

Connecticut River AirSWOT and Cal/Val campaign, 2020

CJ Gleason, UMass

TM Pavelsky, UNC

JT Minear, CU Boulder

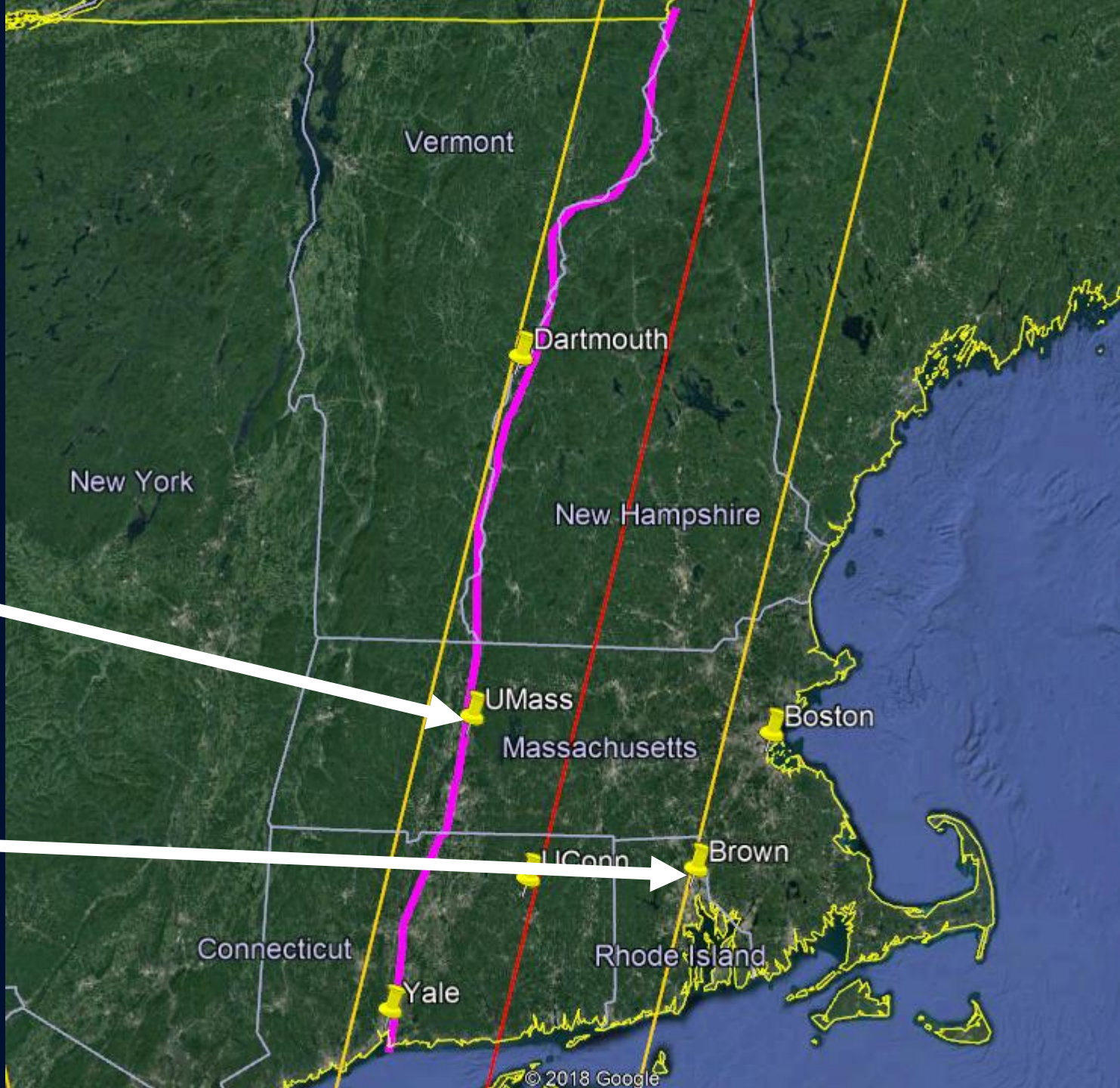
LC Smith, ~~UCLA~~ Brown

A very convenient fast sampling orbit.

Quite a few folks working the CT!!!

