**OPERA:** Observational Products for
End-Users from Remote Sensing Analysis

Dynamic Surface Water Extent (DSWx)

Why surface water extent?

Surface water is a highly dynamic component of the water cycle. Time varying information on the location and extent of surface water is critical for hydrologic science, water resource management and disaster response. The DSWx suite of products maps the surface water extent on a near-global geographical scale (all land masses except Antarctica).
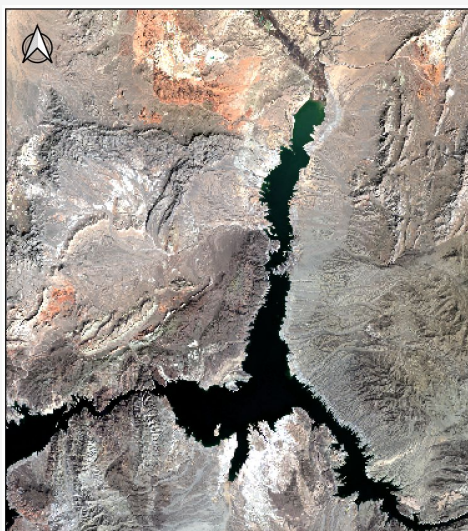
Landsat-8 true color image of Lake Mead, Nevada

OPERA DSWx-HLS
- No Water
- Open Water
- Partial Surface Water
- Cloud Mask
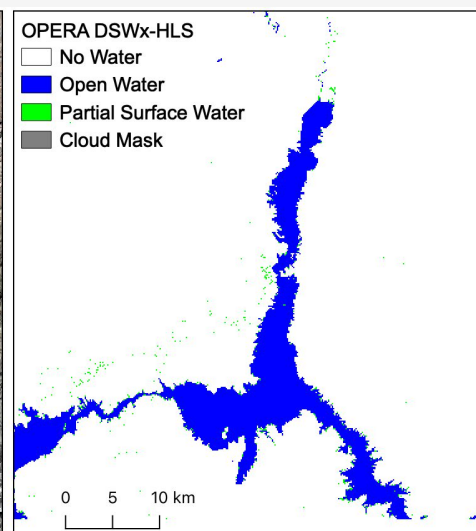
DSWx-HLS product created from the Landsat-8 image

What is DSWx made of?

Input sensors
- Optical: Harmonized Landsat/Sentinel-2 (HLS)
- Radar: Sentinel-1 (S1)
- Radar: NISAR
- Radar: Surface Water and Ocean Topography (SWOT)

→ Sensor specific water detection algorithms →

Output product suite:
- DSWx-HLS
- DSWx-S1
- DSWx-NISAR
- DSWx-SWOT

Impact on Use:

DSWx offers multi-sensor operational quantitative assessments of surface water at 30m resolution (TBD for DSWx-SWOT):
- Multi-sensor sampling improves revisit time, providing more temporally dense observations.
- Radar sensors provide complimentary observations to optical data by identifying water beneath clouds and vegetation.

Things to keep in mind:

Different sensors have different strengths and weaknesses:
- Optical sensors are blocked by clouds and dense vegetation. Radar can penetrate clouds, but different radar sensors have different sensitivities to vegetation and water surfaces.
- All DSWx products are provided as Analysis Ready Data on the same posting, but are not harmonized.
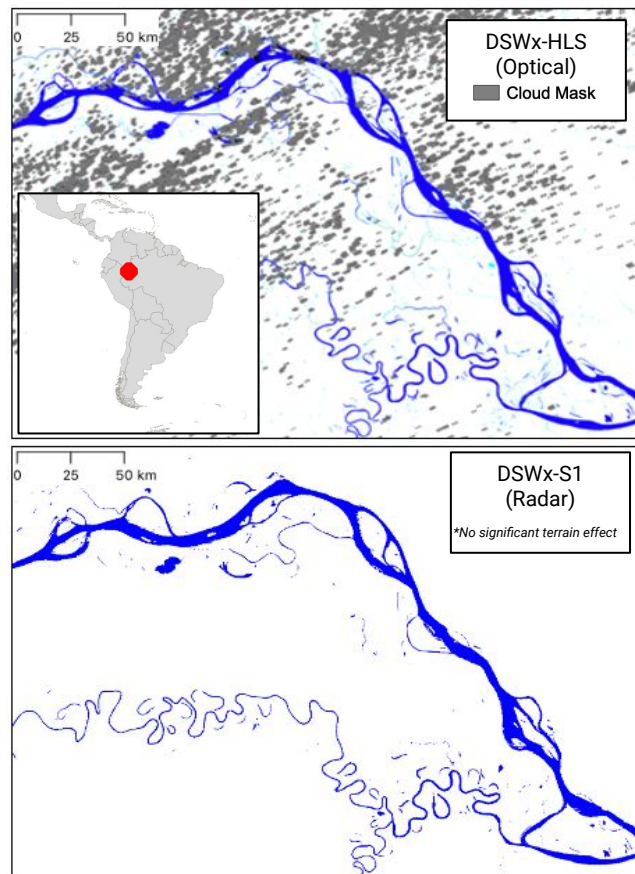
DSWx-HLS
(Optical)

