



2021 Delta-X Open Data Workshop

November 17, 2021

DATASETS

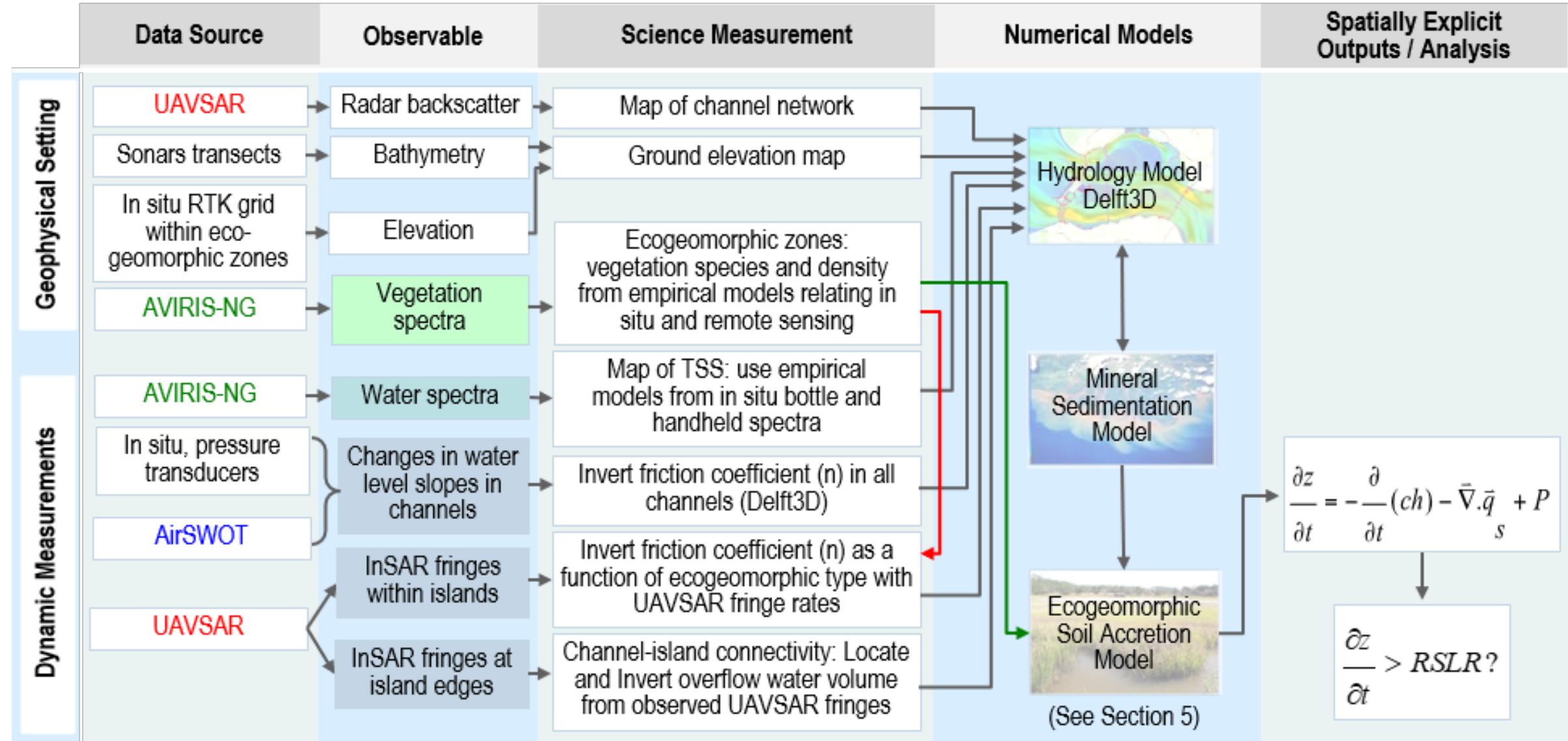
Summary

River deltas and their wetlands are drowning as a result of sea level rise and reduced sediment inputs. The Delta-X mission (NASA EVS-3) will determine which parts will survive and continue to grow, and which parts will be lost. The Delta-X team has completed their Spring and Fall 2021 airborne and field campaigns. Learn about the data and how to access it.

Agenda

- 2:00 PM Introduction to Delta-X
- 2:20 PM Datasets**
- 2:50 PM Data Location & Access
- 3:40 PM Discussion & Questions
- 4:00 PM End of workshop

Delta-X: Measurements-to-Models Flowdown



Delta-X NASA Airborne Instrument Collections

Instrument	Spring 2021	Fall 2021	Product Delivery (after end of field campaign)
UAVSAR	Collected (high, low, rising tides)	Collected (high, rising tides)	6 months (L1), 9 months (L2 & L3)
AVIRIS-NG	Collected	Collected	6 months (L1), 9 months (L2), 12 months (L3)
AirSWOT	Collected (high, low, rising tides)	Collected (high, low, rising tides)	6 months (L1), 9 months (L2 & L3)

Pre-Delta-X data is available from 2015 and 2016

- Subset of data acquired during Delta-X
- Data from different instruments not collected concurrently
- Some data products are available from the repository



Delta-X: Dataset Overview

Product Level	Description
L0	Field / in situ data
L1	Raw airborne instrument data (not geocoded, without all corrections applied)
L2	Geocoded and calibrated airborne instrument data
L3	Remote sensing derived information
L4	Science products / models



Spring and Fall 2021 Field / In Situ Data Collections (1)

Field Measurements	Spring 2021	Fall 2021
Water level gauges	Collected	Collected
GPS	<i>Not collected</i>	Collected
Sonar	<i>Not collected</i>	Collected
ADCP (water velocity)	Collected	Collected
Total suspended sediments (TSS) concentration from discrete water samples	Collected	Collected
Particulate organic carbon (POC) concentrations	Collected	Collected
Water quality indicators	Collected	Collected
In situ remote-sensing reflectance $R_{rs}(l)$ of water from field spectrometer	Collected	Collected
In situ beam attenuation and particle size distribution from LISST sensor	Collected	Collected
Vegetation structure	Collected	Collected
Sediment core	Collected	Collected
Soil accretion (feldspar plots)	Collected	Collected

*Spring campaign ended Apr 24, 2021.
Fall campaign ended Sep 25, 2021.*



Spring and Fall 2021 Field / In Situ Data Collections (1)

Field Measurements	Spring 2021	Fall 2021	Fall delivery date
Water level gauges	Collected	Collected	
GPS	<i>Not collected</i>	Collected	
Sonar	<i>Not collected</i>	Collected	
ADCP (water velocity)	Collected	Collected	
Total suspended sediments (TSS) concentration from discrete water samples	Collected	Collected	
Particulate organic carbon (POC) concentrations	Collected	Collected	
Water quality indicators	Collected	Collected	3/25/2022
In situ remote-sensing reflectance $R_{rs}(l)$ of water from field spectrometer	Collected	Collected	
In situ beam attenuation and particle size distribution from LISST sensor	Collected	Collected	
Vegetation structure method	Collected	Collected	
Sediment core	Collected	Collected	
Soil accretion (feldspar plots)	Collected	Collected	

Spring campaign ended Apr 24, 2021.

Fall campaign ended Sep 25, 2021.