My office

Larry's office



Goals for Connecticut 2020 campaign

Objectives:

- Study Tidal effects (lower Connecticut, Middletown – mouth)
- Attempt long reach AirSWOT CalVal (400+km)
- Investigate effects of locks, dams, cities on CalVal
- Lidar vs AirSWOT CalVal surface water elevation test on relatively clear river. Also other methods? (drone, etc)

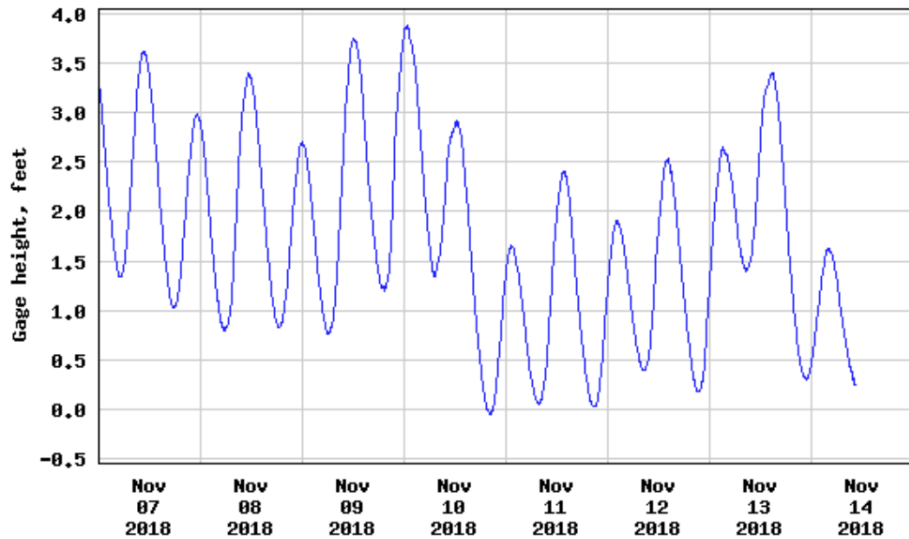
Overall approach:

- 3-4 teams: 1-2 in tidal reach (multiple AirSWOT passes), 2-3 teams in upper reach (2-3 AirSWOT passes)
- Location for aerial lidar vs AirSWOT test: TBD

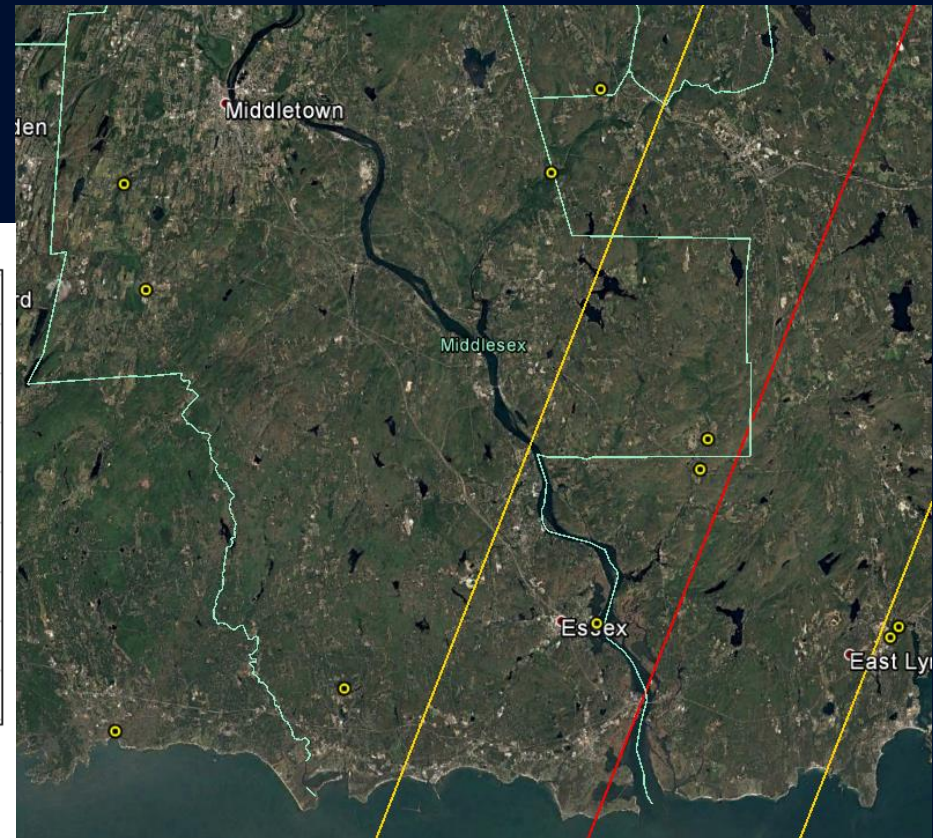
Tidal Reach

- 5-6 AirSWOT flights with standard CalVal set up: 10-20 PTs, boat-based surveys, 1-2 crews
- Middletown to mouth, ~40km
- 4 flightlines, ~1hr
- plane based near mouth

