North American Land Surface Albedo and Nearshore Shallow-Bottom Properties from Landsat and MODIS/VIIRS

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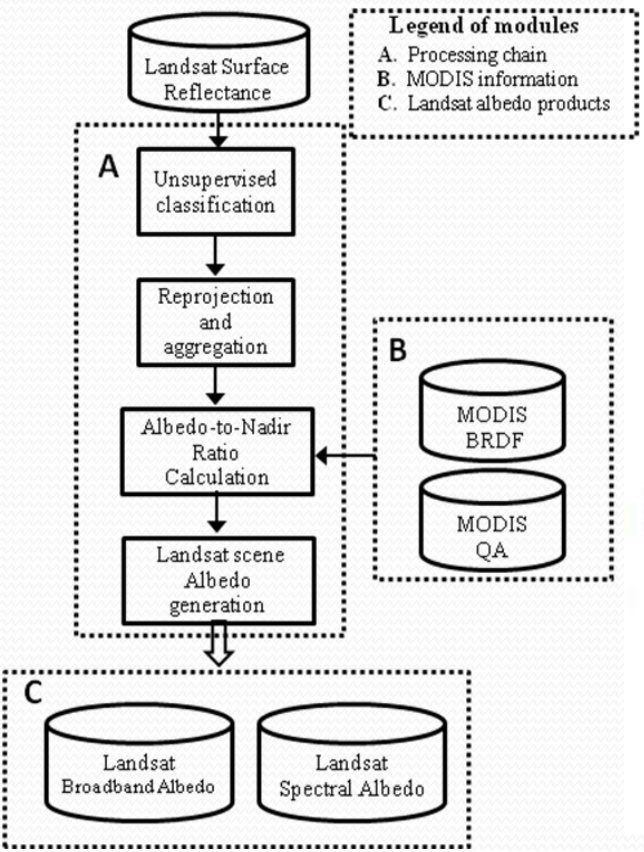
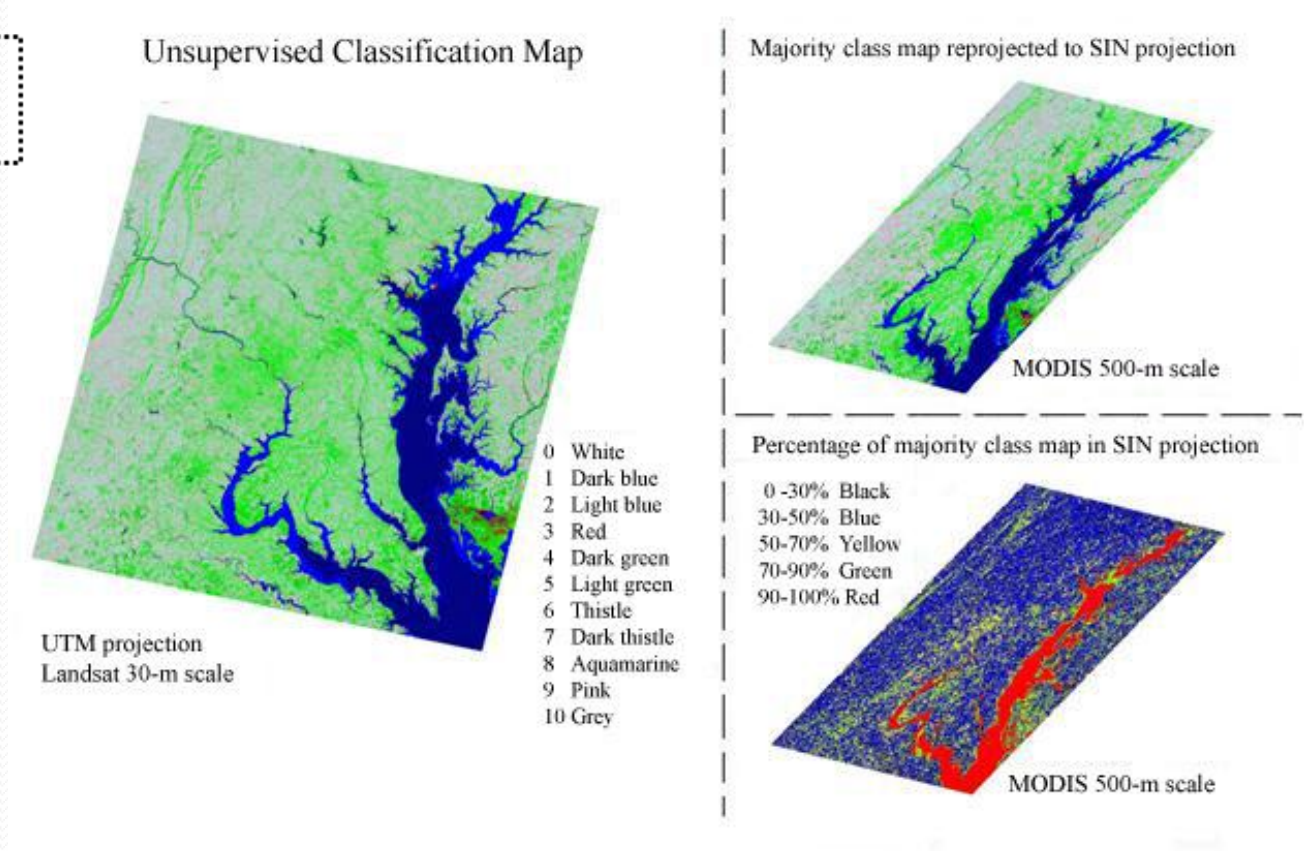
- Produce Land Surface Albedo over North America by coupling Landsat with MODIS daily BRDF/Albedo retrievals
- Extend through the Landsat-8 era with both MODIS and VIIRS BRDF/Albedo retrievals
- Extend to Nearshore Substrates (albedo and bathymetry) through the use of the extra OLI ocean channel (427-459nm) and improved signal-to-noise.
- Establish a framework for producing spectral albedo from future Landsat and moderate resolution missions

