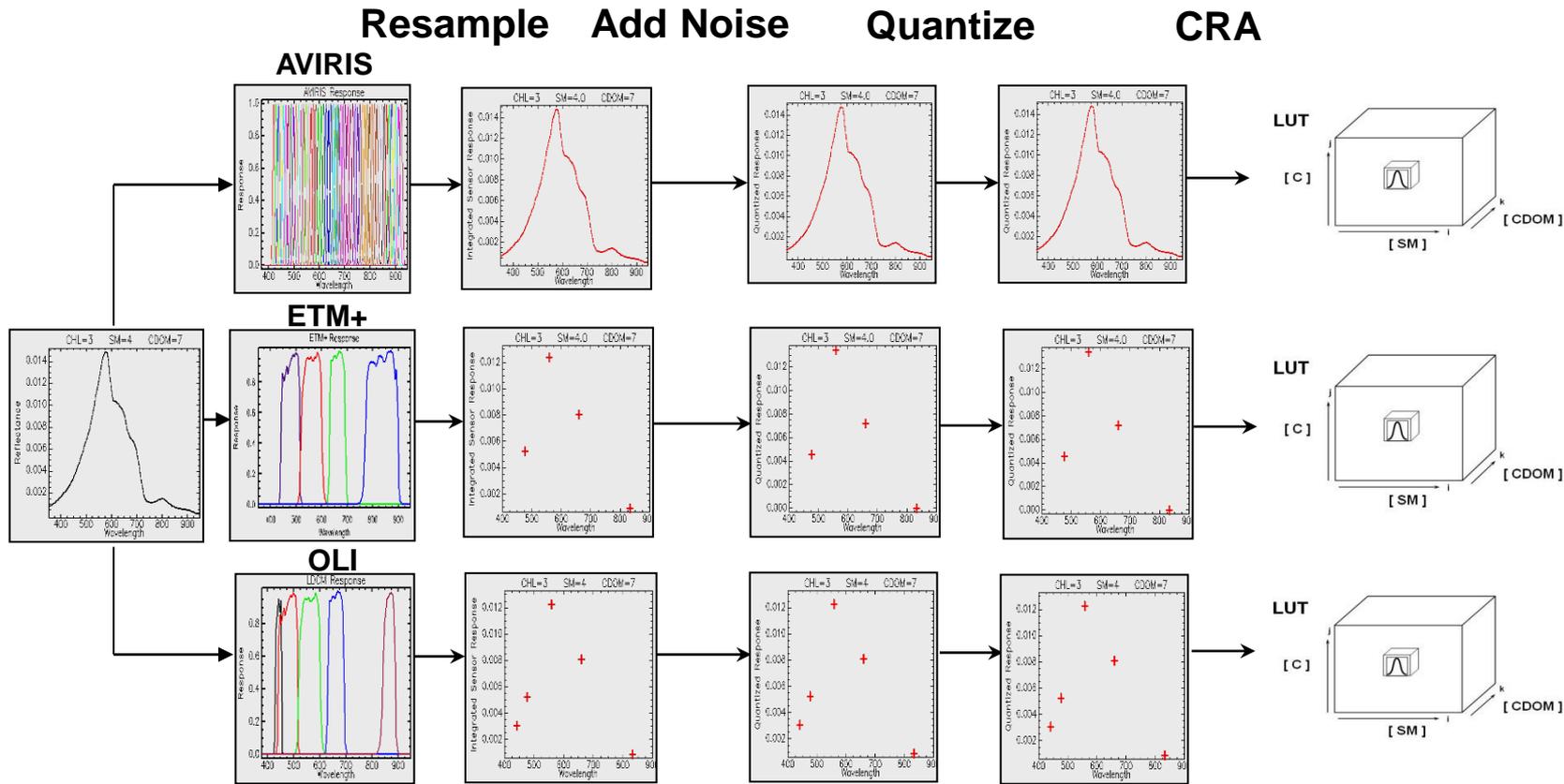
True Color Composite



Thermal Channel



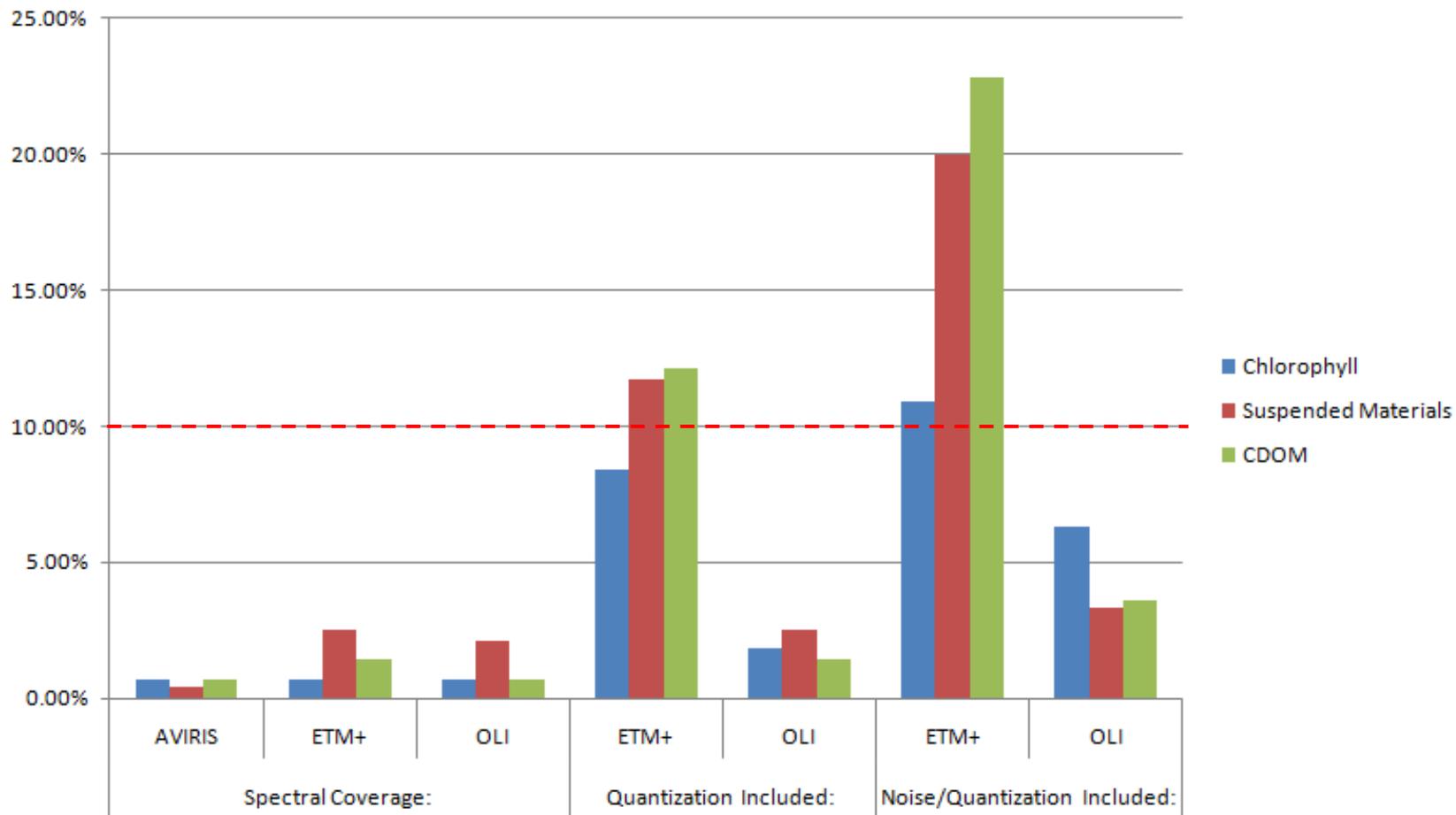
Does OLI Have the Necessary Radiometric Fidelity?



- Modeled 3 new features of OLI in the absence of atmospheric effects.
