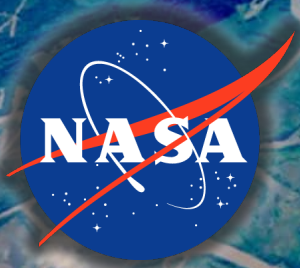# Airborne Visible/Infrared Imaging Spectrometer— Next Generation (AVIRIS-NG) Data in the Delta-X Campaign

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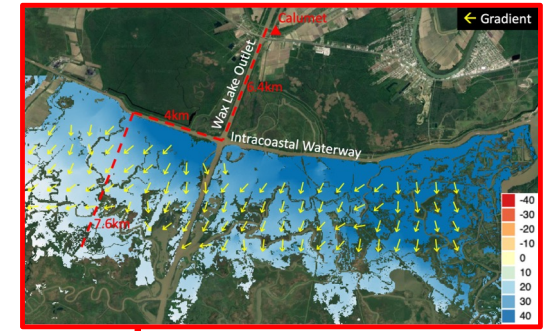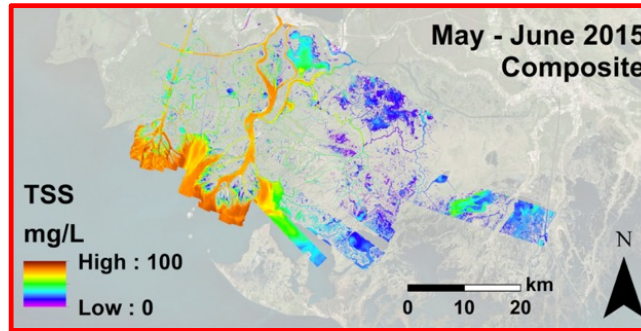
March 30, 2022

