

# Case Study: Using Sentinel-3 OLCI Data Products for Water Detection

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# Motivation for the Case Study

## Continuity of MODIS/Terra Data Products

- **Time-Synced Acquisition:**

Only ~30 minutes gap between OLCI (Sentinel-3A/B) and MODIS (Terra) acquisitions.

- **Consistent Resolution:**

Comparable temporal and spatial resolutions.

Spatial resolutions of OLCI data products are the Full Resolution (~300m) and Reduced Resolution (~1.2km). Temporal resolution of Land colour products is near daily (Table 1).

- **Near Real-Time Data Availability:**

ESA provides Sentinel-3A/B data products in Near Real-time (< 3 hours latency) including the Level-1 Top of Atmosphere Reflectance, Level-2 Water, and Level-2 Land and Atmospheric Geophysical data products.

Table 1: Global coverage revisit times for OLCI optical measurements

	Constellation configuration	Revisit at equator	Revisit for latitude > 30°	Specification
Ocean colour (sun-glint free, day only)	1 satellite	< 3.8 days	< 2.8 days	< 2 days
	2 satellites	< 1.9 days	< 1.4 days	
Land colour (day only)	1 satellite	< 2.2 days	< 1.8 days	< 2 days
	2 satellites	< 1.1 days	< 0.9 days	

# Identified Gaps in Current S3 OLCI Level-2 Data Products:

*The OLCI Level-2 surface reflectance data products are not suitable for water detection because they contain lots of missing values, which may be due to the inaccuracies in pixel classification for Water/Land during data processing.*

Figure 1. The spectral coverage of selected bands of MODIS and OLCI.

