



National Aeronautics and  
Space Administration  
  
Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California



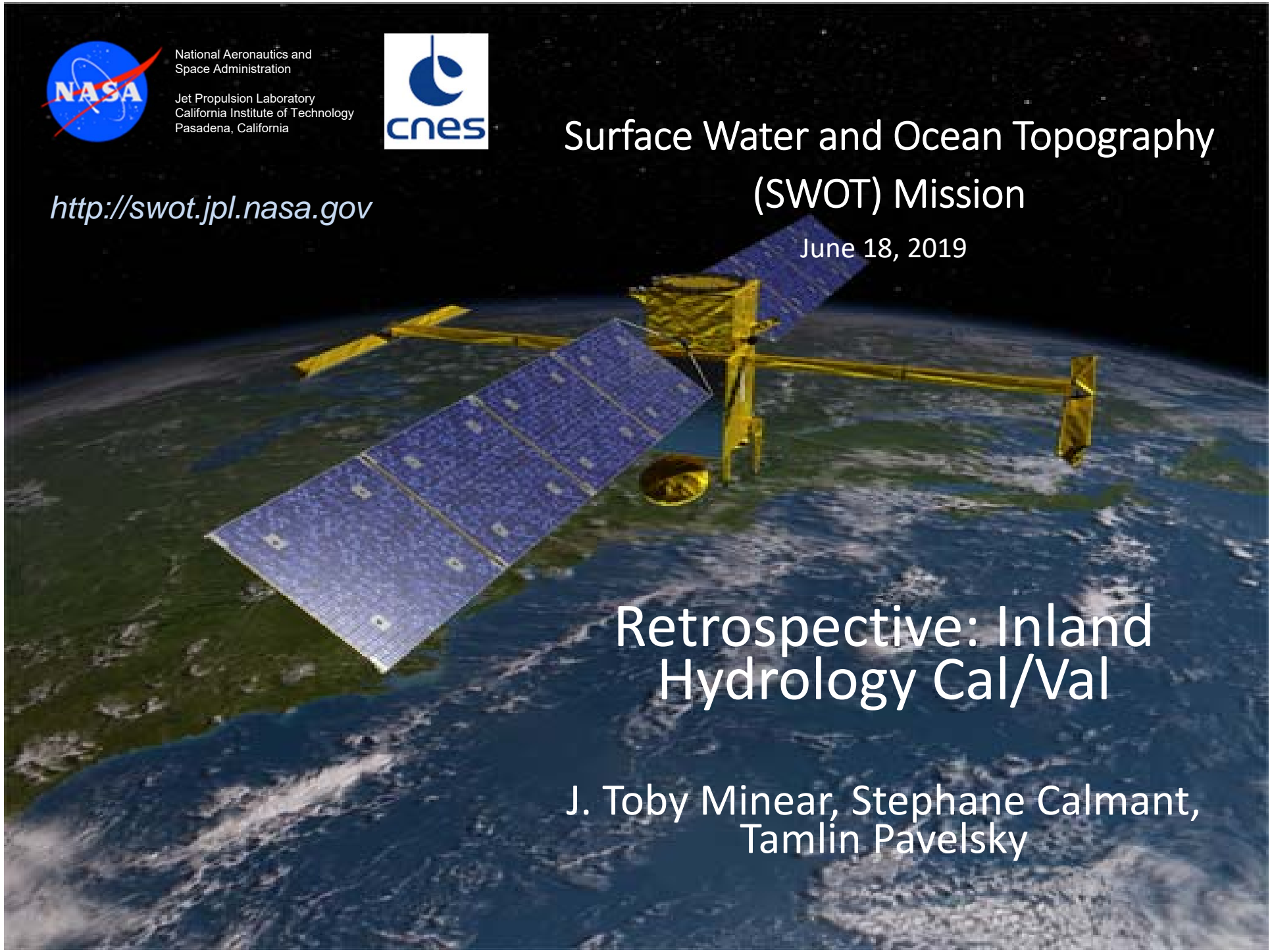
# Surface Water and Ocean Topography (SWOT) Mission