Louisiana's Degrading Coastal Wetlands

- Mississippi Deltaic Plain wetland loss
  - Soil surface outpaced by relative sea level rise
- Aggradation in the Atchafalaya and Wax Lake Deltas
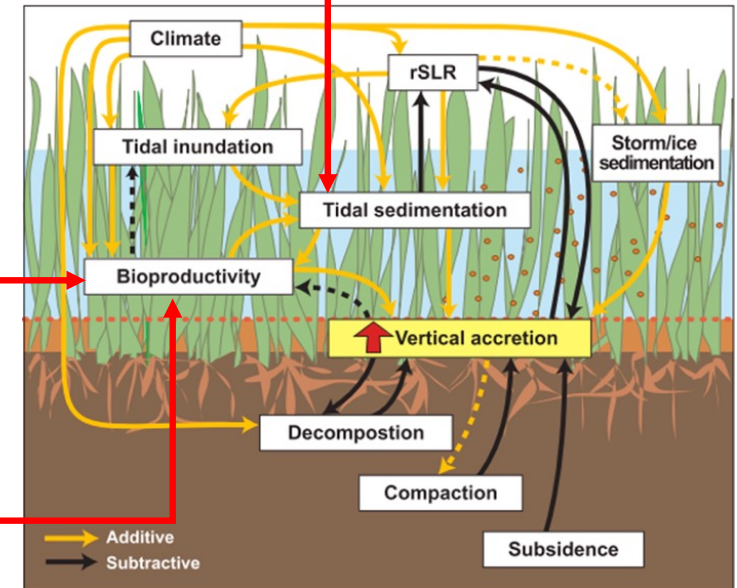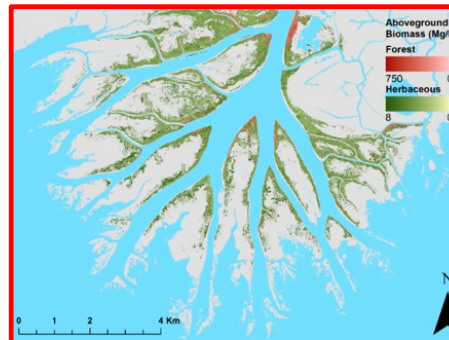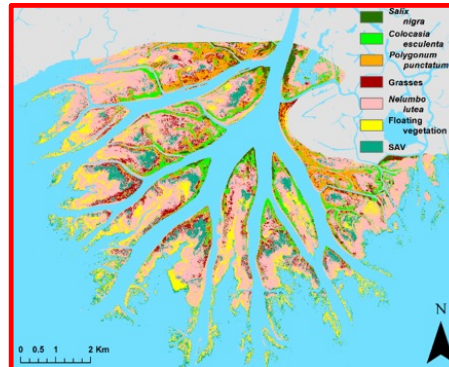- Sediment supply and organic matter production drive accretion
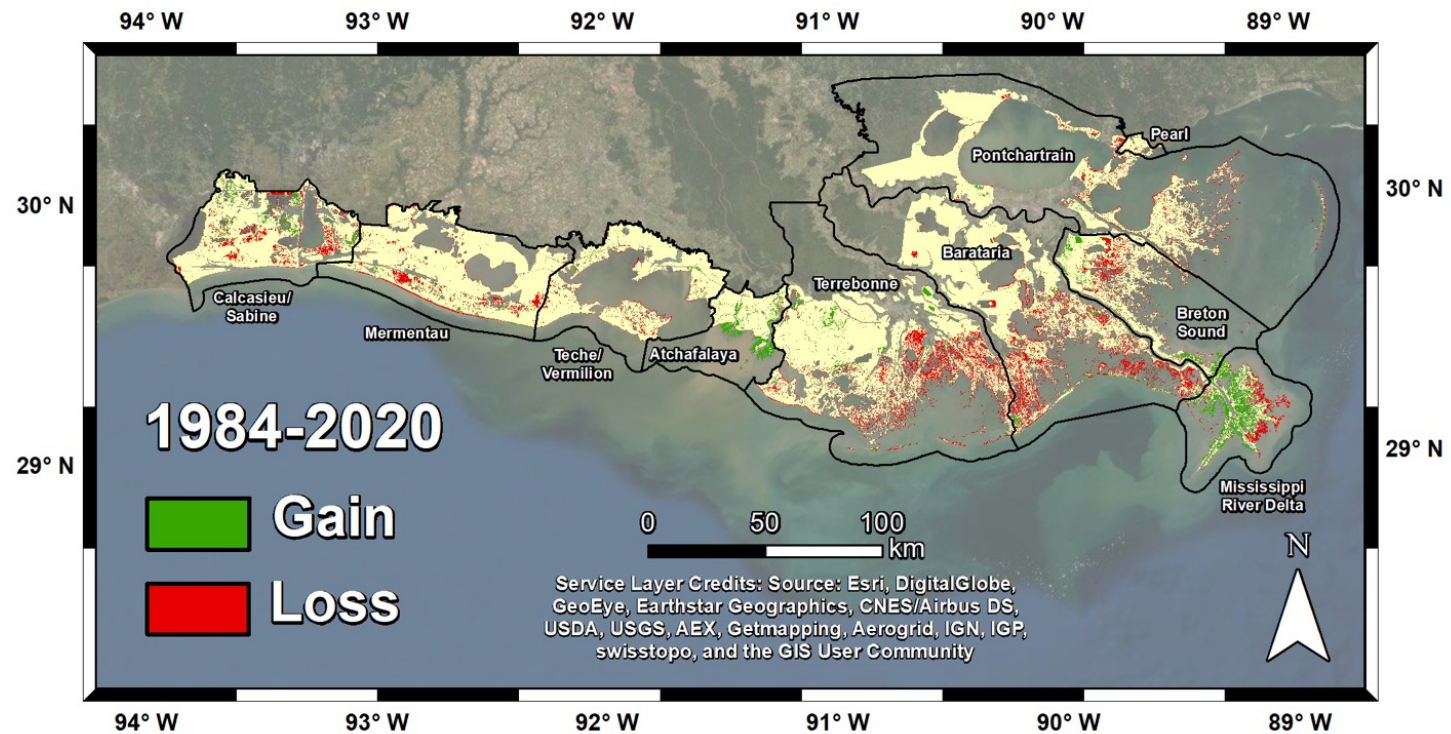
Delta-X: Airborne Remote Sensing of Accretion and Wetland Loss

- AVIRIS-NG, UAVSAR, AirSWOT
- Remote sensing estimates of organic and inorganic accretionary components → Unified landscape-scale model for vertical accretion
  - Enable projections of vertical accretion/subsidence and wetland loss

May - June 2015 Composite

TSS mg/L
High : 100
Low : 0

(Liao et al. 2020)