- Water quality parameters were randomly varied to generate 2000 water types. [0 – 68], SM [0 – 24], CDOM [0 – 14]
- 10% error is our target for this experiment.

CHL

Results



OLI Over-Water Atmospheric Correction

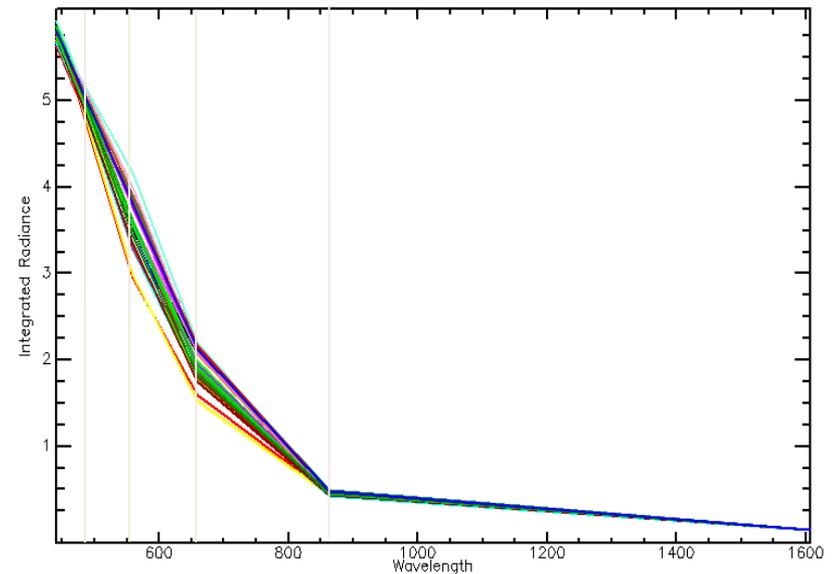
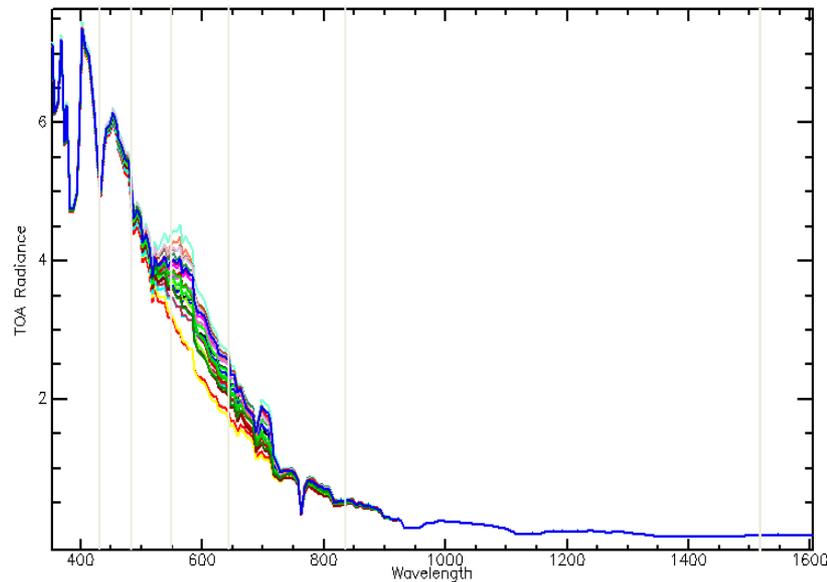
Case 2 Waters