USGS 01194750 CONNECTICUT RIVER AT ESSEX, CT

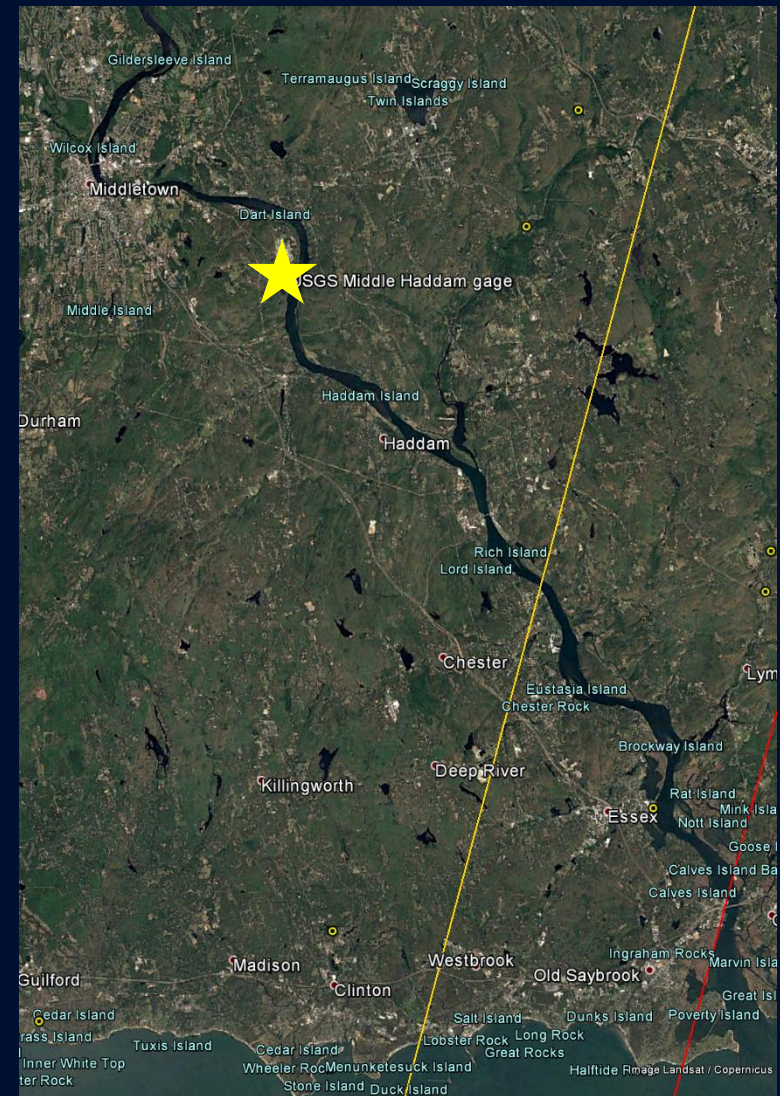
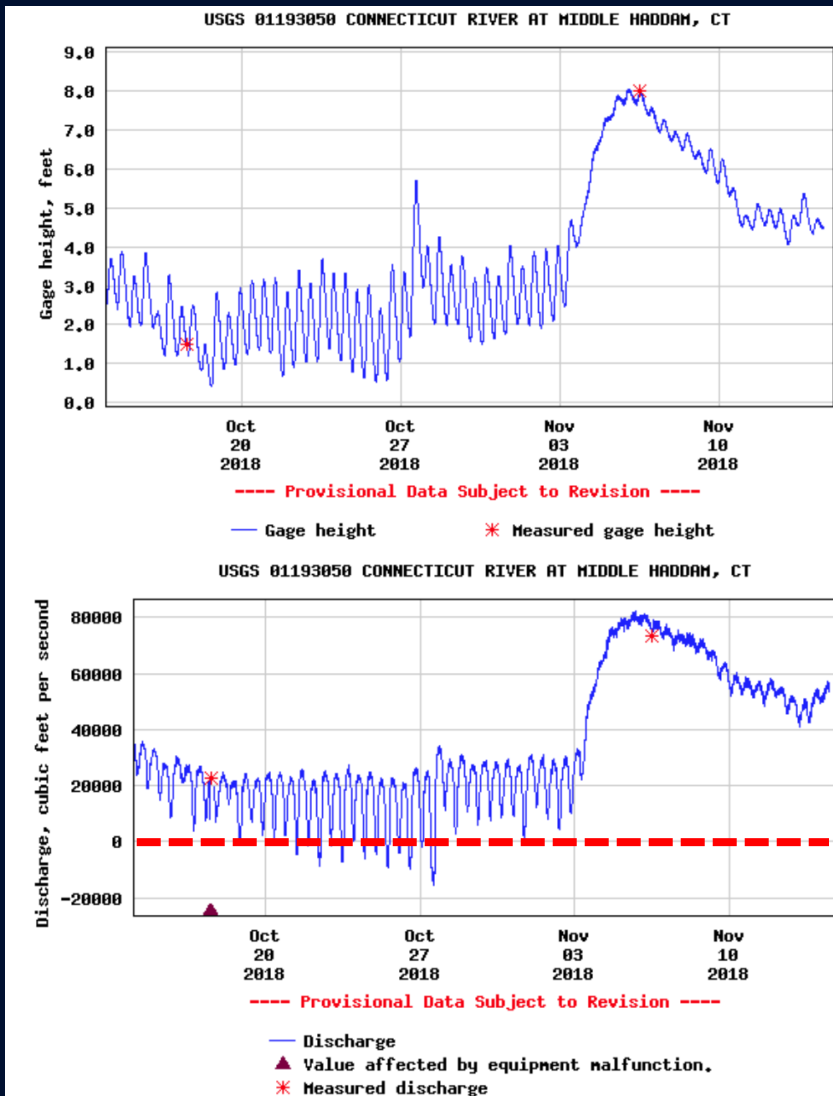