Salix nigra
Colocasia esculenta
Polygonum punctatum
Grasses
Nelumbo lutea
Floating vegetation
SAV

Aboveground Biomass (Mg/ha)
Forest 750 0
Herbaceous 8 0

Climate
rSLR
Tidal inundation
Storm/ice sedimentation
Tidal sedimentation
Bioproductivity
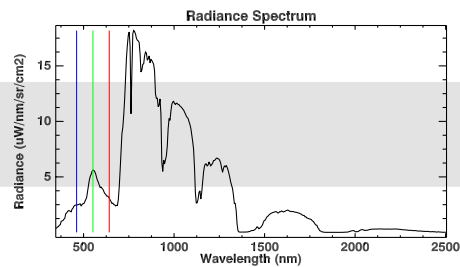Vertical accretion
Decompostion
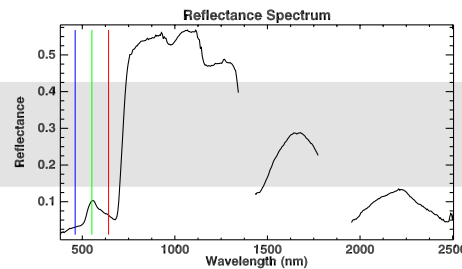Compaction
Subsidence

→ Additive
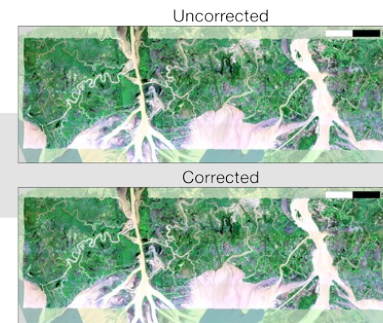→ Subtractive

(Fitzgerald et al. 2008)

Airborne Visible/Infrared Imaging Spectrometer–Next Generation (L1-L3)
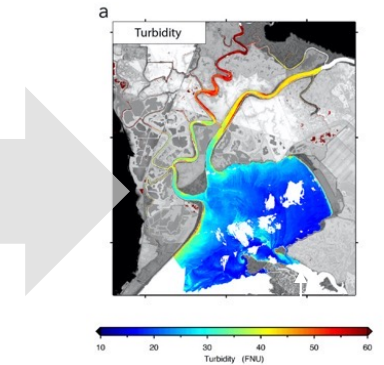

Radiance at sensor

**Surface Reflectance (HRDF)**

BRDF and glint correction

Vegetation and water sediment maps

- Radiance products use May 2021 hangar calibration data (Chapman et al. 2019) and atmospheric features for in-flight wavelength calibration adjustments (Thompson et al. 2015)

- Atmospheric correction is the EMIT mission approach of Optimal Estimation (Thompson et al. 2018, 2019) with speed enhancements (Thompson et al. 2020)

- BRDF correction via FlexBRDF (Queally et al., 2022) and simultaneous sunglint correction (Greenberg et al. 2022)

Delta-X AVIRIS-NG Data Products

Delta-X AVIRIS-NG Vegetation Flightlines
Spring 2021

- Spring, Fall, Post-Ida Deployments: 144 Terrestrial Vegetation lines, 44 Water Quality flightlines