All delivered to the data repository (ORNL DAAC)



Spring and Fall 2021 Field / In Situ Data Collections (2)

Field Measurements	Spring 2021	Fall 2021	Fall Delivery Date
Anemometers	<i>Not collected</i>	Collected	
Turbidity sensor (within islands)	Collected	Collected	
Suspended and bed-sediment samples for concentration and grain size (transects)	Collected	Collected	3/25/2022
Fallout radionuclide (^{210}Pb , ^{137}Cs)	<i>Not collected</i>	Collected	

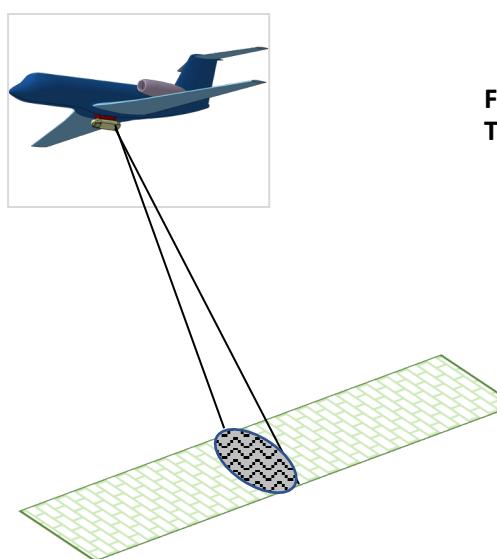
All delivered to the data repository (ORNL DAAC)



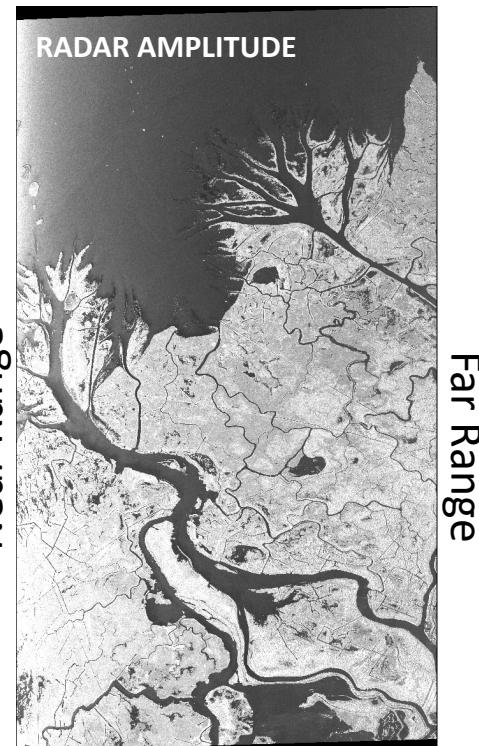
Spring campaign ended Apr 24, 2021. Fall campaign ended Sep 25, 2021.

Delta-X: Dataset Overview

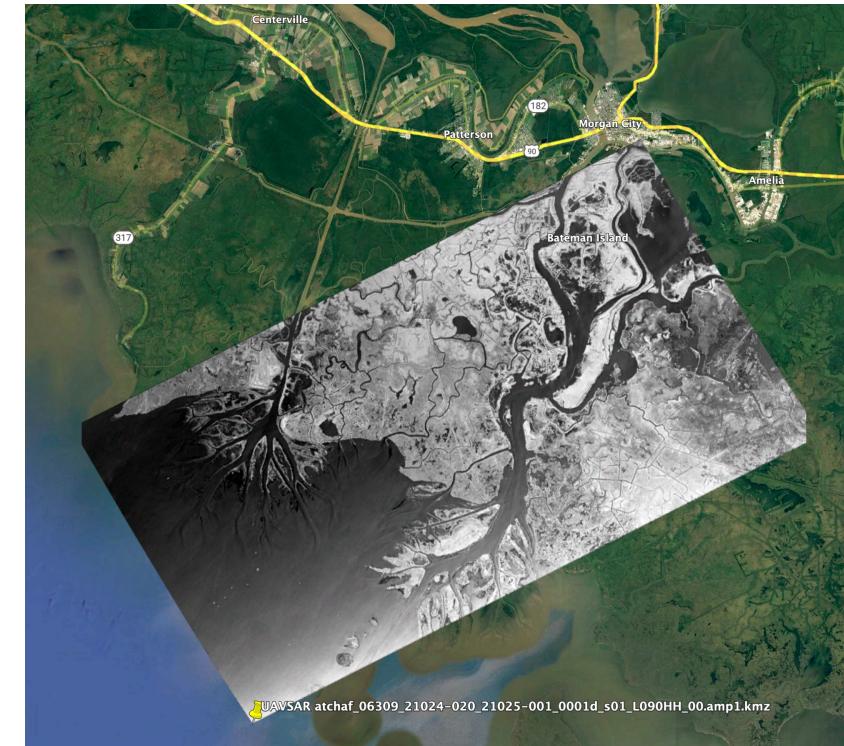
Product Level	Description
L0	Field / in situ data
L1	Raw airborne instrument data (not geocoded, without all corrections applied)
L2	Geocoded and calibrated airborne instrument data
L3	Remote sensing derived information
L4	Science products / models



Level 1 (radar coord.)



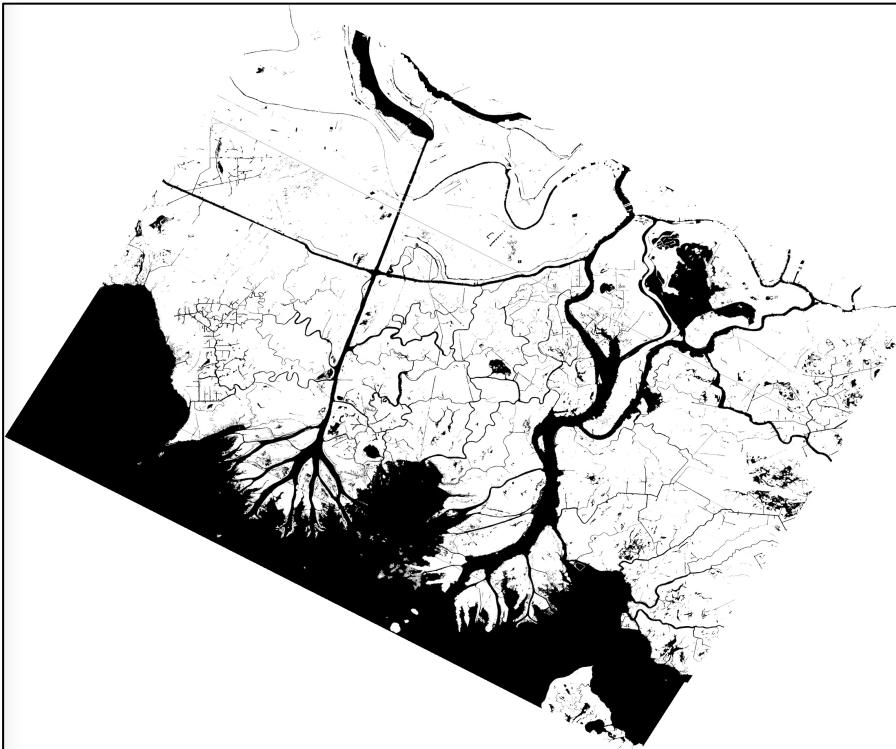
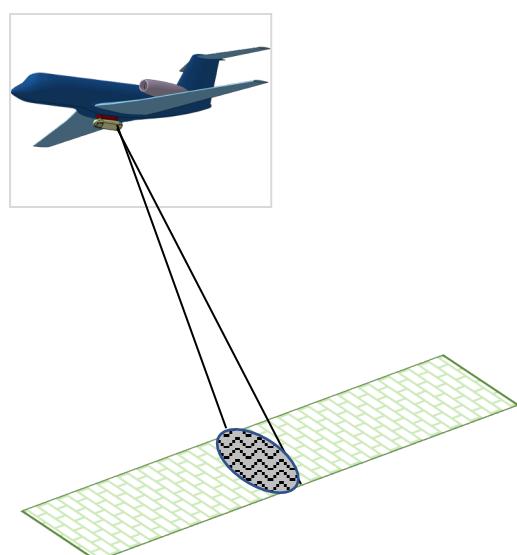
Level 2 (georeferenced)