---- Provisional Data Subject to Revision ----



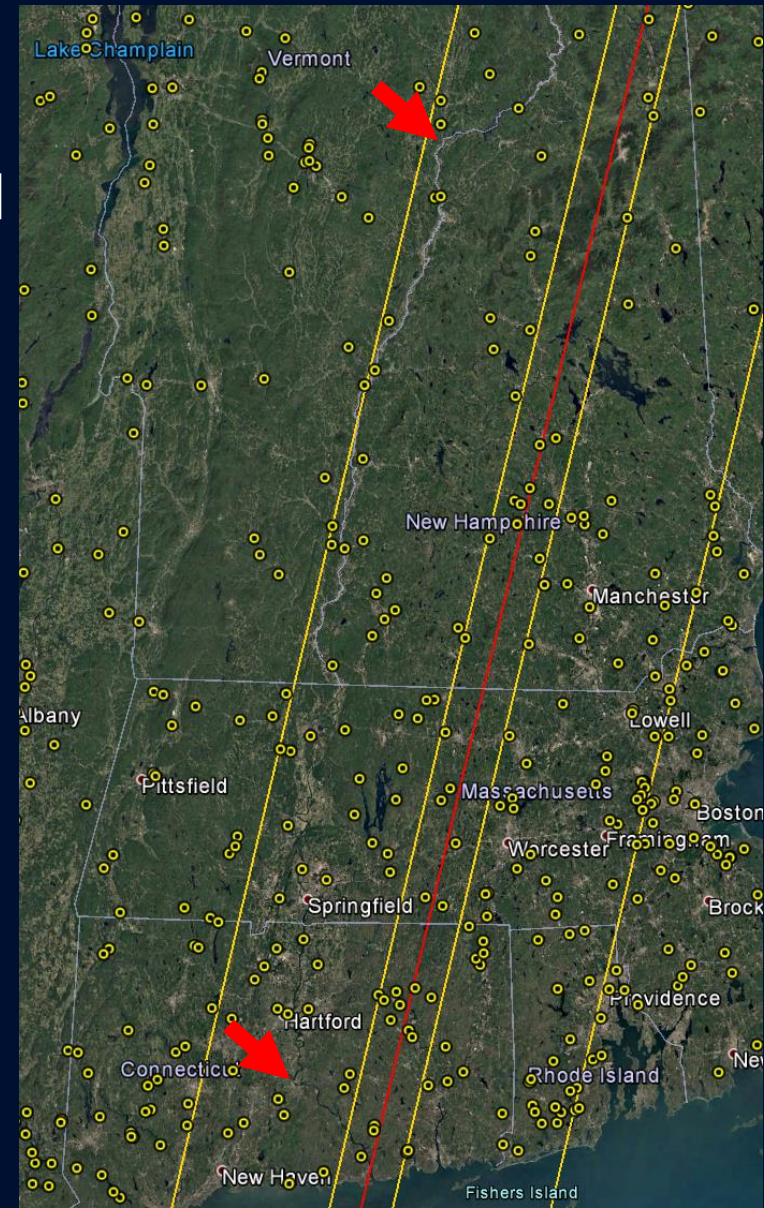
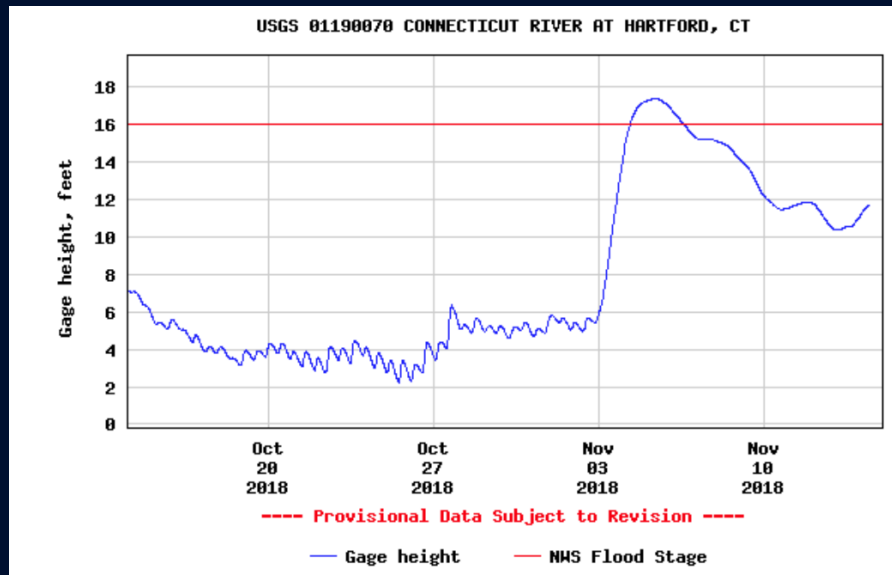
Tidal Reach