- L1
  - Radiance at Sensor flightlines
- L2
  - Surface Reflectance flightlines
- L2B
  - BRDF and Glint-Corrected flightlines
  - BRDF and Glint-Corrected mosaics
- L3
  - Vegetation Type and Biomass Maps
  - Water Quality (Suspended Sediment Concentration)
- Hosted by ORNL DAAC
  - DAAC Home > Get Data > NASA Projects > Delta-X
  - daac.ornl.gov/cgi-bin/dataset_lister.pl?p=41
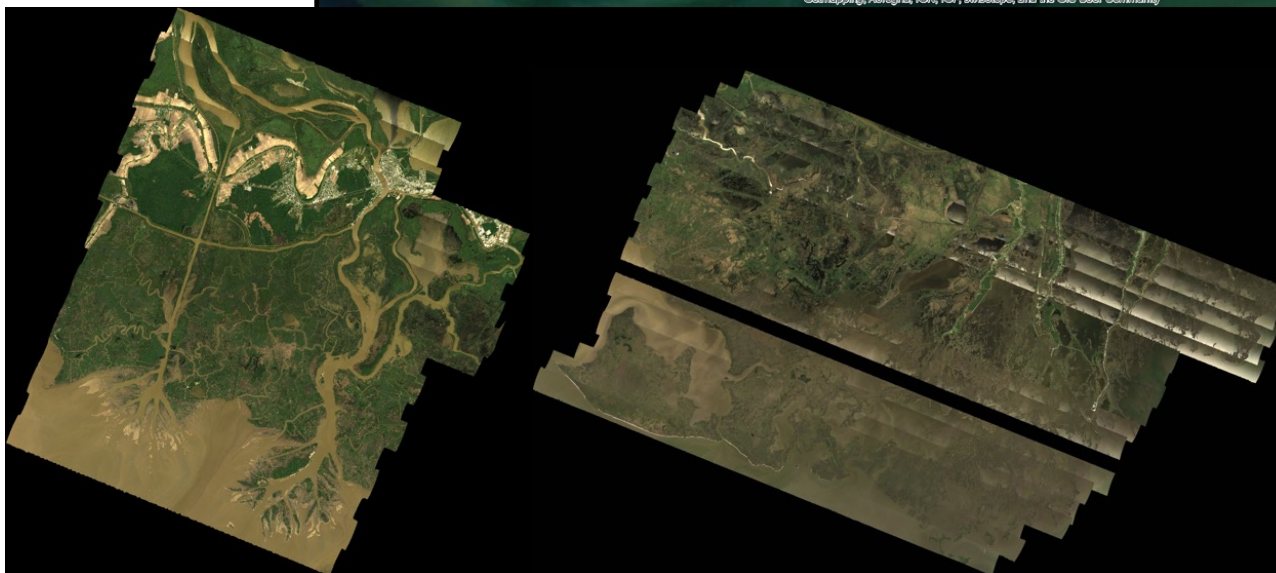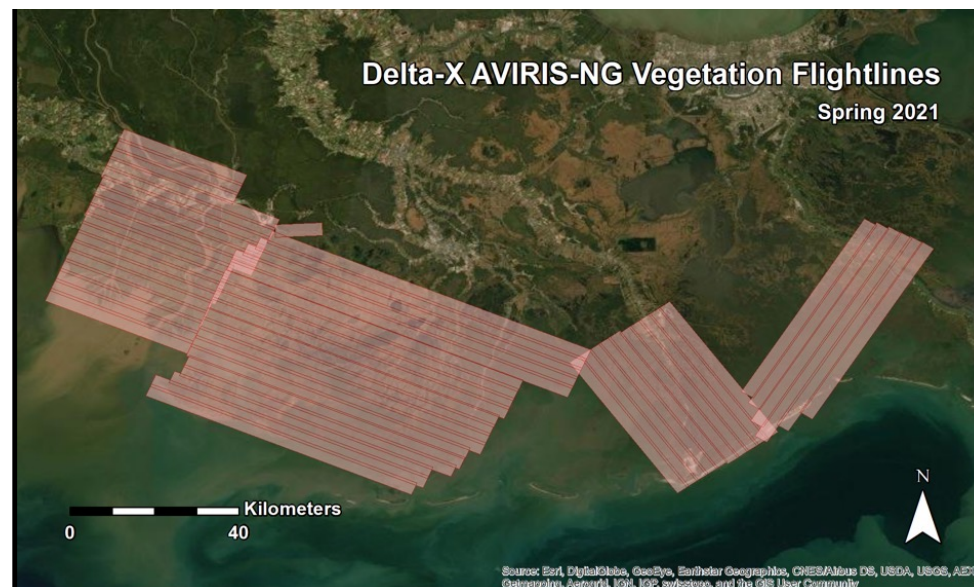
L3 Products

(Pre-Delta-X, 2015-16)