Delta-X: Dataset Overview

Product Level	Description
L0	Field / in situ data
L1	Raw airborne instrument data (not geocoded, without all corrections applied)
L2	Geocoded and calibrated airborne instrument data
L3	Remote sensing derived information
L4	Science products / models

Level 3 Example – Water Channel Map



From Pre-Delta-X 2016 campaign
Data available at the ORNL DAAC
https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1954



Delta-X: Data Overview

Product Level	Description
L0	Field / in situ data
L1	Raw airborne instrument data (not geocoded, without all corrections applied)
L2	Geocoded and calibrated airborne instrument data
L3	Remote sensing derived information
L4	Science products / models



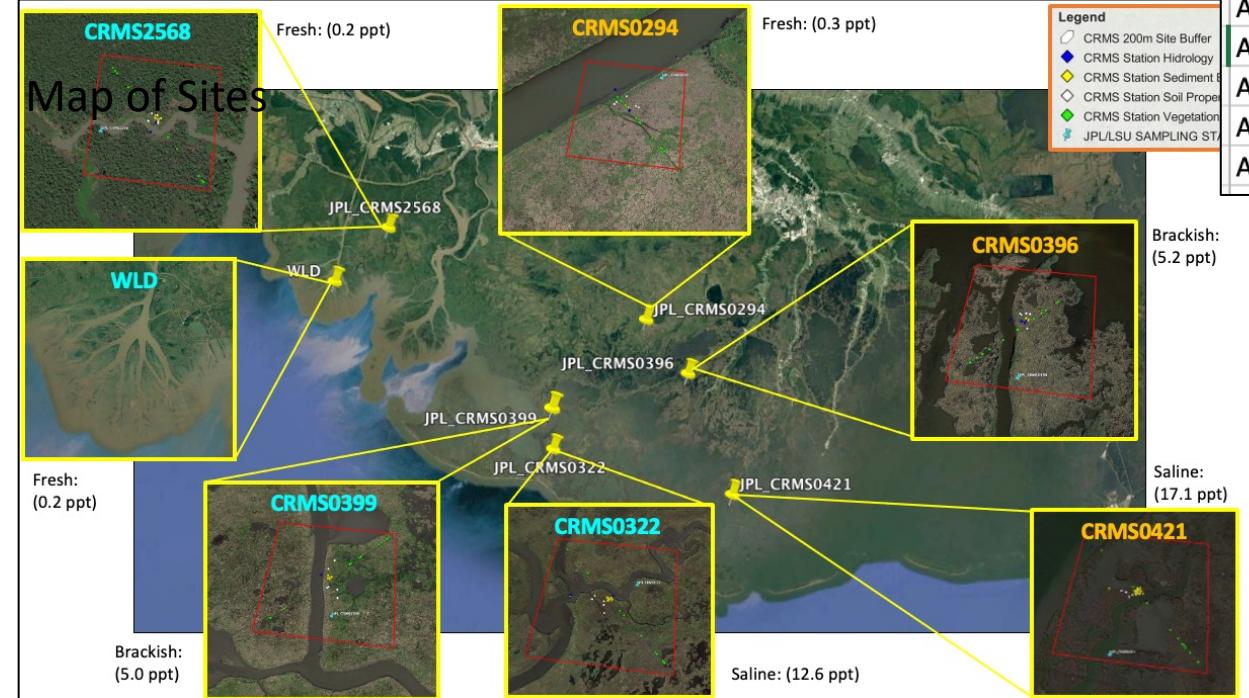
Level 4 Derived Products & Models

Level	Deliverable Product / Model	Delivery Date
4	Map of bathymetry/elevation	Due 03/25/2023
	Map of friction coefficient in channels	Due 03/25/2023
	Map of friction coefficient in wetlands	Due 03/25/2023
	Relationship of friction coefficient with vegetation structure	Due 03/25/2023
	Calibrated hydrodynamic model for MRD	Due 05/25/2023
	Discharge in channels from model	Due 05/25/2023
	Flow in wetlands from model	Due 05/25/2023
	Mineral sediment deposition model	Due 05/25/2023
	Map vegetation belowground biomass	Due 03/25/2023
	Calibrated NUMAN/MEM for MRD (Plant Productivity Model)	Due 03/25/2023
	Ecosystem biomass model	Due 03/25/2023
	Validated soil accretion at annual time steps to year 2024	Due 03/24/2024
	Map of soil accretion at annual time steps to year 2100	Due 03/24/2024

Spring campaign ended Apr 24, 2021. Fall campaign ended Sep 25, 2021.



Example In Situ Data Set – Soil Properties



Citation

Castañeda-Moya, E., and E. Solohin. 2021. Delta-X: Soil Properties for Herbaceous Wetlands across MRD, LA, USA, 2021. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAA/1995>

Data File: DeltaX_Soil_Properties_Spring2021.csv

basin	campaign	date	latitude	longitude	site_id	hydrogeomorphic_zone	sampling_station
Atchafalaya	Spring_2021	3/29/21	29.51017	-91.44492	Mike Island	Supratidal	1
Atchafalaya	Spring_2021	3/29/21	29.51017	-91.44492	Mike Island	Supratidal	1
Atchafalaya	Spring_2021	3/29/21	29.51017	-91.44492	Mike Island	Supratidal	1
Atchafalaya	Spring_2021	3/29/21	29.51017	-91.44492	Mike Island	Supratidal	1
Atchafalaya	Spring_2021	3/29/21	29.51017	-91.44492	Mike Island	Supratidal	1
Atchafalaya	Spring_2021	3/29/21	29.50993	-91.44512	Mike Island	Supratidal	2
Atchafalaya	Spring_2021	3/29/21	29.50993	-91.44512	Mike Island	Supratidal	2
Atchafalaya	Spring_2021	3/29/21	29.50993	-91.44512	Mike Island	Supratidal	2
Atchafalaya	Spring_2021	3/29/21	29.50993	-91.44512	Mike Island	Supratidal	2
Atchafalaya	Spring_2021	3/29/21	29.50993	-91.44512	Mike Island	Supratidal	2

soil_core_id	depth_inter_val	soil_bulk_density	soil_organic_matter_content	soil_total_carbon_density	soil_total_nitrogen_density	soil_total_phosphorus_density
1	0-10 cm	0.761	6.8	13.4	0.93	0.45
1	10-20 cm	0.754	5.5	16	1.28	0.65
1	20-30 cm	0.836	6.3	11.5	0.85	0.69
1	30-40 cm	0.871	5.5	11.3	0.93	0.59
1	40-50 cm	0.751	6.6	11.8	0.94	0.45
2	0-10 cm	0.719	7	11.7	0.91	0.47
2	10-20 cm	0.815	7.3	14.2	1.09	0.56
2	20-30 cm	0.789	7.8	16.6	1.23	0.54
2	30-40 cm	0.746	7.3	12.5	0.92	0.68
2	40-50 cm	0.929	6	12.7	1.11	0.74



Example In Situ Data Set – Soil Accretion

Delta-X: Feldspar sampling – Fall 2020 and Spring 2021 Campaigns

Dataset Authors (listed in the order they will appear in the data citation)

Name	Affiliation	Email	ORCID ID (optional)
Robert Twilley	Louisiana State University	r_twilley@lsu.edu	0000-0002-6173-6033
Amanda Fontenot Cassaway	Louisiana State University	a_font78@lsu.edu	
Andre Rovai	Louisiana State University	a_rovai1@lsu.edu	0000-0003-4117-2055



Documentation: Ex. entries in Data Description Table

time_marker_sampled	Year-Month-Day Hour:minutes:seconds	Date and time feldspar marker horizon plots were sampled
sediment_accretion	millimeter	Height of sediment accreted on top of feldspar marker horizon plots since deployment date
days_between_sampling_and_deployment	days	Number of days between feldspar marker horizon plots deployment and sampling event
normalized_accretion	millimeter per year	Yearly normalized sediment accretion (mm yr^{-1}) obtained by multiplying sediment accretion (mm) by 365 days per year and then dividing the result by the number of days between feldspar marker horizon plots deployment and sampling event
soil_bulk_density	grams per cubic centimeter	Soil bulk density calculated from the sample's dry weight divided by its wet volume. Wet volume determined from the cross-sectional area of the core (cm^2) multiplied by the length the soil column interval (cm)
soil_organic_matter_content	percentage (% of dry mass)	Organic matter content determined by loss on ignition
soil_organic_carbon	percentage (% of dry mass)	Percent organic carbon determined on acid-fumigated soil samples using elemental analyzer
soil_organic_carbon_density	grams per cubic centimeter	Soil organic density obtained by multiplying sample's bulk density (g cm^{-3}) by its organic carbon fraction (g g^{-1}).

