SWOT Raster: Update

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Current Status of the SWOT Raster Product

- Raster will be produced systematically at 100 m and 250 m resolutions over all regions where the pixel cloud is produced and there is water.

- We will use a fixed grid with fixed boundaries, divided into tiles of ~120 x 120 km, for raster storage and distribution.

- Raster will be produced in netCDF format, with on-demand processing to geoTIFF, JPEG2000, etc. to be discussed with data distribution centers.

- Raster will be provided in UTM coordinates, but we will aim to have on-demand processing from pixel cloud direct to lat/lon.

- Prototype software for producing the raster product has been developed at UNC (in python) and has been evaluated and added to by JPL (B. Williams).

Identifying Information

- Cycle Number
- Tile ID
- Time
- Projection Information

Data Fields

- Height (m)
- **Height Uncertainty (m)**
- Inundated Area (m^2 or %)
- **Inund. Area Uncert. (m^2)**
- Cross-track Distance (m)
- Average Sigma0 (dB)
- Sigma0 Uncertainty (dB)

Implemented (**New**)
Not implemented, simple
Not implemented, requires work

Current Raster Data Fields

Flags

- Data quality flag
- Low SNR
- Ice Cover
- Layover
- Geoid: geoid height above reference ellipsoid
- Geoid Slope
- Solid Earth tide model
- Pole tide model
- Orbit quality flag
- Instrument flags
- Wet tropospheric correction
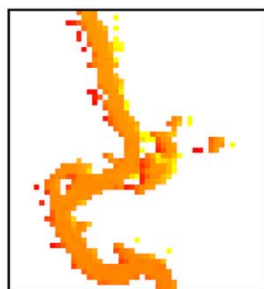- Dry tropospheric correction
- Ionospheric correction
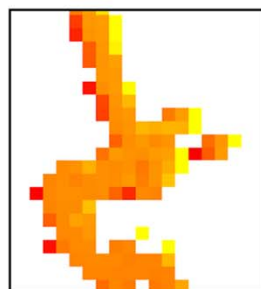
Sacramento Example
Water Surface Elevation

cycle_0001_pass_0249_001L_nlcd-5dB_water10dB
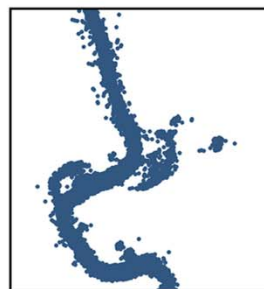
	Mean elev (m)	Std elev (m)
Point	-2.88	2.83
100-m raster	-2.41	6.69
250-m raster	-1.95	8.03

Sacramento Example
Water Surface Elevation Uncertainty

cycle_0001_pass_0249_001L_nlcd-5dB_water10dB
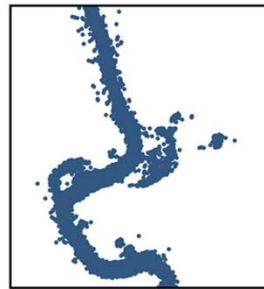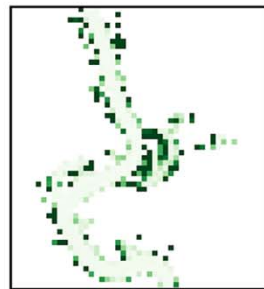
Cloud points | 100-m raster | 250-m raster

Height uncertainty (m)