- Proof-of-concept products
  - Vegetations species/type
  - Aboveground biomass
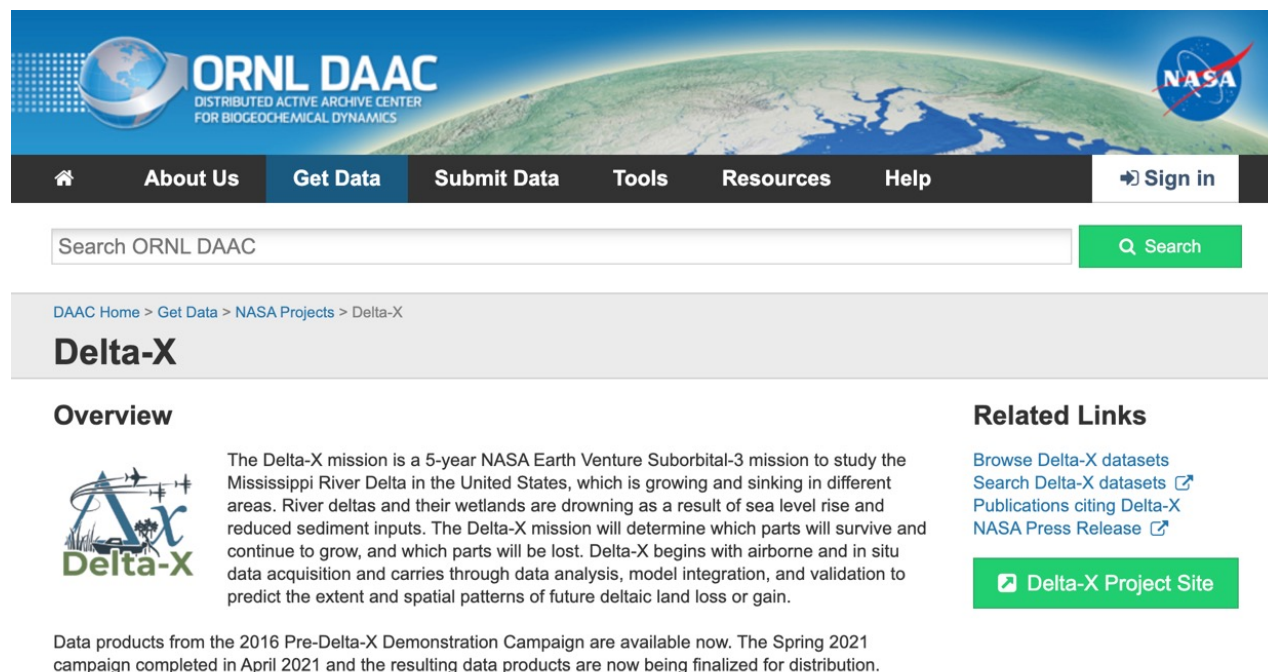   - (Jensen et al. 2021a, doi.org/10.3334/ORNLDAAC/1821)
  - Total Suspended Solids
    - (Jensen et al. 2021b, /doi.org/10.3334/ORNLDAAC/1822)