Example In Situ Data Set – Water Quality

Citation

Fichot, C.G., J. Harringmeyer, and M. Weiser. 2021. Delta-X: In Situ Water Quality Indicators across MRD, LA, USA, 2021. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAAC/1992>



Figure 1: ProDSS probe being deployed by hand off the side of the boat (left), and picture of the probe submerged in the turbid waters of the study area (right).

turbidity	FNU	average turbidity	No
standard_deviation_of_turbidity	FNU	Standard deviation of turbidity	No
salinity	PSU	average salinity	No
standard_deviation_of_salinity	PSU	Standard deviation of salinity	No
temperature	°C	average temperature	No
standard_deviation_of_temperature	°C	Standard deviation of temperature	No
chlorophyll_a_fluorescence	$\mu\text{g L}^{-1}$	average chlorophyll-a fluorescence	No
standard_deviation_of_chlorophyll_a_fluorescence	$\mu\text{g L}^{-1}$	Standard deviation of chlorophyll-a fluorescence	No

Example In Situ Data Set – Water Reflectances

Documentation File

Delta-X: Remote-sensing Reflectance Measurements from Above-water Radiometry - Spring 2021 Field Campaign

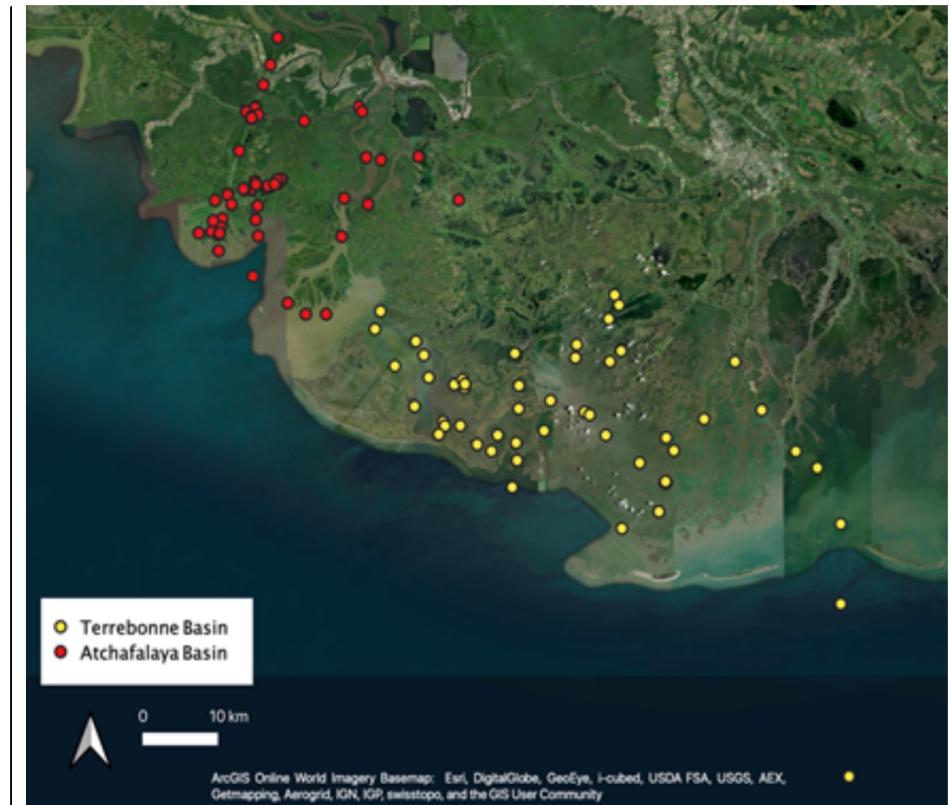
Working Title

Delta-X: Remote-sensing Reflectance Measurements from Above-water Radiometry – Spring 2021 Campaign

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Dataset Authors (listed in the order they will appear in the data citation)

Name	Affiliation	Email	ORCID ID (optional)
Cedric Fichot	Boston University	cgfichot@bu.edu	
Joshua Harringmeyer	Boston University	joshuaph@bu.edu	



Data file:
**DeltaX_WaterReflectance
_PSR_Spring2021.csv**

site_id	basin	campaign	latitude	longitude	date	time	Rrs360	uncertainty_Rrs360	Rrs361	uncertainty_Rrs361	Rrs362	uncertainty_Rrs362	Rrs363	uncertainty_Rrs363	unc
TB_0405_D1	Terrebonne	Spring 2021	29.262435	-90.935865	4/5/21	20:34	0.001807	2.28E-04	0.001819	2.20E-04	0.001839	2.15E-04	0.001868	2.15E-04	2
TB_0405_S1	Terrebonne	Spring 2021	29.3433121	-90.885895	4/5/21	15:30	8.74E-04	1.45E-04	8.71E-04	1.36E-04	8.73E-04	1.28E-04	8.81E-04	1.28E-04	1
TB_0405_S2	Terrebonne	Spring 2021	29.2587825	-90.928929	4/5/21	17:15	0.002043	3.20E-04	0.002045	3.26E-04	0.002057	3.33E-04	0.002073	3.33E-04	3
TB_0405_S3	Terrebonne	Spring 2021	29.1335246	-90.83353	4/5/21	18:15	0.002301	7.67E-05	0.002315	8.15E-05	0.002335	8.58E-05	0.00236	8.58E-05	9
TB_0405_S4	Terrebonne	Spring 2021	29.1707946	-90.825446	4/5/21	19:18	0.002129	1.92E-04	0.002127	1.83E-04	0.002135	1.74E-04	0.002152	1.74E-04	1
TB_0406_D1	Terrebonne	Spring 2021	29.293538	-91.101512	4/6/21	16:05	0.002088	2.07E-04	0.002101	1.98E-04	0.00212	1.89E-04	0.002143	1.89E-04	1
TB_0406_S1	Terrebonne	Spring 2021	29.3359338	-91.157578	4/6/21	14:48	0.003935	3.95E-04	0.003947	4.00E-04	0.003967	3.96E-04	0.003991	3.96E-04	3
TB_0406_S2	Terrebonne	Spring 2021	29.293538	-91.101512	4/6/21	16:05	7.57E-04	1.06E-04	7.72E-04	1.03E-04	7.90E-04	9.39E-05	8.13E-04	9.39E-05	8
TB_0406_S3	Terrebonne	Spring 2021	29.3381965	-91.032071	4/6/21	17:08	0.001563	1.76E-04	0.00156	1.72E-04	0.001565	1.69E-04	0.001576	1.69E-04	1
TB_0408_S1	Terrebonne	Spring 2021	29.3414759	-90.885694	4/8/21	17:10	0.00181	6.18E-05	0.001811	6.28E-05	0.001819	6.78E-05	0.001831	6.78E-05	7
TB_0408_S2	Terrebonne	Spring 2021	29.3276837	-90.901028	4/8/21	18:09	0.002676	4.56E-04	0.002668	4.61E-04	0.002667	4.66E-04	0.002668	4.66E-04	4