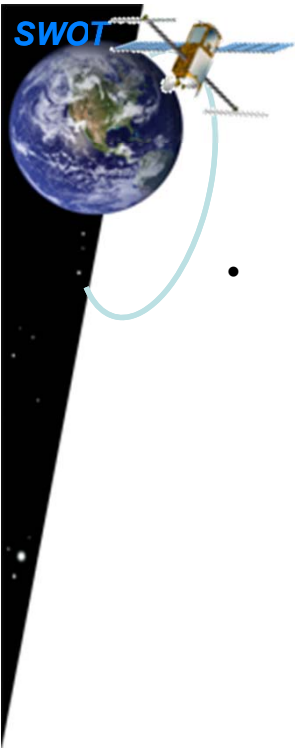
<http://swot.jpl.nasa.gov>

June 18, 2019

## Retrospective: Inland Hydrology Cal/Val

J. Toby Minear, Stephane Calmant,  
Tamlin Pavelsky

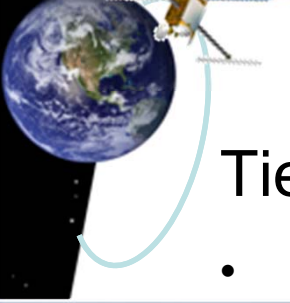




## Retrospective: Major accomplishments



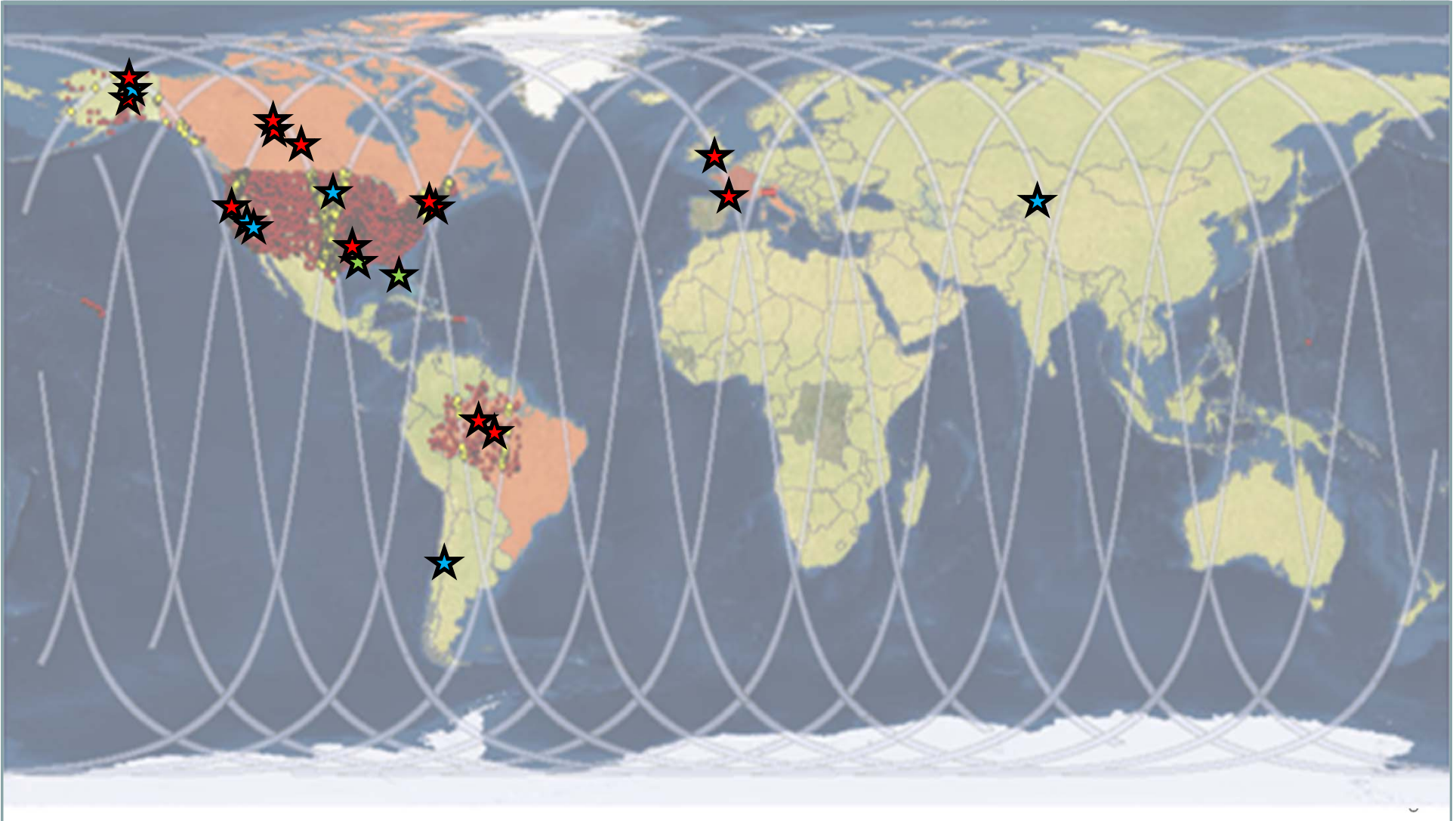
- Completion of SWOT Cal/Val Study Plan
  - Spectrum of tiered Inland Cal/Val sites chosen to study specific aspects of expected errors, also allowing for quickly assessing unexpected errors
    - ◆ Tier 1: High effort sites
    - ◆ Tier 2: Low effort sites
- Field experiments
  - Understanding distributions of natural water surface elevations, slope, inundation extent
- ABoVE 2017
  - Allowed extensive testing of Cal/Val methods
  - Large improvement in AirSWOT processing capability
  - Smith and Gleason ST – great example of hybrid ST and Cal/Val, partnership with project partner (Canada)