North American Land Surface Albedo

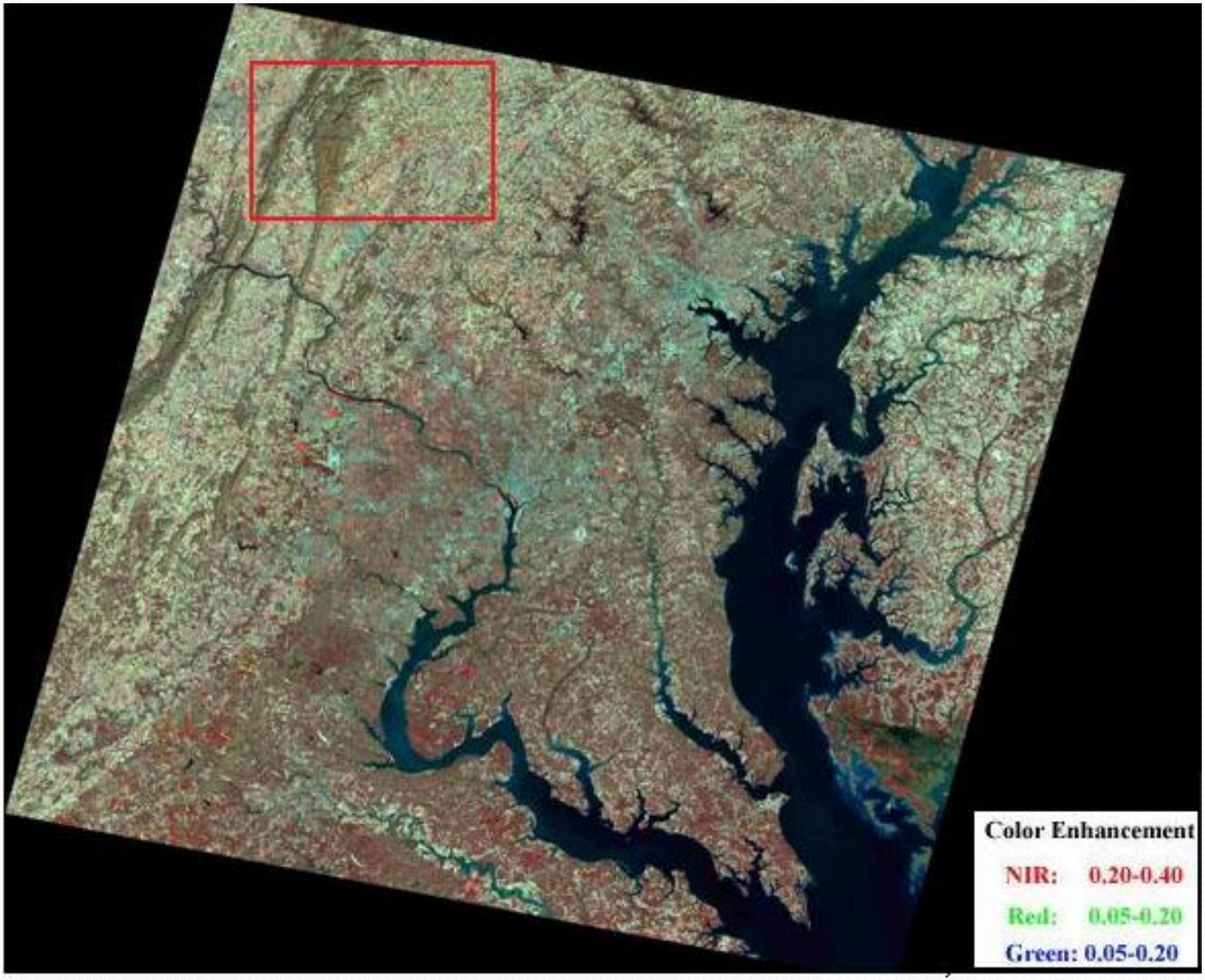


Data processing flow chart for the Concurrent Landsat Land Albedo

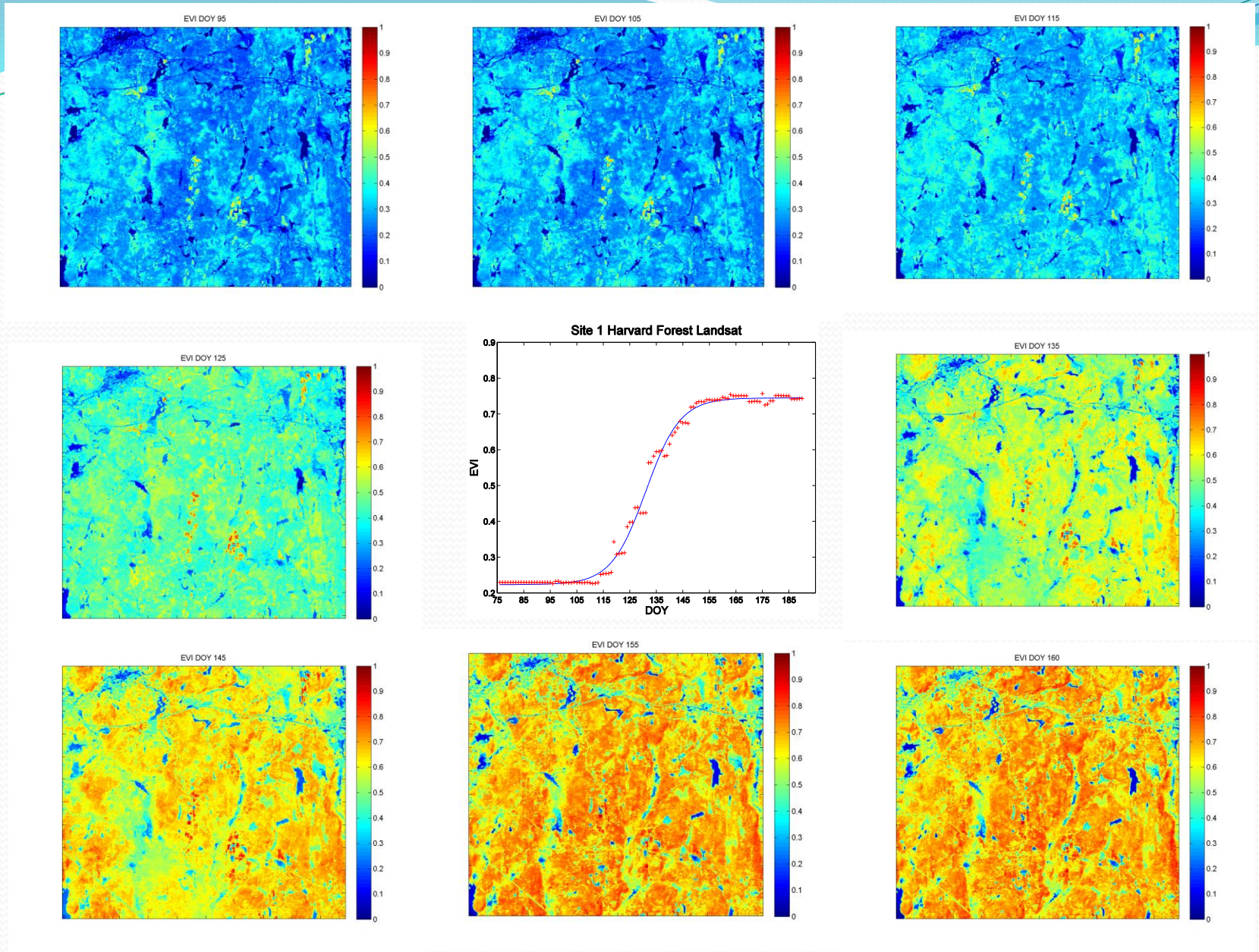