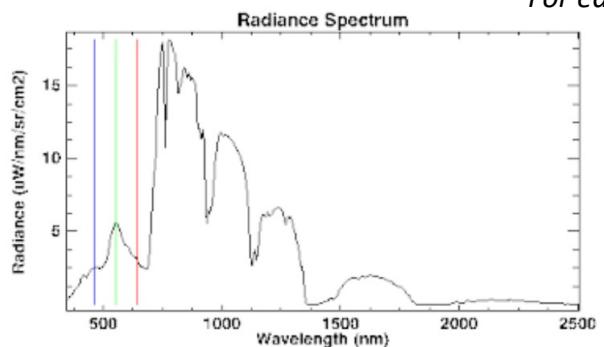
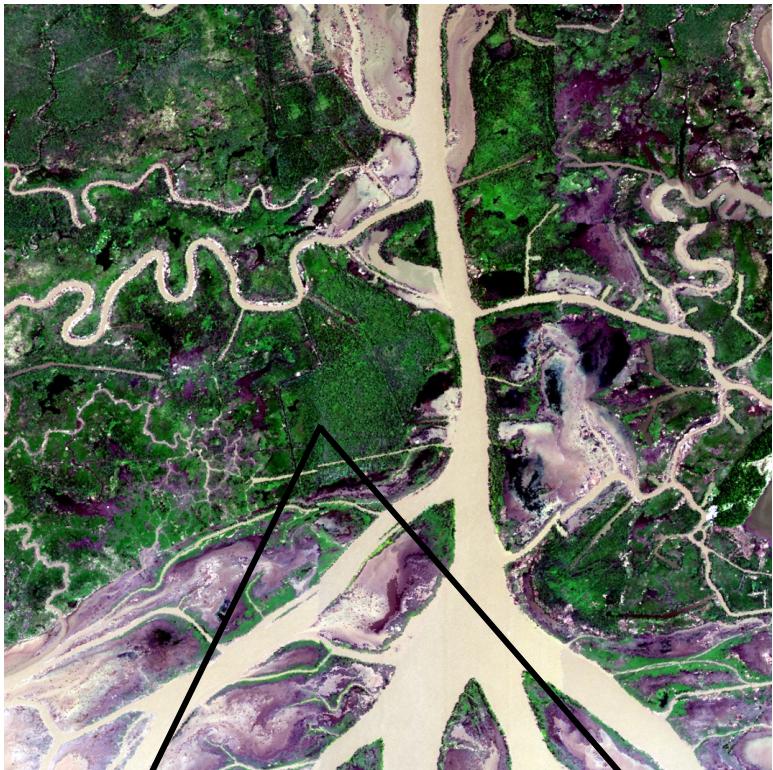
AVIRIS-NG L1-L3 Products

Level	Deliverable products	Delivered By Date
1	AVIRIS-NG hyperspectral	Due 03/25/2022
2	AVIRIS-NG reflectance	Due 06/25/2022
2b	AVIRIS-NG bidirectional reflectance distribution function	Due 06/25/2022
3	AVIRIS-NG hydrogeomorphic zones	Due 09/25/2022
	AVIRIS-NG aboveground biomass	Due 09/25/2022
	AVIRIS-NG water quality (sediment concentration)	Due 09/25/2022

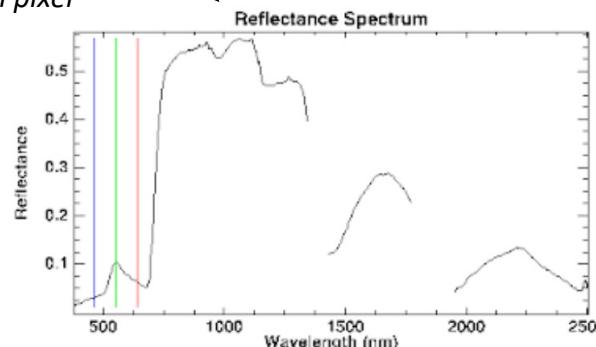
Some products from the Spring 2021 campaign have been delivered to the DAAC (L1, 2, 2b)



Example: AVIRIS-NG L1/L2/L3



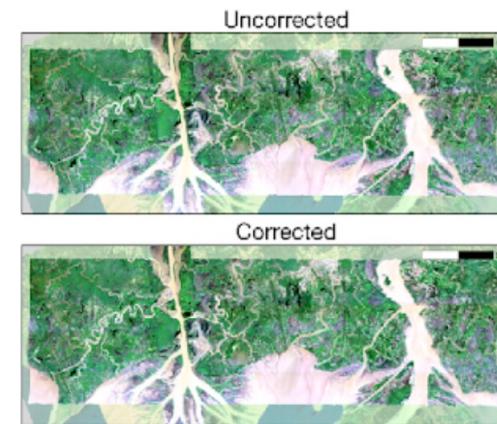
Level 1: Radiance at



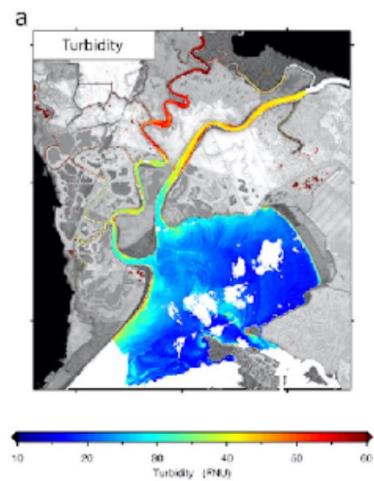
Level 2: Surface Reflectance

Dataset Authors (listed in the order they will appear in the data citation)

Name	Affiliation	Email	ORCID ID (optional)
David R. Thompson	NASA Jet Propulsion Laboratory	david.r.thompson@jpl.nasa.gov	0000-0003-1100-7550
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John Chapman	NASA Jet Propulsion Laboratory	john.w.chapman@jpl.nasa.gov	
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Marc Simard	NASA Jet Propulsion Laboratory	Marc.simard@jpl.nasa.gov	0000-0002-9442-4562