Issue: OLI doesn't have 2 NIR bands which are required by traditional water-based algorithms.

- Gordon's method (SeaWiFS).

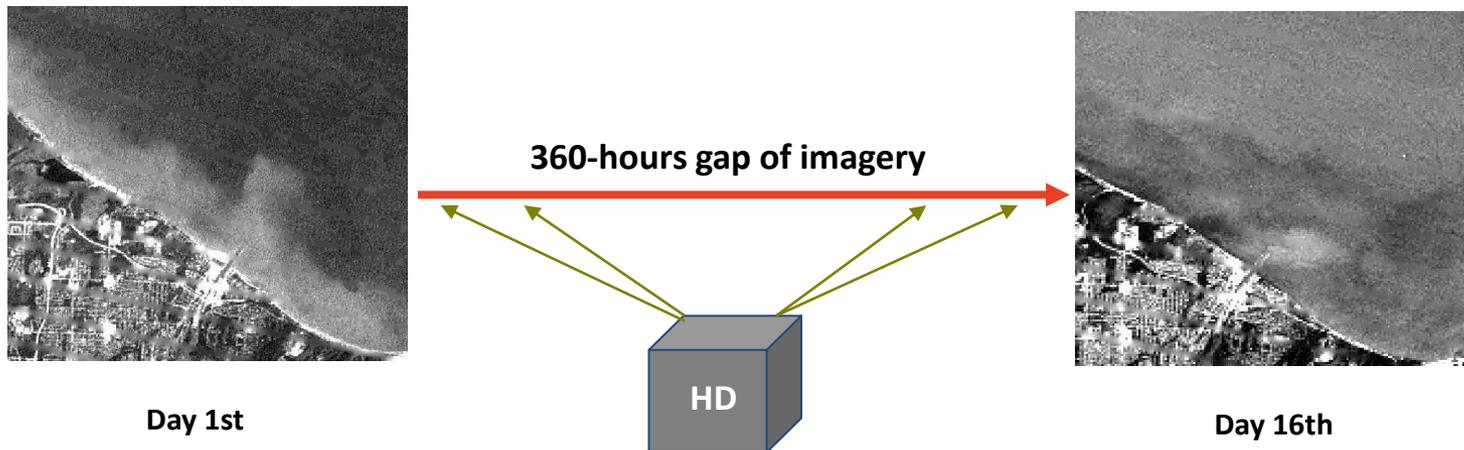
2 methods developed:

- Blue Band method.
- NIR/SWIR band ratio method.



Hydrodynamic models calibrated with LDCM data

- ✓ Hydrodynamic modeling, when calibrated, can compensate low temporal resolution of Landsat
- ✓ A well-calibrated model enables pre-casting and forecasting of the state of the environment
- ✓ Hydrodynamic models can provide volumetric data below LDCM penetration



Can Landsat 8 be used as a tool by water resource managers?

- Can more robust operational procedures be developed for over water atmospheric compensation?
 - Calibration issues
 - Stray light issues
 - Hybridization of existing research grade algorithms?
- Can constituent retrieval algorithms be operationalized?
 - Robustness to calibration and atmospheric compensation errors
 - Compensation for IOP variations
- Can OLI be used for bottom cover mapping?
- Can OLI be used for depth mapping in shallow waters?
- Can TIRS and OLI data be operationally fused to calibrate hydrodynamic models of coastal waters?

Conclusions and Future Work

OLI exhibits the potential to be a useful tool for monitoring water quality.

2 over-water atmospheric correction algorithms were developed for the OLI instrument and have been successfully applied to both synthetic and real data.

We look forward to applying these methods to actual OLI data...Summer 2013.

Water-sat?