Upper left, a modified 30m unsupervised classification map in UTM of Maryland, DC, eastern Virginia, 19 March 2001, with a majority class map (upper right) and percentage map related to the aggregated majority class (lower right) at MODIS 500-m scale in SIN projection. (Shuai et al., 2011)

North American Land Surface Albedo



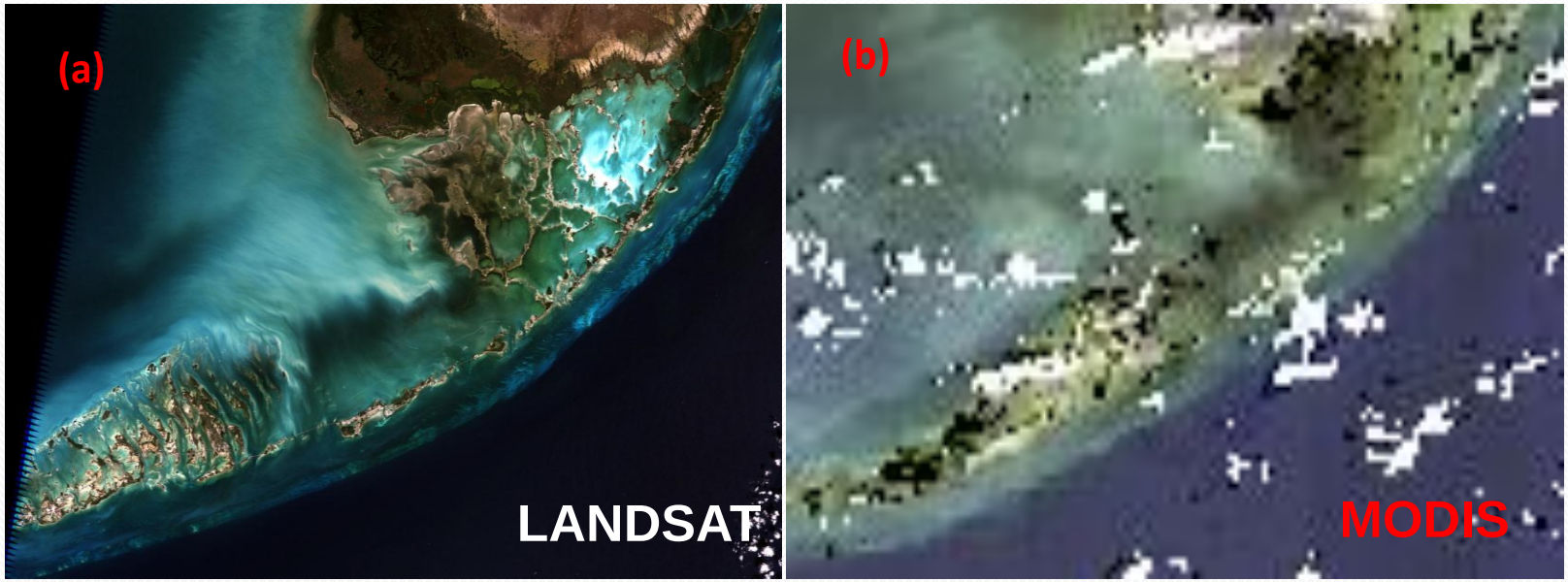
. *Resultant Landsat 30-m white-sky albedo image 19 March 2001(Shuai et al., 2011)*