- USGS Middle Haddam gage (#01193050)
 - Partial tidal cycle



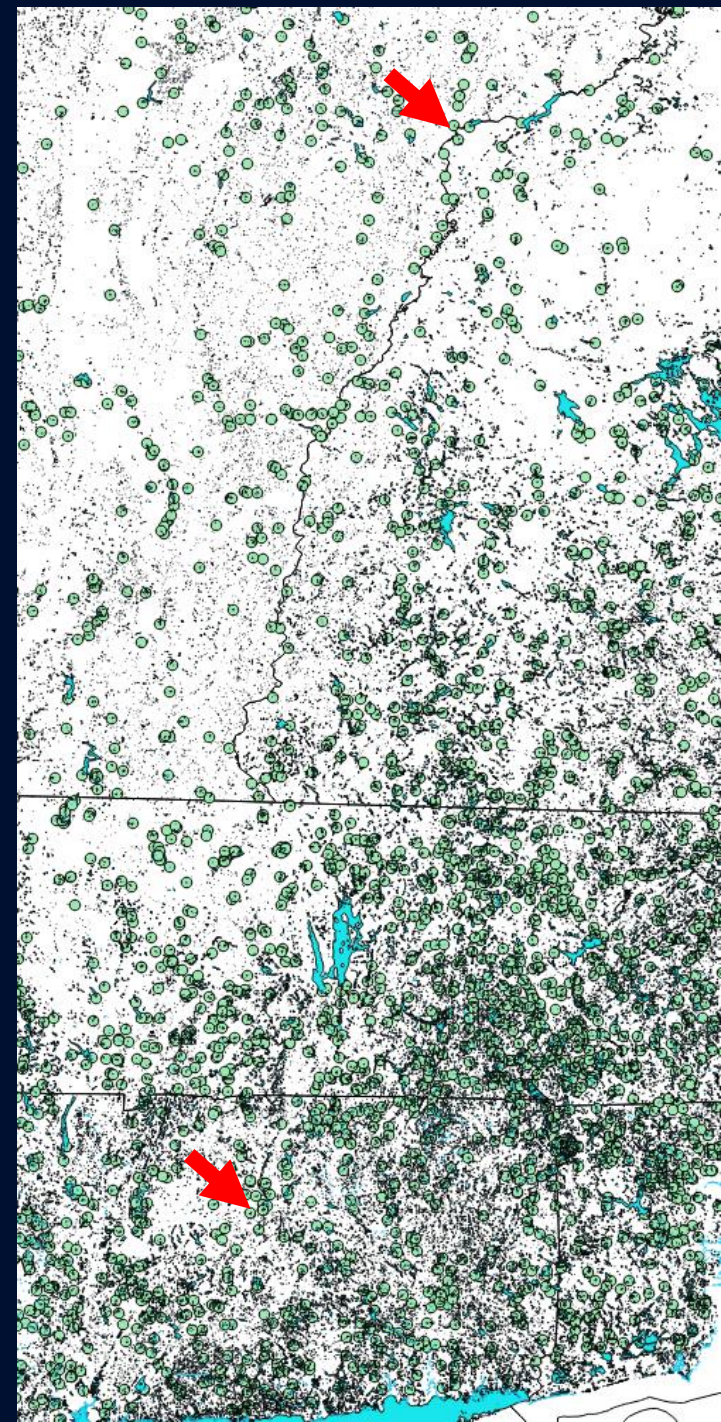
Long Reach CalVal

- Middletown – Monroe (~300km)
- 2-3 teams: 40-60 PTs + boat-based measurements
- Get ahold of topobathy dataset, 1D and 2D models



Effects of Instream Infrastructure

- Green dots are NID dams
- Arrows: Monroe and Middletown
- Many instream and out-of-stream structures near the Connecticut



