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Delta-X: Real-Time Kinematic Elevation Measurements for Coastal Wetlands, LA, 2021

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Summary

This dataset provides real-time kinematic (RTK) GPS elevation measurements, along with horizontal and vertical precision errors, obtained along transects near Louisiana's Coastwide Reference Monitoring Systems (CRMS) sites and on Mike Island in Wax Lake Delta (WLD). The data were collected during the Delta-X Spring Campaign from 2021-03-24 to 2021-04-02. The data are provided in comma-separated values (CSV) format.

This dataset consists of one data file in comma-separated values (.csv) format.



Figure 1. GPS elevation measurements being taken in the field during the Delta-X Spring Campaign in March and April 2021.

Citation

Twilley, R., and A. Rovai. 2022. Delta-X: Real-Time Kinematic Elevation Measurements for Coastal Wetlands, LA, 2021. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/2071>

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1. Dataset Overview

This dataset provides real-time kinematic (RTK) GPS elevation measurements, along with horizontal and vertical precision errors, obtained along transects near Louisiana's Coastwide Reference Monitoring Systems (CRMS) sites and on Mike Island in Wax Lake Delta (WLD). The data were collected during the Delta-X Spring Campaign from 2021-03-24 to 2021-04-02.

Project: [Delta-X](#)

The Delta-X mission is a 5-year NASA Earth Venture Suborbital-3 mission to study the Mississippi River Delta in the United States, which is growing and sinking in different areas. River deltas and their wetlands are drowning as a result of sea level rise and reduced sediment inputs. The Delta-X mission will determine which parts will survive and continue to grow, and which parts will be lost. Delta-X begins with airborne and in-situ data acquisition and carries through data analysis, model integration, and validation to predict the extent and spatial patterns of future deltaic land loss or gain.

Related datasets

There are additional [Delta-X](#) datasets archived at the ORNL DAAC.

Acknowledgements

This research was funded by the Earth Venture Suborbital (EVS-3) program, grant number NNH17ZDA001N-EVS3.

2. Data Characteristics

Spatial Coverage: Atchafalaya and Terrebonne Basins, Mississippi River Delta, southern coast of Louisiana, USA

Spatial Resolution: Point

Temporal Coverage: 2021-03-24 to 2021-04-02

Temporal Resolution: One-time field measurements

Site Boundaries: Latitude and longitude are given in decimal degrees.

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Longitude	Southernmost Longitude
Atchafalaya and Terrebonne Basins, LA	-91.44554	-90.82228	29.5095	29.17101

Data File Information

There is one data file with this dataset in comma-separated values (.csv) format: **DeltaX_RTK_Measurements_Spring_2021.csv**

Table 1. Variables in the data file. Data not measured are noted as -9999 or NA (Not measured due to alligator nest on site).

Variable	Unit of measurement	Description
basin		Atchafalaya or Terrebonne Basin
campaign		Spring 2021
salinity_zone		Salinity zone according to Louisiana's Coastwide Reference Monitoring System (CRMS) classes: 'Freshwater', 'Brackish', and 'Saline'
site_id		Site ID's: WLD_1, WLD_2, 399, 322, 294, 396, 421
transect_id		Transect classification: T1-Transect 1; T2-Transect 2

point_id		For WLD sites: P1, P2, and P3-elevations retrieved from supratidal zone along the island's levees, P4, P5, and P6-elevations retrieved from intertidal zone, and P7, P8, and P9 elevations retrieved from subtidal zones. For all other sites: P0-at the marsh-channel edge; P1-10 m inland from channel; P2-20 m inland from channel; P3-30 m inland from channel; P4-40 m inland from channel; P5-50 m inland from channel.
measurement_date	YYYY-MM-DD	Measurement date
latitude	decimal degrees	Latitude in decimal degrees for each RTK point
longitude	decimal degrees	Longitude in decimal degrees for each RTK point
horizontal_precision	m	Horizontal precision for each RTK point
ellipsoid_height	m	Difference between the ellipsoid and a point on the Earth's surface
elevation_NAVD88	m	Elevation in meters relative to NAVD88
vertical_precision	m	Vertical precision for each RTK elevation measurement

3. Application and Derivation

RTK GPS elevation measurements will be used to estimate the duration and spatial extent of flooding as well as to correct LiDAR-generated DEMs.

4. Quality Assessment

Horizontal and vertical precision values are provided for each RTK GPS point retrieved to inform end users of intrinsic instrument errors.

5. Data Acquisition, Materials, and Methods

RTK GPS elevation measurements were obtained along transects near Louisiana's Coastwide Reference Monitoring Systems (CRMS) sites and on Mike Island in Wax Lake Delta (WLD) to capture surface elevation variability across discrete hydrogeomorphic zones: subtidal < -0.04 m, intertidal -0.04 m to 0.30 m, and supratidal > 0.30 m; relative to NAVD88, after Bevington and Twilley (2018).

Surface elevation measurements were acquired in March and April 2021 using a RTK GPS (Trimble R12, using Geoid 18, referenced to NAVD88). At each site, two 50-meter long transects approximately 10 meters parallel and apart were established perpendicular to the main water channel. Along each transect, between six and nine measurements were retrieved approximately every 10 meters, starting at the edge of the marsh vegetation with the channel.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[Delta-X: Real-Time Kinematic Elevation Measurements for Coastal Wetlands, LA, 2021](#)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Bevington, A.E. and R.R. Twilley. 2018. Island edge morphodynamics along a chronosequence in a prograding deltaic floodplain wetland. *Journal of Coastal Research* 34: 806–817. <https://doi.org/10.2112/JCOASTRES-D-17-00074.1>

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