Level 2a: BRDF and glint



Vegetation and water
Level 1

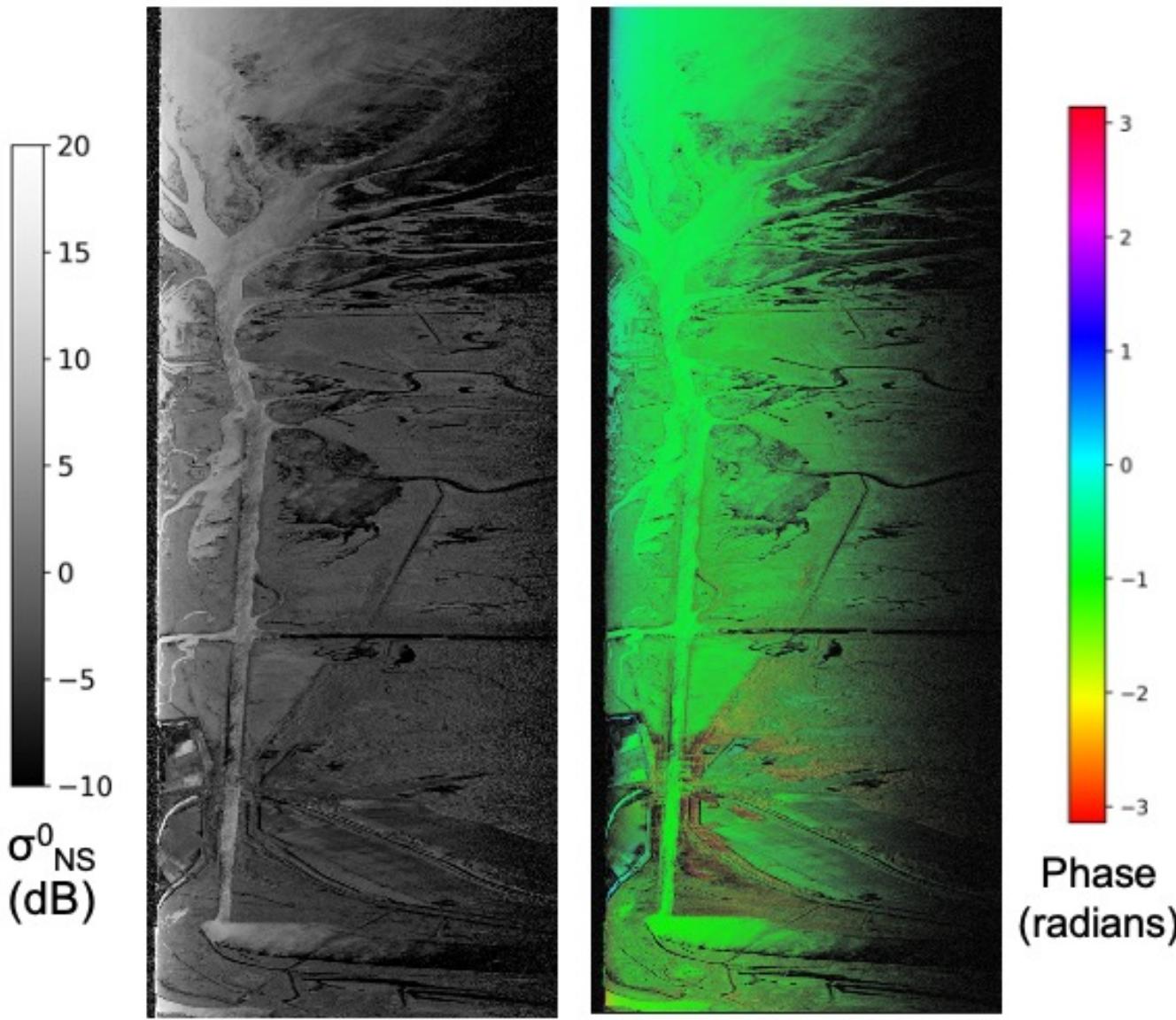
AirSWOT L1-L3 Products

Level	Deliverable products	Delivered By Date
1b	AirSWOT interferogram (radar coordinates)	Due 03/25/2022
2	AirSWOT georeferenced interferograms	Due 06/25/2022
3	AirSWOT water-surface elevation vs time	Due 06/25/2022

Some products from the Spring 2021 campaign have been delivered to the DAAC (L1b)



Example: AirSWOT L1 (interferometric, not georeferenced)



In dataset documentation file:

Parameters or variables provided in the dataset

Variable	Units of Measurement / Dimensions / Data Type	Description
int_m0.par	Units: N/A Dimensions: N/A Data Type: Plain Text Metadata	Interferometric parameter file. Plain text metadata describing some of the relevant parameters of the dataset, including the number of image lines ("nr_lines"), number of image pixels ("nr_pixels"), first aux index used in interferogram ("first_image_line_tvps_index"), number of aux indices per interferogram image line ("nr_tvps_per_image_line"), number of azimuth looks ("azimuth_looks"), number of range looks ("range_looks"), slant range of the first range bin ("near_range", in meters), and the slant range spacing ("range_spacing", also in meters).
int_m0.int	Units: Complex interferogram, unitless Dimensions: (nr_lines, nr_pixels) from int_m0.par file. Data Type: 64-bit Complex	Complex-valued interferogram. The magnitude of this interferogram represents the coherence magnitude between the SAR acquisitions used to form the interferogram. The phase of this interferogram represents the interferogram phase.
int_m0.int.unw	Units: radians Dimensions: (nr_lines, nr_pixels) from int_m0.par file. Data Type: 32-bit Float	Unwrapped phase of the interferogram, in radians.
int_m0.int.sch	Units: meters	This raster contains the SCH



Example: AirSWOT L3 Water Level Profiles

DAAC Home > Get Data > NASA Projects > Delta-X > Landing page

Pre-Delta-X: L3 AirSWOT-derived Water Level Profiles, Wax Lake Outlet, LA, USA, 2015



Figure 1. Extent of AirSWOT Level 3 water level profiles along the Wax Lake Channel in the Atchafalaya Basin. The red line shows the general path of the channel draining to the Gulf of Mexico. Source: 2015 AirSWOT data collection

Data File Information

There are three data files in comma-separated value (*.csv) format, one for each date of sampling. The files provide estimates of water surface elevation at points along the sampled Wax Lake Outlet. The files are named `PreDeltaX_WaterLevel_YYYYMMDD_Atcha_AirSWOT.csv` where YYYYMMDD is the sampling date.

Table 1. Variables names and descriptions.

Variable	Units	Description
channel_id	none	String identifying the river channel of this profile (e.g., "WLO" for Wax Lake Outlet)
date	YYYY-MM-DD	Acquisition date
time	hh:mm:ss	Acquisition time (UTC)
utc_time	Seconds of day	Acquisition time in number of seconds since the start of the acquisition day (UTC)
along_channel_distance	meters	Distance along the river channel
CoordX	meters	UTM X coordinate, in WGS 84 / UTM Zone 15N projected coordinate reference system (EPSG:32615)
CoordY	meters	UTM Y coordinate, in WGS 84 / UTM Zone 15N projected coordinate reference system (EPSG:32615)
longitude	decimal degrees	Longitude coordinate in WGS 84 coordinate reference system (EPSG:4326)
latitude	decimal degrees	Latitude coordinate in WGS 84 coordinate reference system (EPSG:4326)
water_surface_elevation_NAVD88	meters	Water surface elevation in meters, with respect to the North American Vertical Datum 1988 (NAVD 88) geoid
water_surface_elevation_WGS84	meters	Water surface elevation in meters, with respect to the World Geodetic System 1984 (WGS 84) ellipsoidal surface
water_surface_elevation_uncertainty	meters	Estimated 1-sigma standard deviation of the water surface elevation

From Pre-Delta-X 2016 campaign

Data available at the ORNL DAAC

UAVSAR L1-L3 Products

Level	Deliverable products	Delivered By Date
1	UAVSAR single-look complex (SLC) images, quad-pol	Due 03/25/2022
1b	UAVSAR interferometric products	Due 03/25/2022
2	UAVSAR georeferenced interferometric products	Due 06/25/2022
3	UAVSAR area maps of water level vs time (georeferenced)	Due 06/25/2022
	UAVSAR channels >10 m wide	Due 06/25/2022