Effects of Instream Infrastructure



Effects of Instream Infrastructure



1,200 MW capacity
1 million homes for 8h

Effects of Instream Infrastructure and Cities

- Many instream dams
- Numerous cities on river
- “Bright mud” equivalent “Radiant rooftops”



Effects of Instream Infrastructure and Cities



Image Landsat / Copernicus

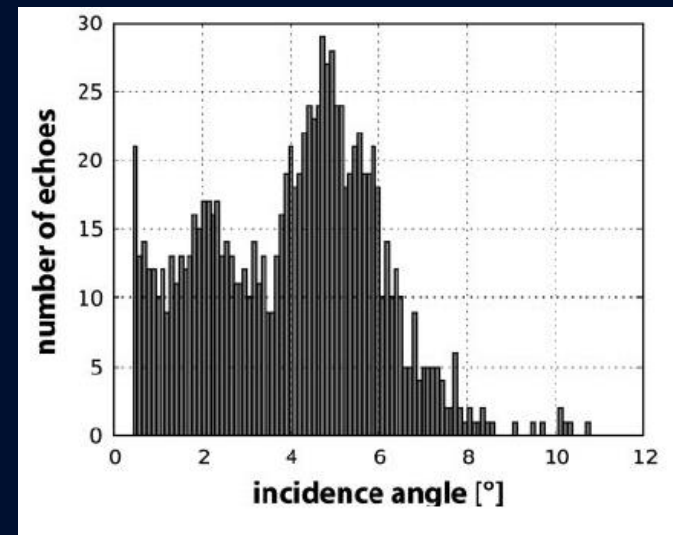
Google Earth

Effects of Instream Infrastructure and Cities

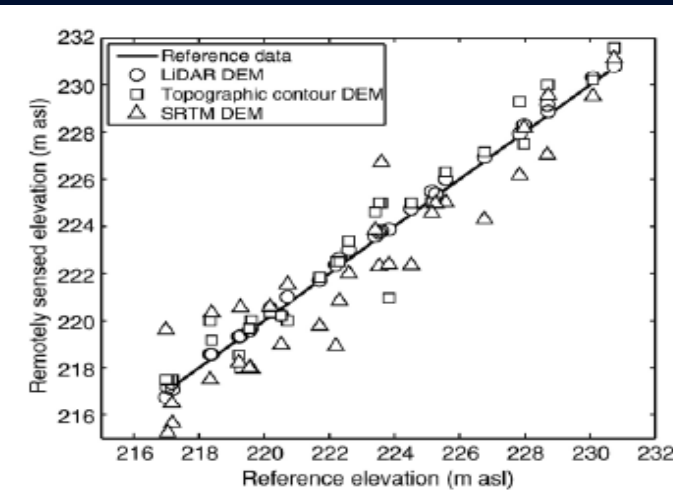
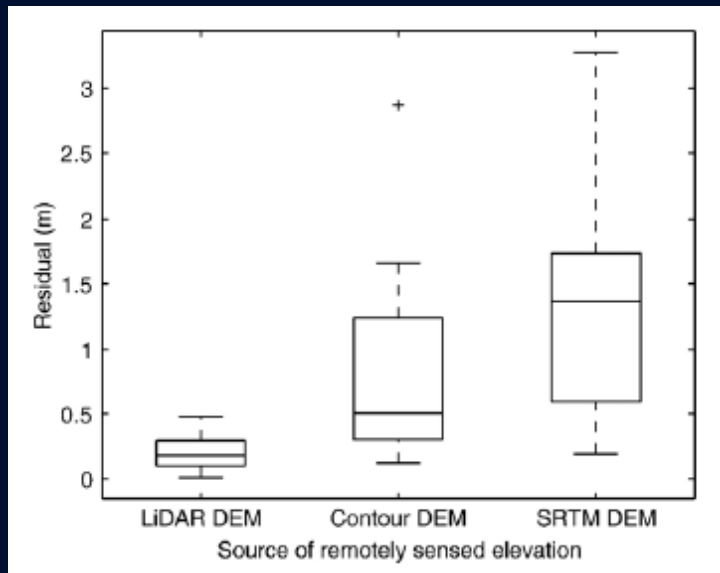


Lidar vs AirSWOT test

- Few papers have reported lidar accuracies on water surface
- Does conventional aerial lidar provide better water surface returns than AirSWOT?
- Test other techniques too? Drone, etc.