0   2.5   5
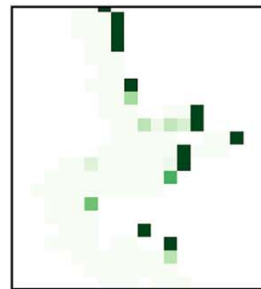
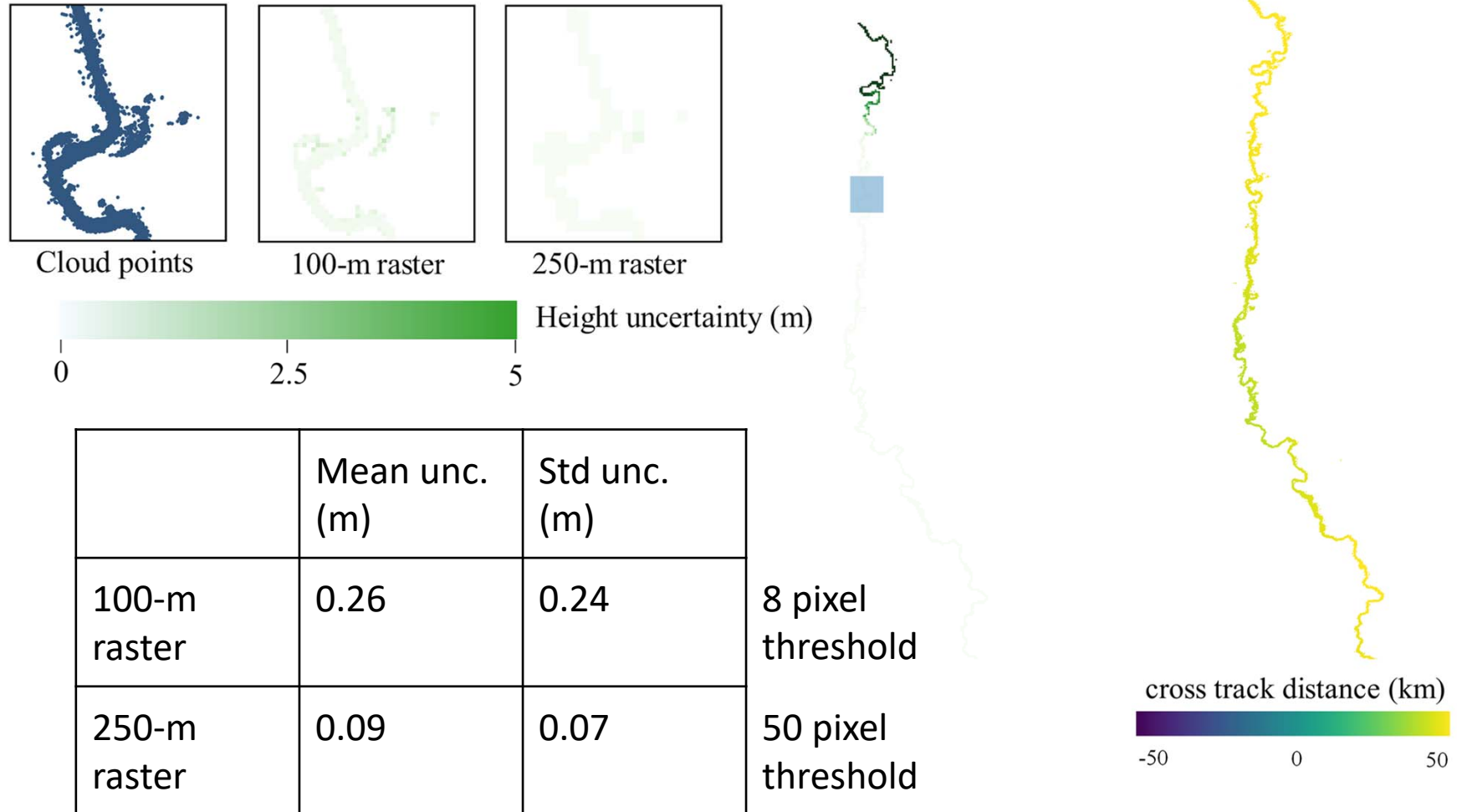|	Mean unc. (m)	Std unc. (m)
100-m raster	6.90	30.17
250-m raster	3.31	6.92

cross track distance (km)

-50   0   50

Note: uncertainty does not contain all systematic errors

Sacramento Example
Water Surface Elevation Uncertainty (Threshold)

cycle_0001_pass_0249_001L_nlcd-5dB_water10dB

Cloud points   100-m raster   250-m raster

Height uncertainty (m)

0   2.5   5

|	Mean unc. (m)	Std unc. (m)	
100-m raster	0.26	0.24	8 pixel threshold
250-m raster	0.09	0.07	50 pixel threshold

cross track distance (km)

-50   0   50

Note: uncertainty does not contain all systematic errors

Sacramento Example
Inundation Extent (% of Pixel Area)

cycle_0001_pass_0249_001L_nlcd-5dB_water10dB

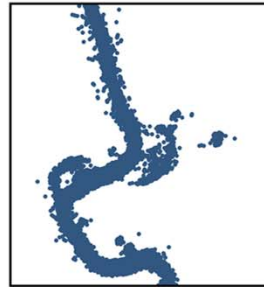Cloud points   100-m raster   250-m raster

Water fraction (%)

0   50   100

cross track distance (km)