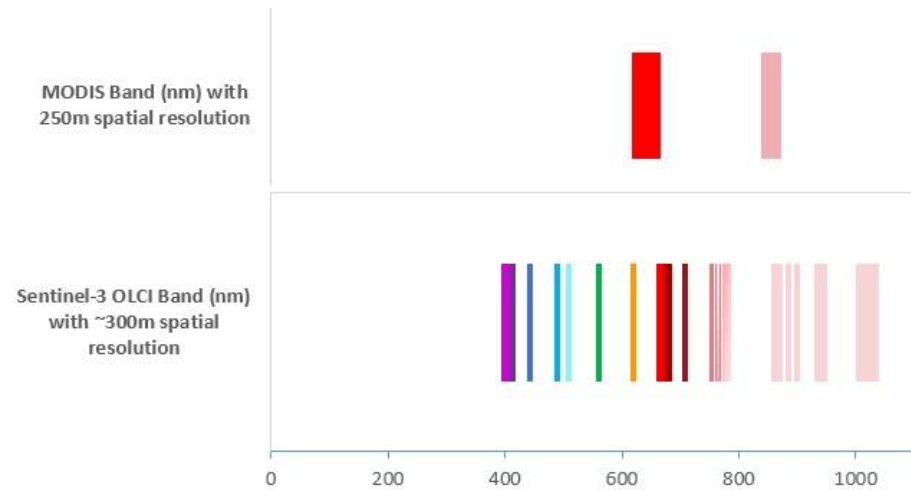
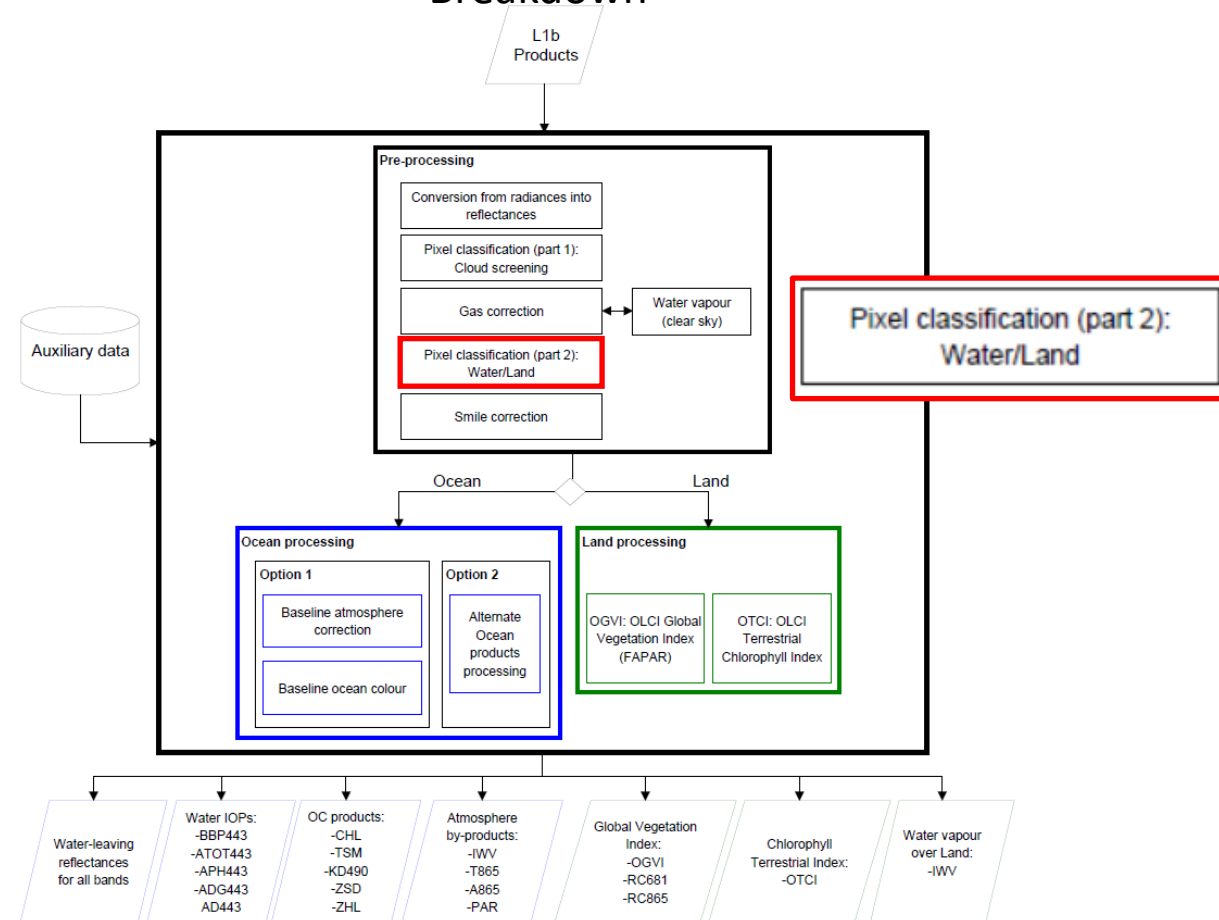
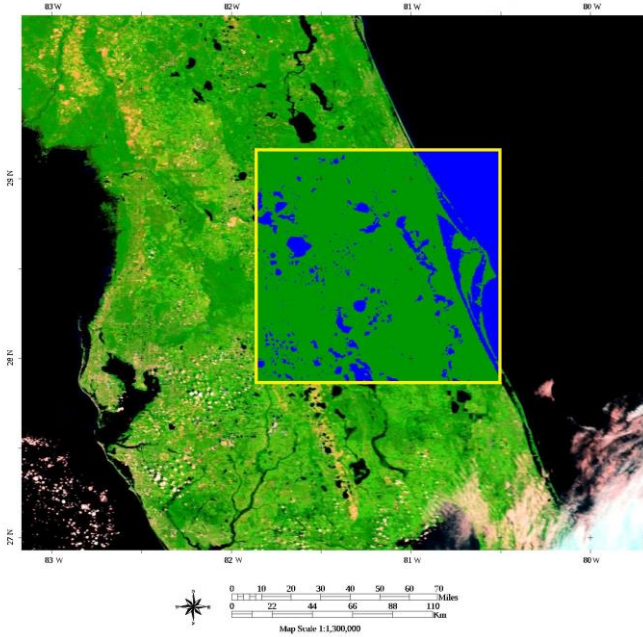