Hofle et al. 2009, ESPL



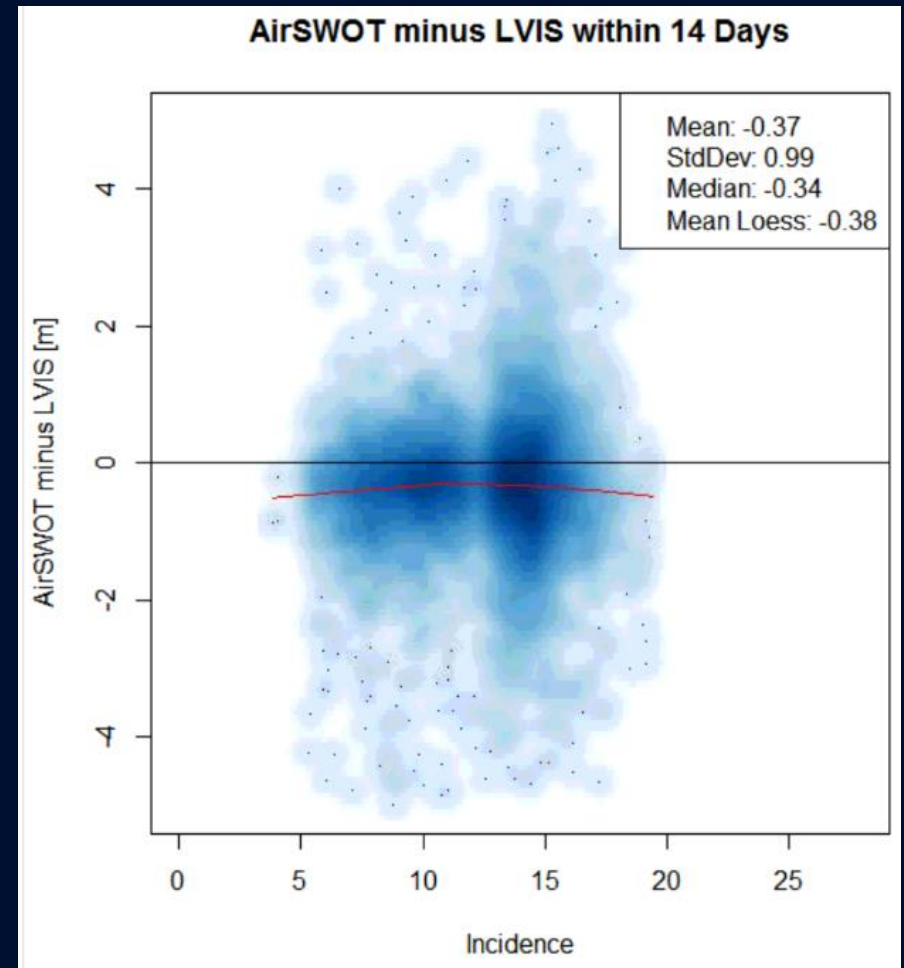
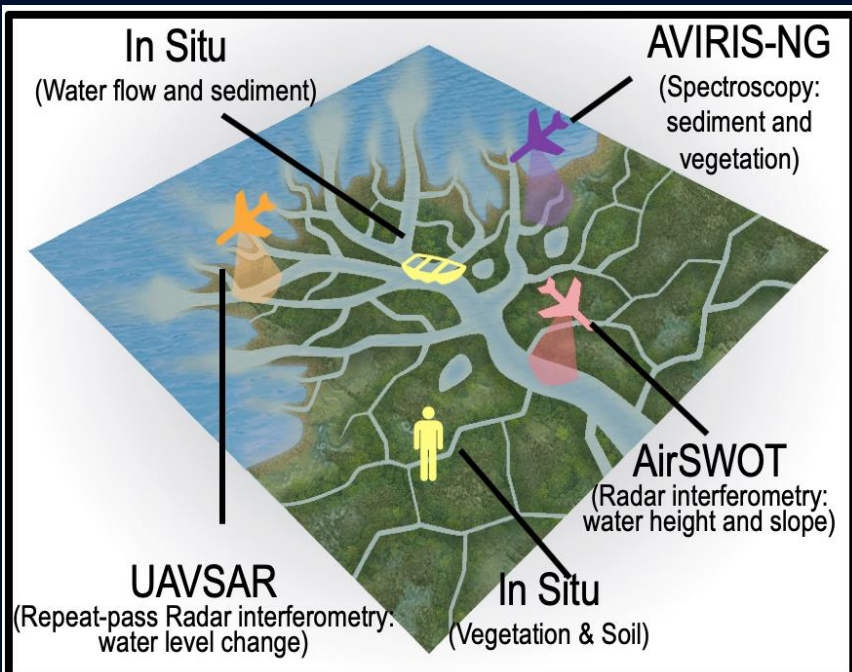
Schumann et al. 2008, JPRS

ABOVE 2017

- AirSWOT & LVIS Flown separately, may be some same-day overlap.