# SWOT Cal/Val sites: Tier 1

Tier 1 sites:

- Rivers (red), lakes (blue), wetlands (green), tidal (black)

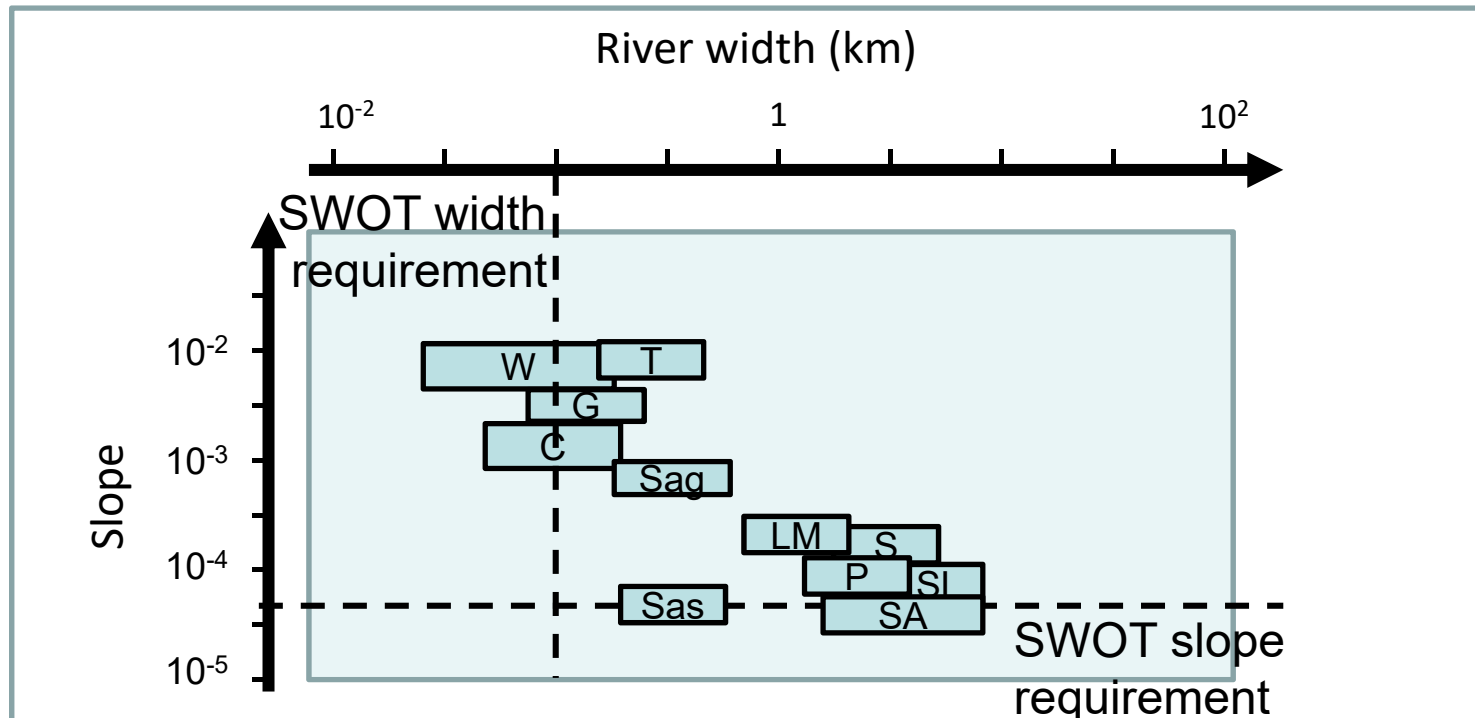




# SWOT Cal/Val sites: Tier 1 Rivers

## Tier 1 River Sites:

- Willamette River (US)
- Garonne River (FR)
- Lower Mississippi River (US)