-50   0   50
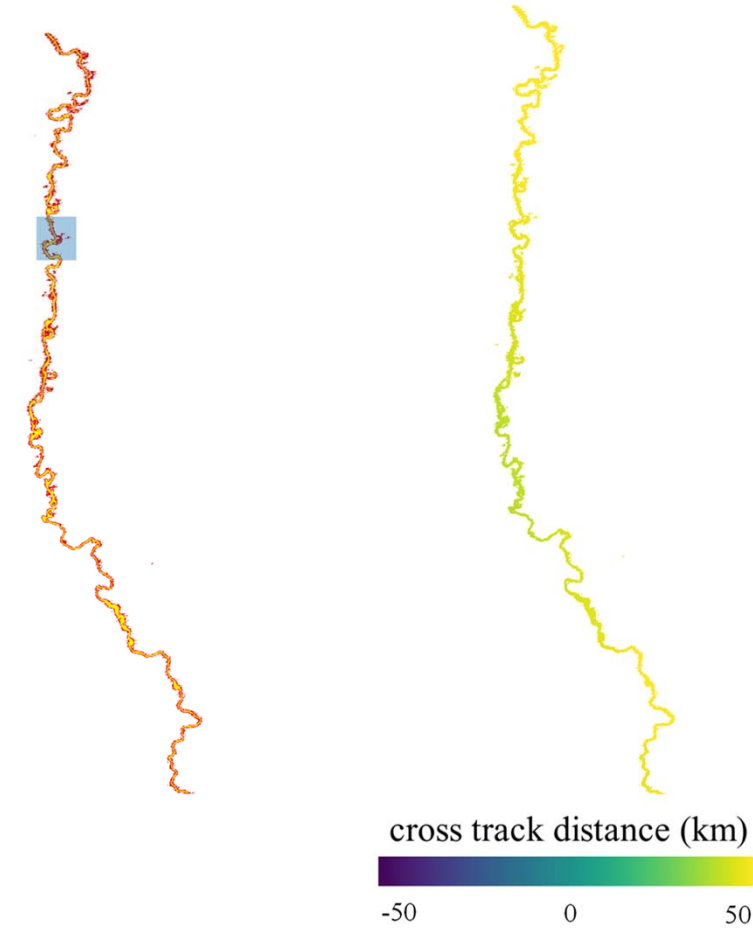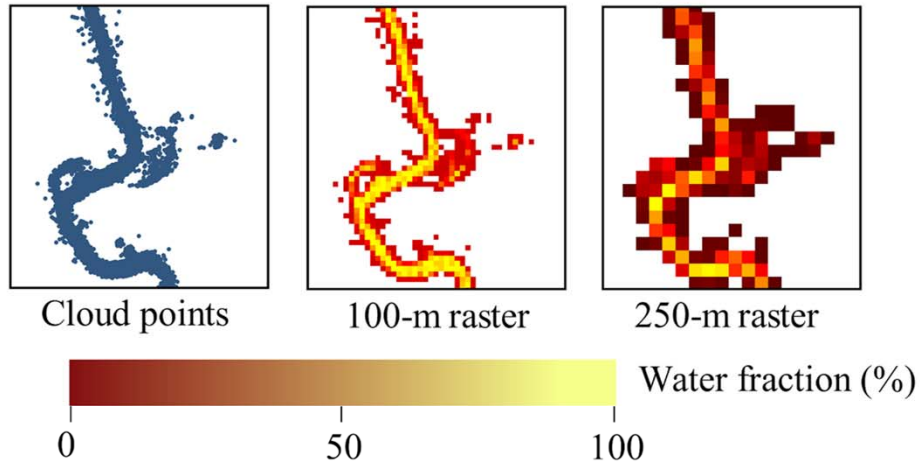
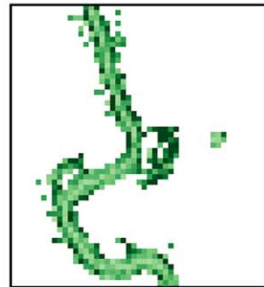|	Mean area (%)	Std area (%)
100-m raster	40.64	40.28
250-m raster	24.31	28.82

Sacramento Example
Inundation Extent Uncertainty

cycle_0001_pass_0249_001L_nlcd-5dB_water10dB
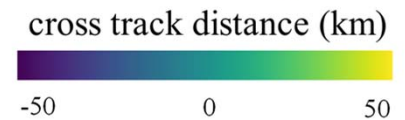
Cloud points   100-m raster   250-m raster

Area fraction uncertainty

0   5.0   10 (%)
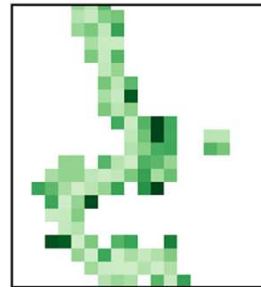
	Mean unc. (%)	Std unc. (%)
100-m raster	7.48	3.21
250-m raster	4.89	2.37

cross track distance (km)

-50   0   50

Current Status Summary

- We can successfully compute WSE, WSE uncertainty, Inundated Area Fraction, and Inundated Area Uncertainty in a raster context

- Water Surface Elevations in the raster should not be interpreted in isolation from inundated area fraction.

- Inundation extent does not have the same issues as water surface elevation.

- Goals going forward:
  - Incorporate additional variables
  - Test on further cases
  - Share code & documentation with ST, JPL, CNES colleagues for feedback and additions