Wax Lake Delta for Delta-X

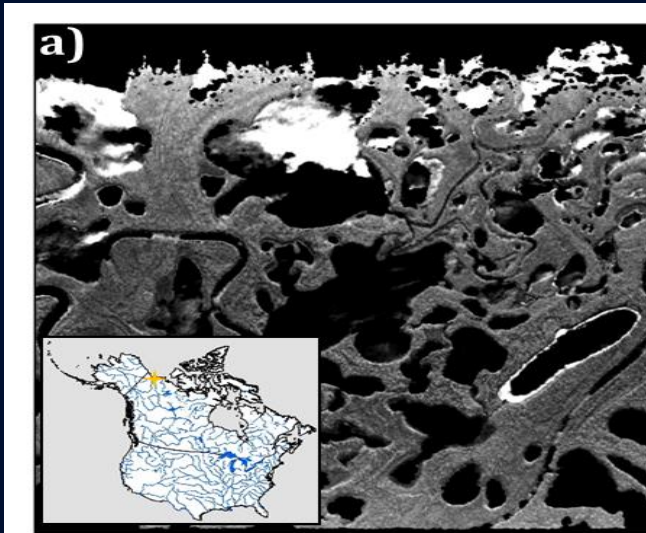
- AirSWOT & ASO flown in successive years (2015 & 2016).



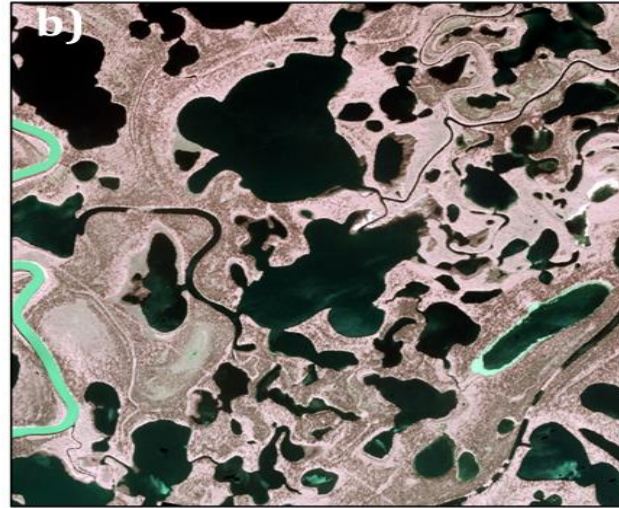
We propose to co-fly AirSWOT and a LiDAR (separate aircraft) to assess relative capabilities for SWOT cal/val (& science).

Opportunity to test AirSWOT CIR Camera

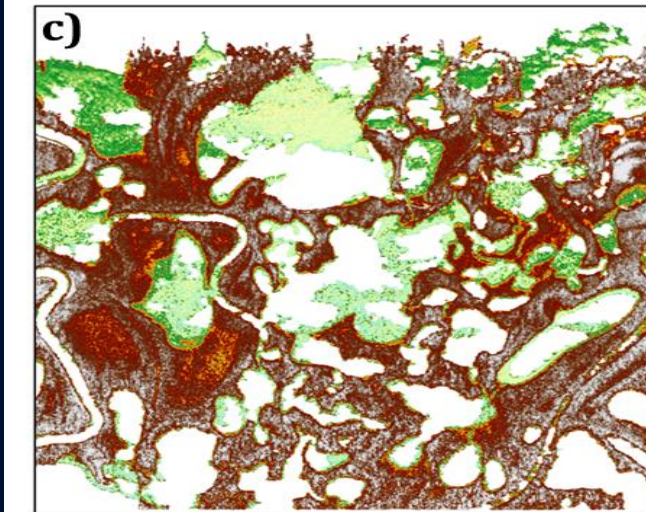
AirSWOT
radar
backscatter



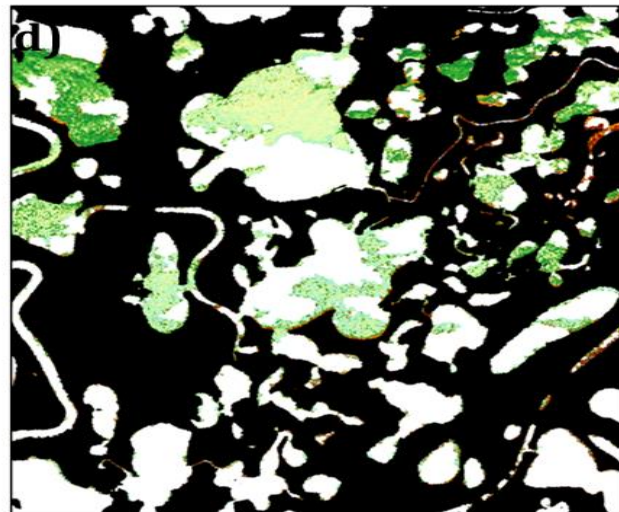
AirSWOT
CIR



AirSWOT
radar DEM



AirSWOT
CIR water
mask
(white)
limits DEM
averaging
to open-
water only



Kyzivat et al., in prep

Old CIR camera no longer viable; Is there a solution for the future?