Partial surface water

Obscured

Open water

0   7.5   15 km
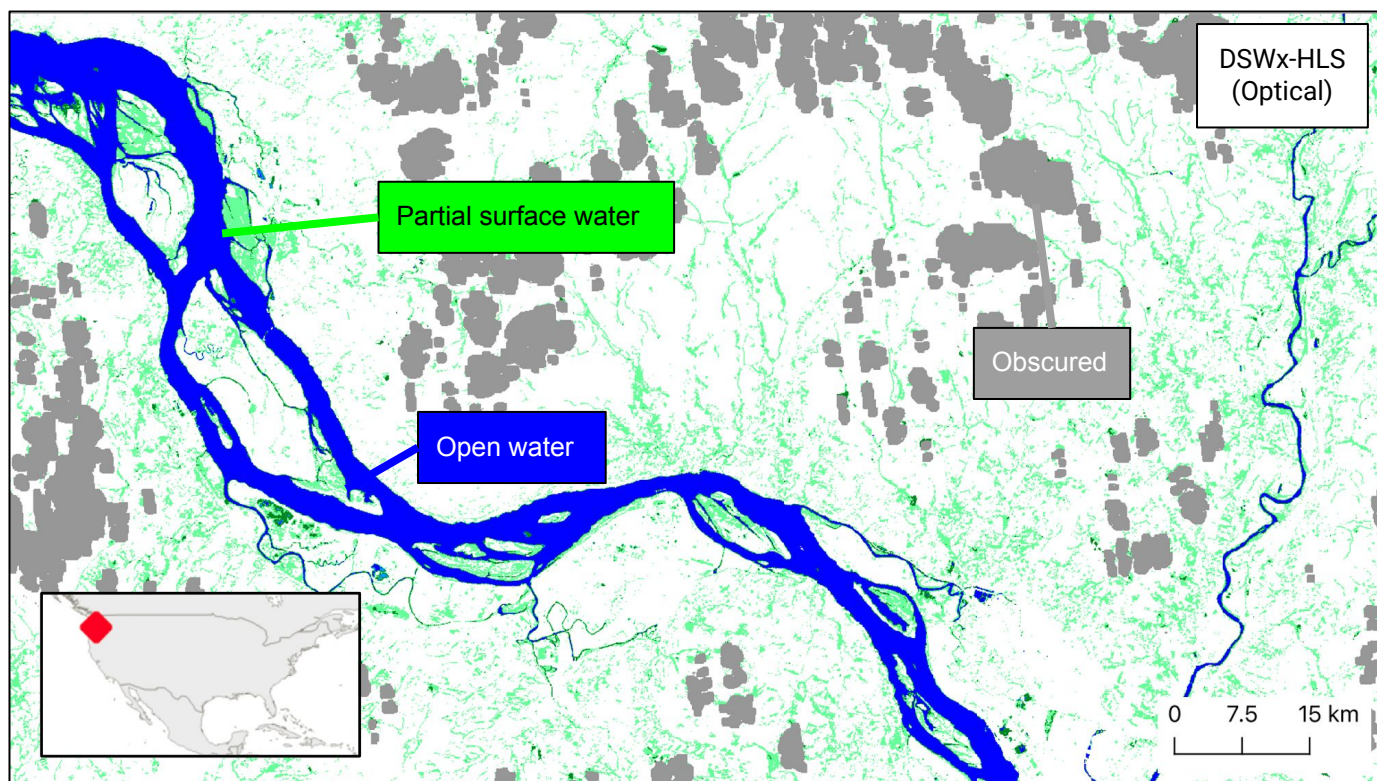
Interpretation

- <u>Open Water</u>: Pixel that is completely inundated and unobstructed to the sensor.
- <u>Partial Surface Water</u>: Pixel that is between 50% and 100% open water, for example, coastlines or sub-pixel sized water bodies.
- <u>Obscured</u>: Mask identifies areas that cannot be seen by the sensor (gray zones in figure to right). May represent clouds/cloud shadows in optical data or terrain effects in radar data.

0   25   50 km

DSWx-HLS
(Optical)

■ Cloud Mask

0   25   50 km

DSWx-S1
(Radar)

No significant terrain effect

Comparison to other products

Product	Sensor Type	Frequency	Coverage	Resolution
DSWx (OPERA)	Optical/ Radar	~2 Days	Near-Global	30m (SWOT TBD)
Global Surface Water Data (JRC)	Optical	Monthly	Near-Global	30m
DSWE (USGS)	Optical	8-16 days	US States and PR	30m