- Connecticut River (US)
- Tanana River (US)
- Peace River (CAN)
- Slave River (CAN)
- Saint Lawrence River (CAN)
- Saskatchewan River (CAN)
- Sagavanirktok River (US)
- South America

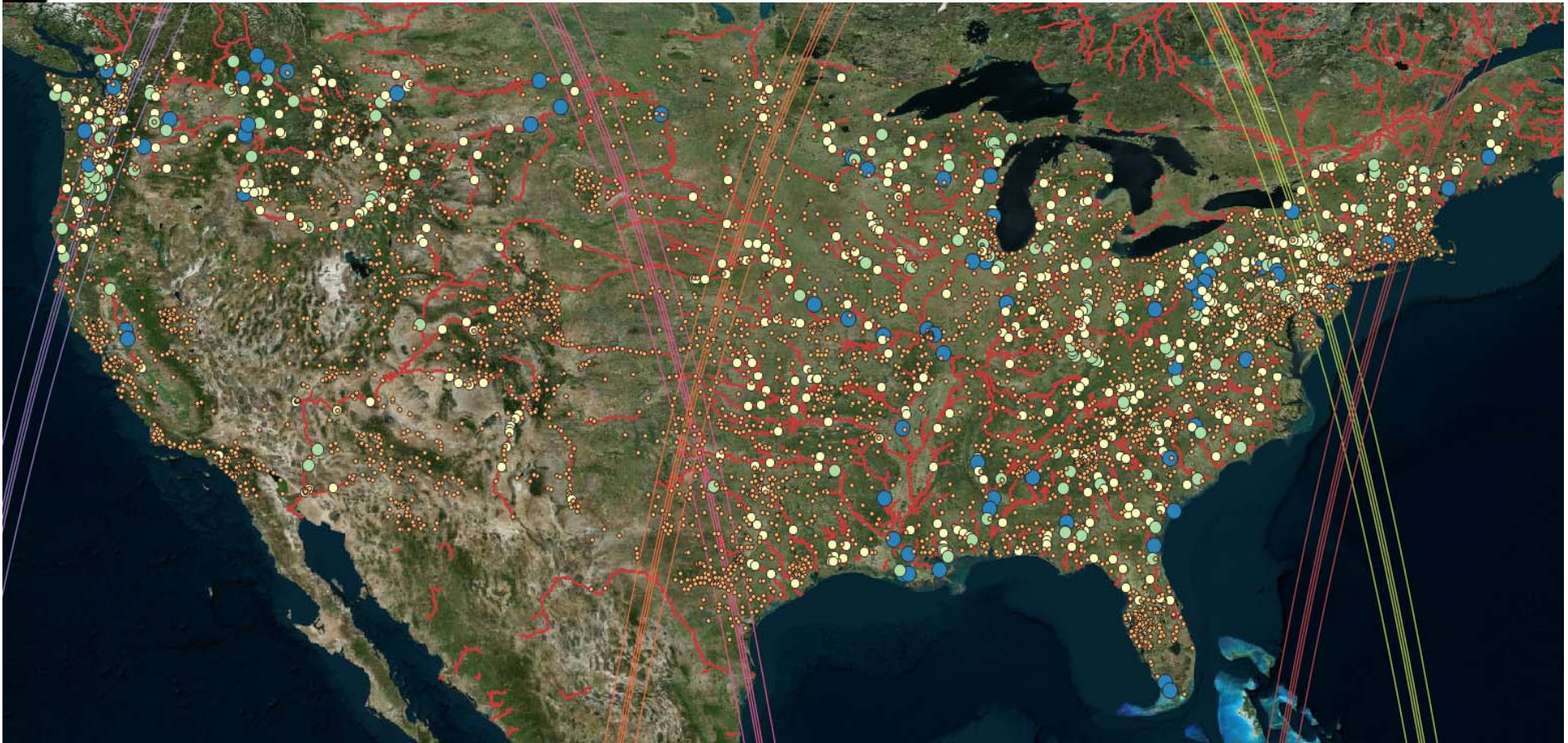




## SWOT Cal/Val sites: Tier 2

Tier 2 sites:

- US Tier 2 possible sites, 75 being selected
- All are sites with useful data



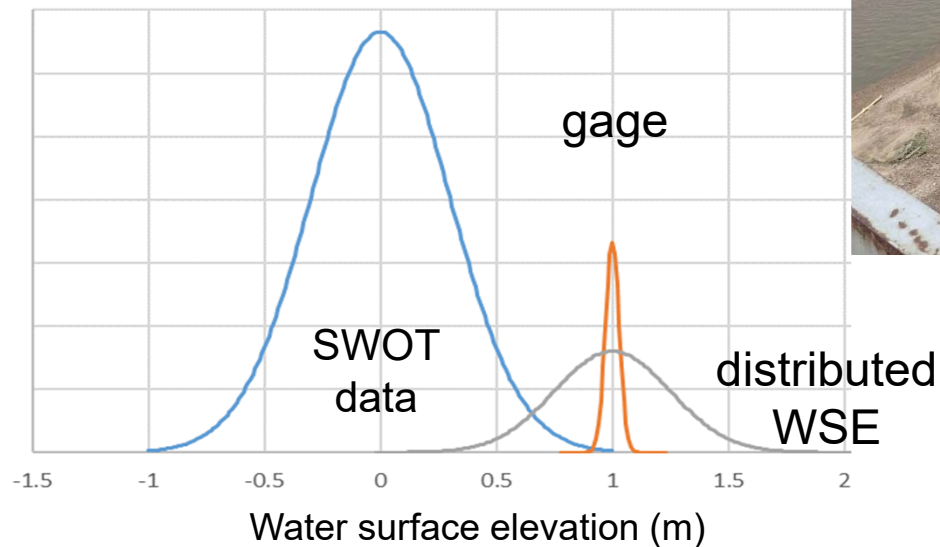


# Natural water surface distributions

- Better understanding of natural water surface distributions

USGS gage: South Platte at Fort Morgan, CO (under 1-day SWOT orbit)