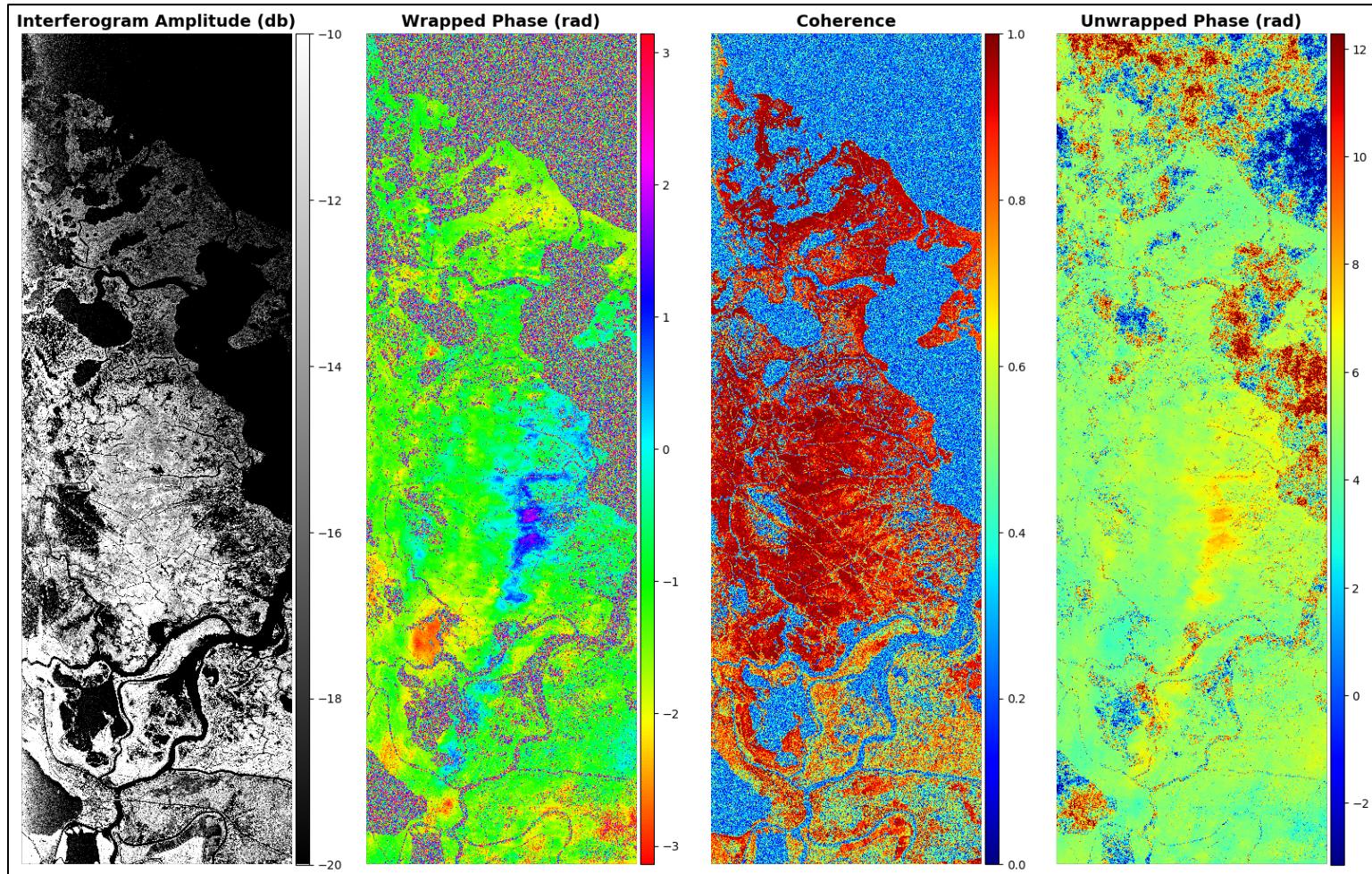
Some products from the Spring 2021 campaign have been delivered to the DAAC (L1, 1b)



Example: UAVSAR L1 (interferometric, not georeferenced)

In dataset documentation file:

The L1 UAVSAR SLC VV-polarization coregistered SLC stack products were used as the underlying data. Spatial coverage of all flight lines is shown in Figure 2. Table 1 summarizes the acquisitions used to generate the interferometric products. Table 2 lists the SLC stack products used to generate the L1b products.



UAVSAR flight line	Date	Number of acquisitions	Interferograms produced
atchaf_06309	03/27/2021	8	18
	04/01/2021	7	15
	04/02/2021	9	21
atchaf_19809	03/23/2021	9	21
	04/01/2021	9	21
	04/02/2021	9	21
wterre_16300	04/05/2021	8	18
	04/06/2021	7	15
	04/07/2021	7	15
.....			

UAVSAR flight line	Baseline L0 SLC Product
atchaf_06309	atchaf_06309_02
atchaf_19809	atchaf_19809_02
wterre_16300	wterre_16300_02
wterre_34202	wterre_34202_02
eterre_08705	eterre_08705_02
eterre_27309	eterre_27309_01



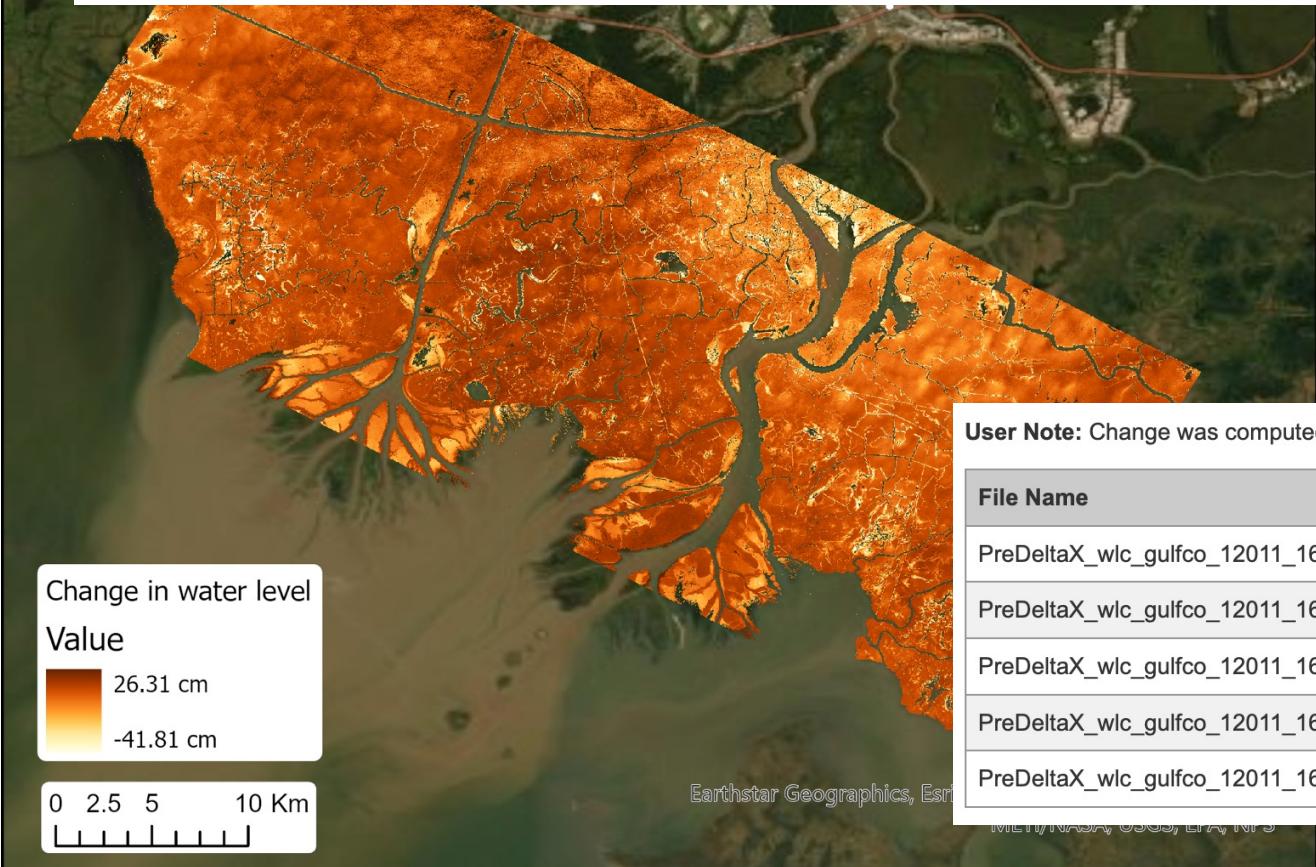
Data Use and Citation

Jones, C., M. Simard, and Y. Lou. 2021. Pre-Delta-X: UAVSAR-derived Water Level Change Maps, Atchafalaya Basin, LA, USA, 2016. ORNL DAAC, Oak Ridge, Tennessee, USA.
<https://doi.org/10.3334/ORNLDAAC/1823>

Example: UAVSAR L3 Water Level Change

DAAC Home

Pre-Delta-X: UAVSAR-derived Water Level Change Maps, Atchafalaya Basin, LA, USA, 2016



From Pre-Delta-X 2016 campaign
Data available at the ORNL DAAC

User Note: Change was computed as the difference in water-surface elevations (i.e., elevation_B – elevation_A).