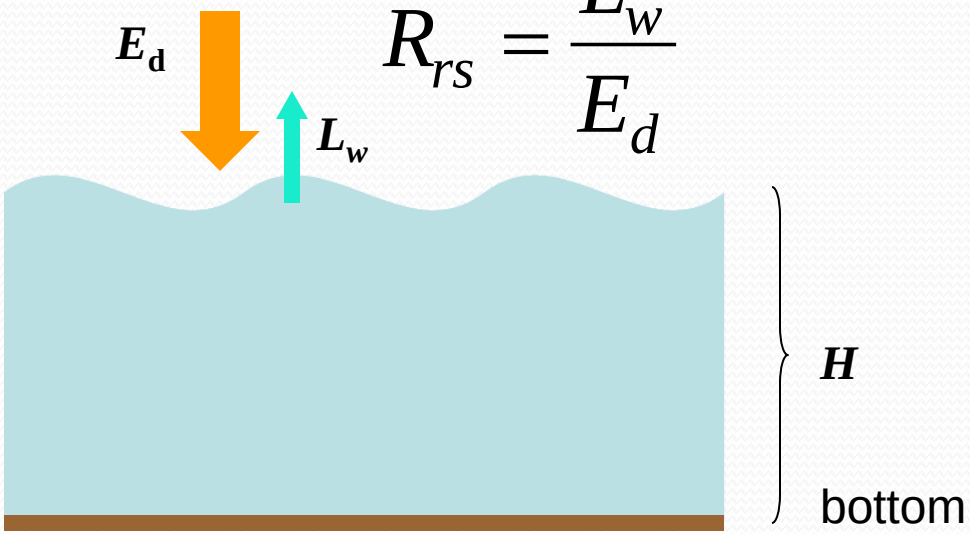
Time series of EVI at 30 m spatial resolution fused from Landsat surface reflectance and MODIS NBAR with the STARFM algorithm (Gao et al., 2006) at Harvard Forest

North American Nearshore Shallow-Bottom Properties

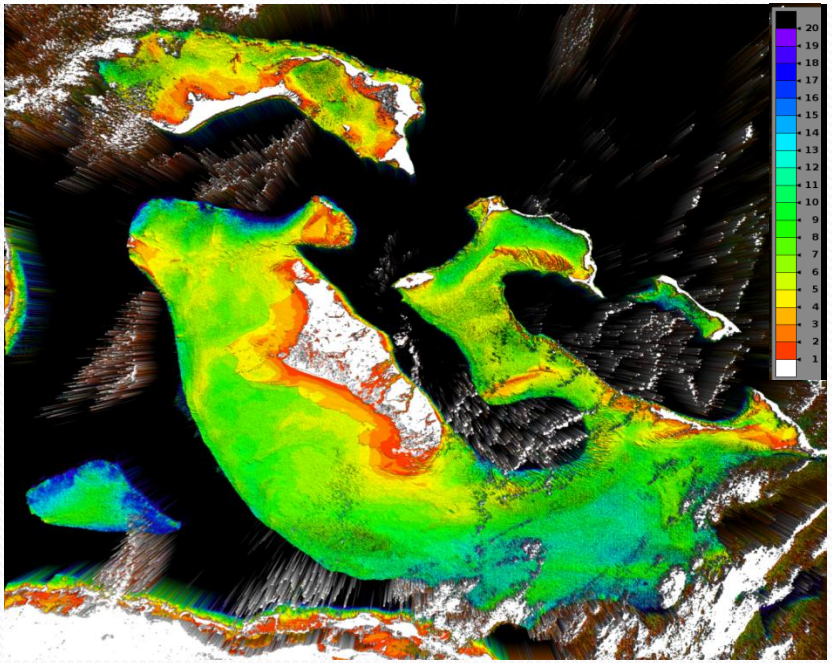
- **Obtain 30 m spatial-resolution shallow bottom properties (bathymetry and albedo) of near-shore regions by inverting coupled measurements from Landsat-8 OLI and MODIS/VIIRS**



Remote Sensing of Shallow Waters:



$$R_{rs} = \frac{L_w}{E_d}$$



Bathymetry of the Bahamas Bank derived from MERIS 300m

$$R_{rs}(\lambda) = F[\underbrace{a(\lambda), b_b(\lambda)}_{\text{Water property}}, \underbrace{\rho(\lambda), H}_{\text{bottom property}}]$$

a: absorption
b_b: back-scattering
ρ: bottom albedo
H: bottom depth

North American Land Surface Albedo and Nearshore Shallow-Bottom Properties from Landsat and MODIS/VIIRS

- North American Land Surface Albedo
  - MODIS and VIIRS (2000 to 2017)
- Nearshore Shallow-Bottom Bathymetry and Albedo
  - MODIS and VIIRS (2013-2017)
- Establish a framework for producing spectral albedo from future Landsat (Landsat-9) and other moderate resolution missions