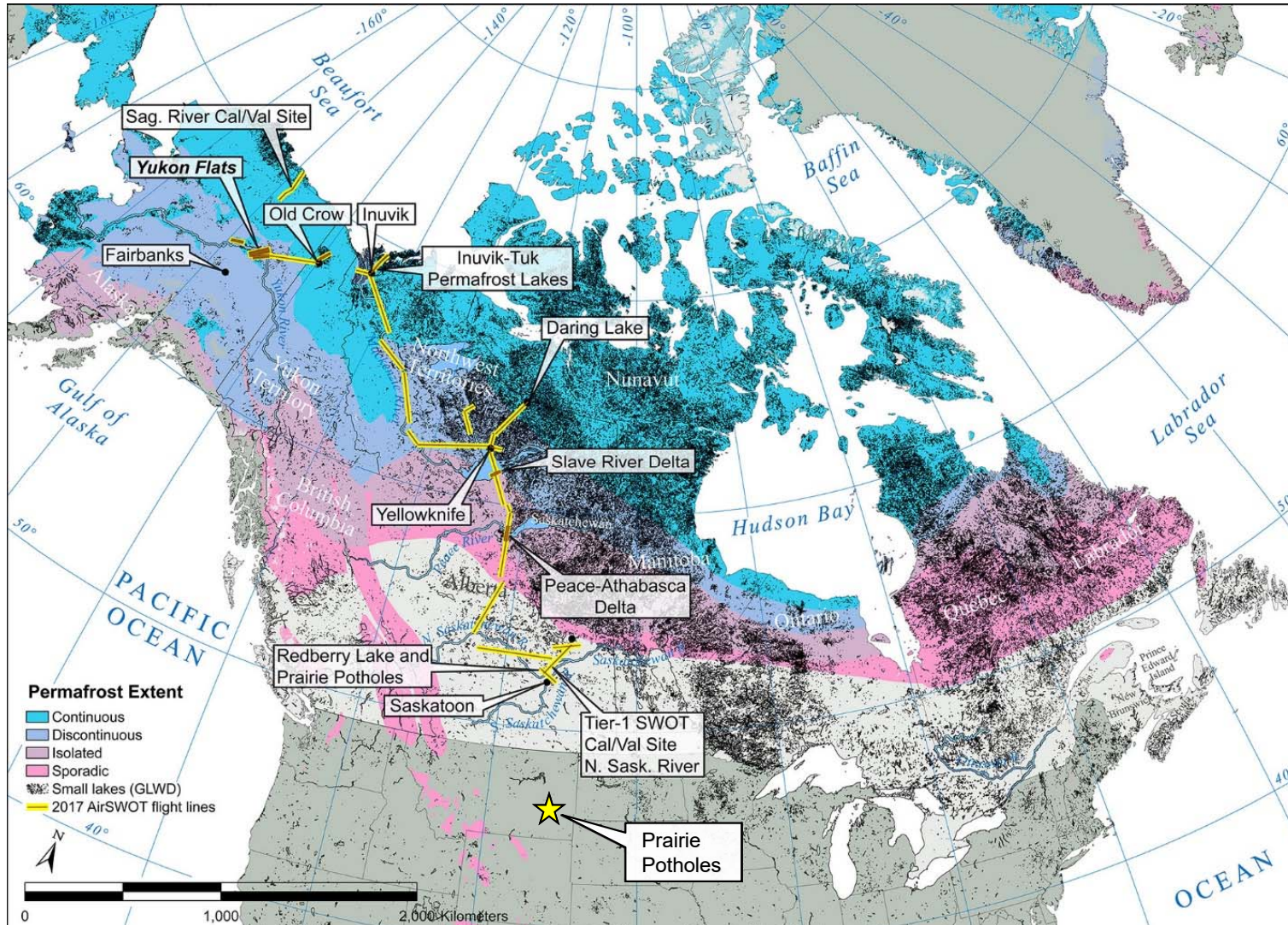
- SWOT observable

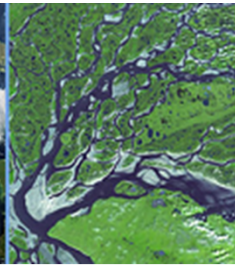
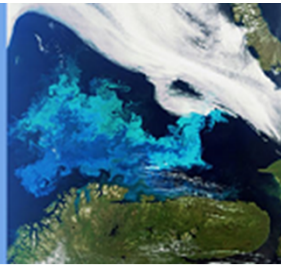




# ABoVE 2017 AirSWOT Flights

- AirSWOT flights as part of NASA ABoVE 2017 project
  - ~29,000 km of AirSWOT flightlines, numerous papers

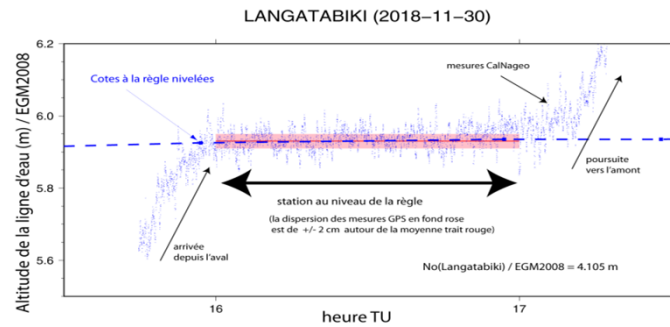
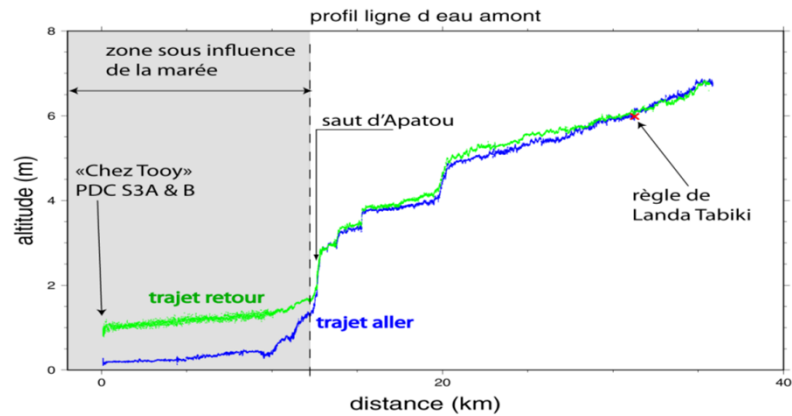
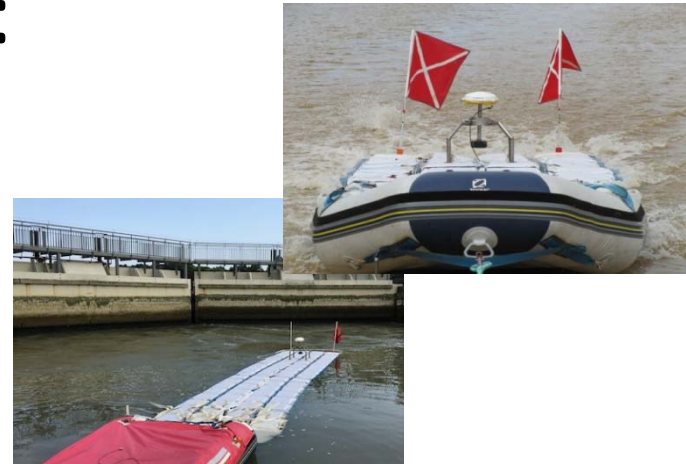