File Name	Units	Description
PreDeltaX_wlc_gulfco_12011_1610161408_1610161438_01.tif	cm	Change after 30 min
PreDeltaX_wlc_gulfco_12011_1610161408_1610161508_01.tif	cm	Change after 60 min
PreDeltaX_wlc_gulfco_12011_1610161408_1610161538_01.tif	cm	Change after 90 min
PreDeltaX_wlc_gulfco_12011_1610161408_1610161607_01.tif	cm	Change after 120 min
PreDeltaX_wlc_gulfco_12011_1610161408_1610161637_01.tif	cm	Change after 150 min

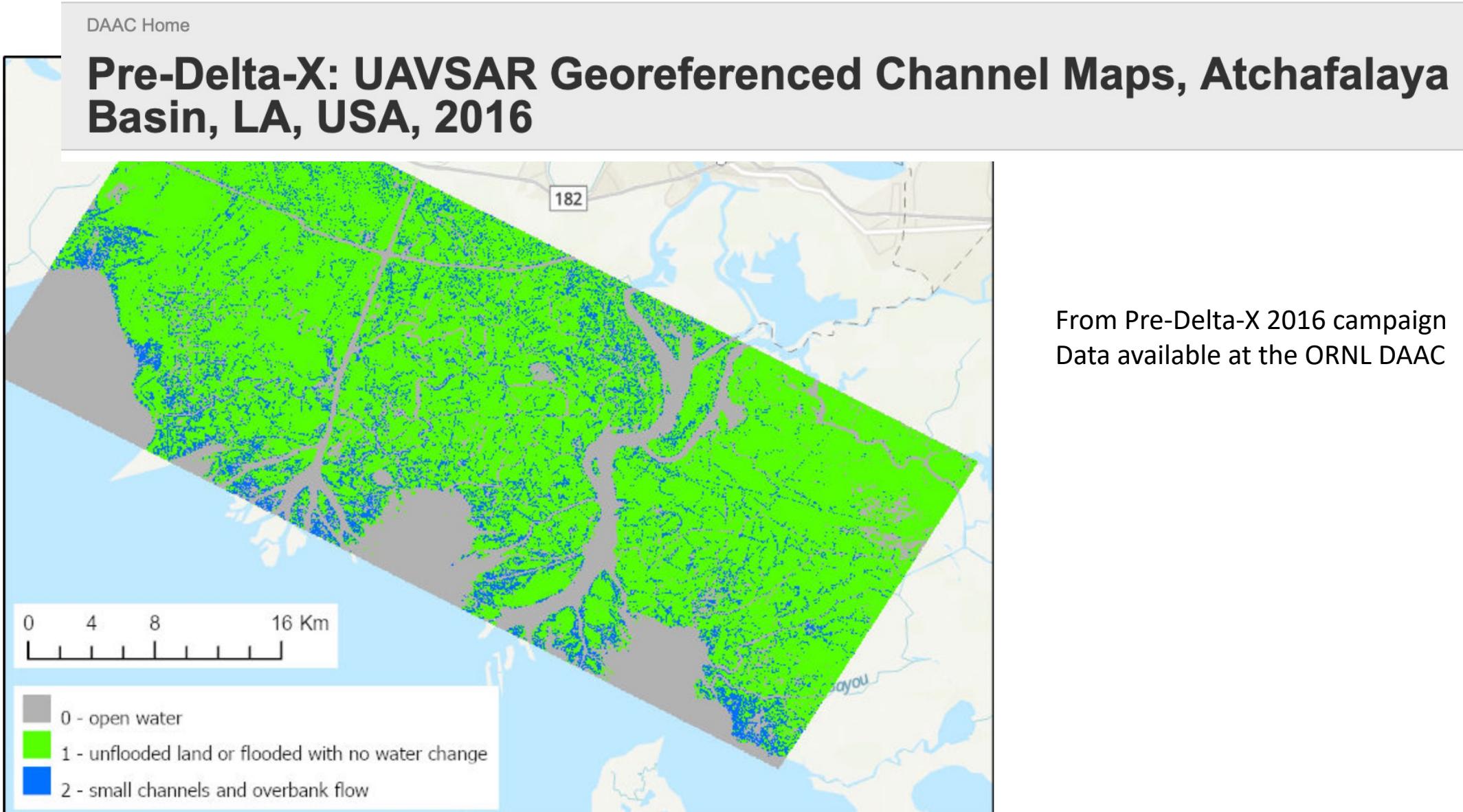
Figure 1. Map of water level changes based on water surface elevations measured by UAVSAR on October 16, 2016, at 14:08 and 16:37 UTC.



Data Use and Citation

Jones, C., T. Oliver, and Y. Lou. 2021. Pre-Delta-X: UAVSAR Georeferenced Channel Maps, Atchafalaya Basin, LA, USA, 2016. ORNL DAAC, Oak Ridge, Tennessee, USA.
<https://doi.org/10.3334/ORNLDAAC/1954>

Example: UAVSAR L3 Georeferenced Channel Map



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Figure 1. Water channels (blue) in the Atchafalaya Basin of the Mississippi River Delta of coastal Louisiana, U.S., during low tide on October 16, 2016.
Source: PreDeltaX_channels_161016_lowtide_01.tif

Delta-X Spring 2021 Datasets Released by ORNL DAAC

Delta-X dataset that has been released from the Spring 2021 campaign:

- ADCP Channel Surveys (river discharge): https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1939

Additionally, ORNL has made more datasets (all from Spring 2021) available as preprints, which means they have not been finalized for public release yet. Once finalized they will be available at the same links:

- Turbidity and water pressure at Mike Island (Spring 2021): https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1993
- Total suspended solids (TSS) concentrations (Spring 2021): https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1991
- In Situ Water Quality Indicators (<https://doi.org/10.3334/ORNLDAAAC/1992>)
- Soil Properties for Herbaceous Wetlands (<https://doi.org/10.3334/ORNLDAAAC/1995>)
- Aboveground Vegetation Structure for Herbaceous Wetlands (<https://doi.org/10.3334/ORNLDAAAC/1997>)
- Feldspar Sediment Accretion Measurements (<https://doi.org/10.3334/ORNLDAAAC/1998>)
- Belowground Biomass and Necromass in Herbaceous Wetlands (<https://doi.org/10.3334/ORNLDAAAC/1999>)
- Aboveground Biomass and Necromass in Herbaceous Wetlands (<https://doi.org/10.3334/ORNLDAAAC/2000>)
- In situ Beam Attenuation and Particle Size from LISST-200X (<https://doi.org/10.3334/ORNLDAAAC/2001>)
- Remote Sensing Reflectance Measurements (<https://doi.org/10.3334/ORNLDAAAC/1994>)
- AirSWOT Level 1b Interferogram Products (<https://doi.org/10.3334/ORNLDAAAC/1996>)
- UAVSAR Single Look Complex (SLC) Stack (<https://doi.org/10.3334/ORNLDAAAC/1984>)
- UAVSAR L1b interferograms (Spring 2021): https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1979