Figure 2. OLCI Level-2 Processing Top Level Breakdown

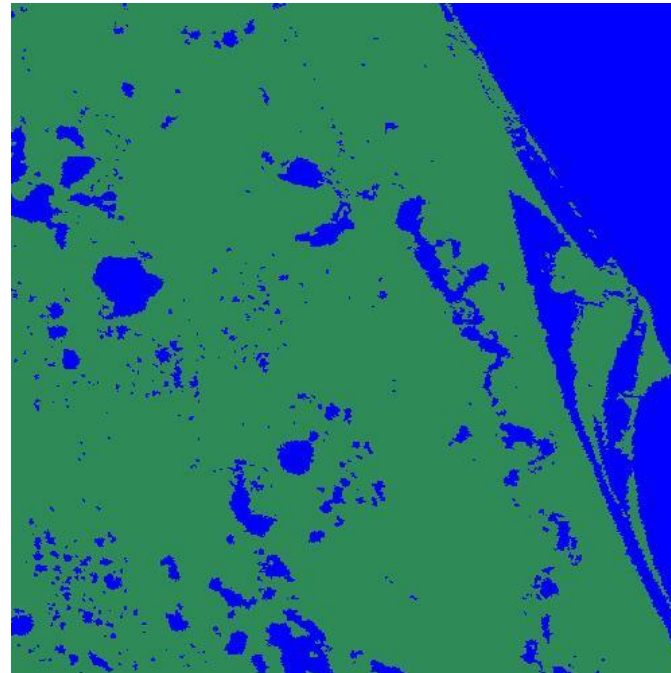


# Comparison of Water Detection Images

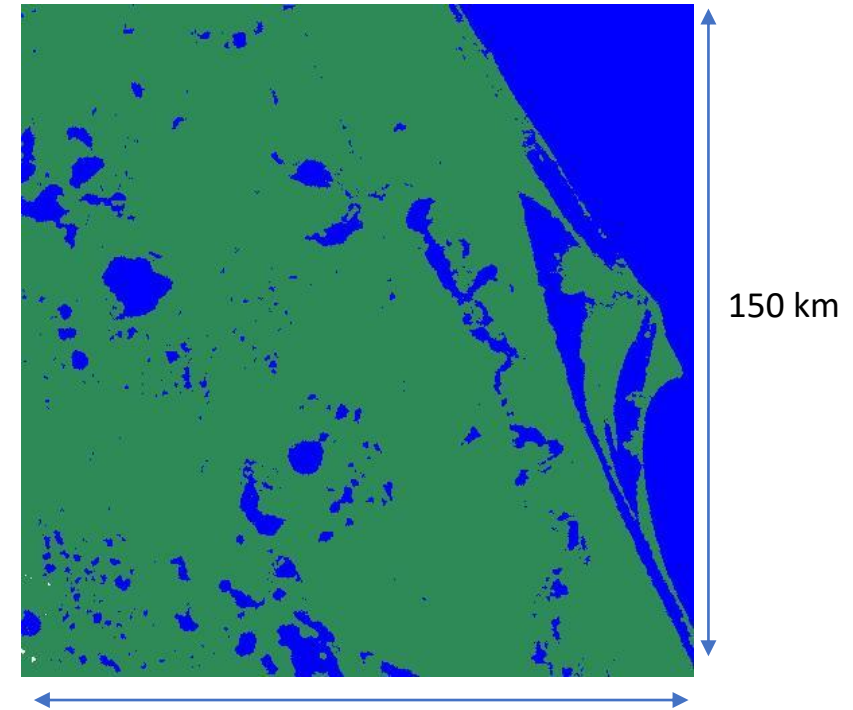
(Location: Florida, US. Date: 10/02/2022)



**MODIS/Terra**  
(250 m upscaled to 300 m spatial resolution)



**OLCI/S3B**  
(300 m spatial resolution)



**Preliminary Results:**  
97.41% of the pixels have identical classes. This indicates a high level of similarity between the two images.

Legend: Land; Water; Cloud.

150 km

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