- To be scaled up to Delta-X study domain and published on ORNL DAAC
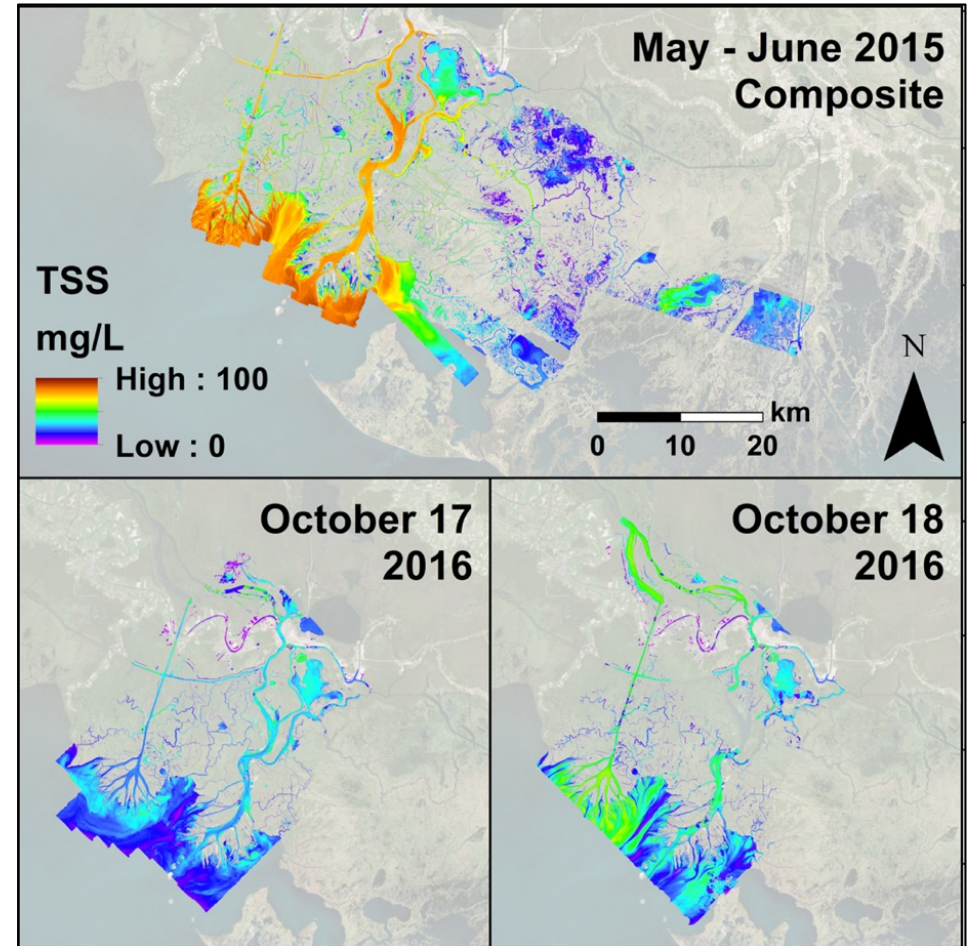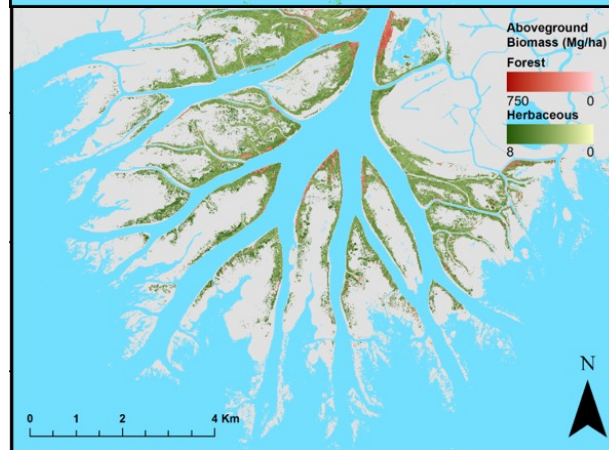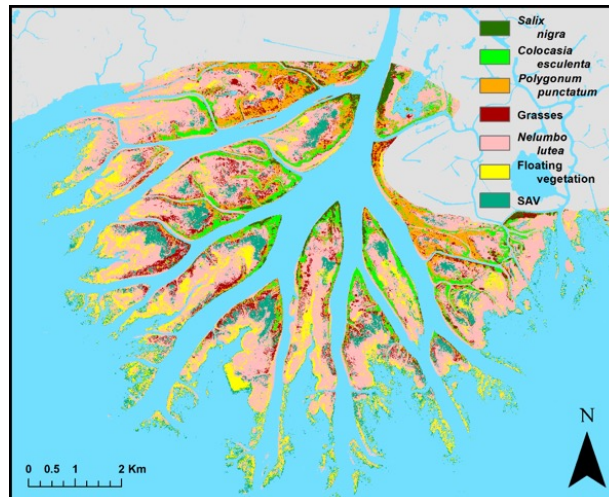
Working with ORNL DAAC

- Publication has been very smooth and ORNL DAAC is responsive
  - Data product page publication and edits
- Delivery primarily through shared Delta-X Google Drive
  - Minor pain point: delivering large AVIRIS-NG datasets (>100 GB) presents logistical difficulty

https://daac.ornl.gov/cgi-bin/dataset_lister.pl?p=41

Suggestions and Questions

- Provide a way to host preliminary data through the DAAC (e.g. data presented at conferences)
  - Currently required to have data from publications/presentations publicly available at the time of publication/presentation
  - Unarchived data ends up hosted the project website, would be helpful if the DAAC could help with these data
- How to publicly release project code?
  - E.g. code used to create products, models, etc.
  - Code currently hosted on project websites, but is a permanent archive (e.g. NASA GitHub) preferable?
  - Directions/preferences from ADMG for hosting code?

- What do you think is needed to encourage and support future use of your data product(s)? What support would be needed from ADMG?
  - Delta-X will produce many datasets that are not widely supported with standard software
  - Support code/tools and documentation to make those datasets more usable

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