# Instrumental development :

-CalNaGeo

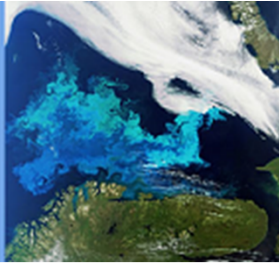
Used successfully in rivers and estuaries



High accuracy of GINS' PPP mode

- ongoing : drones for alti and for DEM





# Potential sites for the CALVAL in estuaries

**14 main sites**

**6 with 1 day-orbit and 8 with 21 day-orbit**

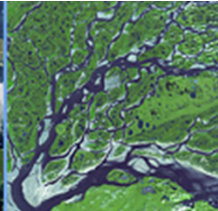
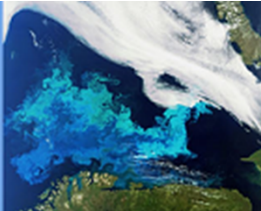
5 USA, 3 Canada, 3 in France, 2 in South America, 1 in Africa

**+ 6 complementary sites**

Site name	Country	Orbit	Morphology	Tidal range	bathymetry	model	gauges	Team	ST POC
Gabon Estuary	Gabon	1	estuary	meso	N	n		JPL/AGEOS	Marc Simard
Guayas Estuary	Ecuador	1	estuary and bay	meso				JPL/CNRS/ESPOL	Marc Simard/Frédéric Frappart
St-Lawrence Estuary	Canada	1	estuary	macro	Y	y	Y	Environment Canada	Pascal Matte
Connecticut river	USA	1	estuary and bay				Y	WHOI (D. Ralston?)/UNC/UMASS?	Tamlin Pavelesky/Colin Gleason
Seine Esuary	France	21	Estuary	macro	Y	y	Y	U. Rouen	Benoît Laignel
Everglades	USA	21	mangrove karstic system and estuary	micro	Y		Y	JPL/FIU	Marc Simard
Mississippi Delta	USA	21	marshes delta	micro	Y	y	Y	JPL/LSU	Marc Simard
Wax Lake Delta	USA	21	marshes delta	micro	Y	y	Y	JPL/LSU/U. Rouen/UNC	Marc Simard/Benoît Laignel
Magdalena	Colombia	21	delta/lagoon	micro	Y?#		Y	JPL/INVEMAR/Natgeo	Marc Simard
Mackenzie Delta	Canada	21	delta		Y	y		JPL/Environment Canada	Marc Simard/Pascal Matte
Mt St Michel Bay/Normandy Coast	France	1	bay, beach, cliff, rocks	macro	Y	y		U. Rouen/U. Caen	Benoît Laignel/Imen Turki
Garonne/Gironde estuary	France	21	estuary	macro	Y	y	Y	U. Rouen/CNRS-Toulouse	Nadia Ayoub/Florent Lyard/benoit Laignel
Columbia/Willamette rivers	USA	1	tidal river	meso	Y	y	Y	Portland State U.	Pascal Matte
Fraser River	Canada	21	estuary		Y	Y	Y	Environment Canada/DFO	Pascal Matte
Tidal Amazon	Brazil	1	tidal river and wetland	macro	Y?#	y		IRD-Toulouse	Stephane Calmant
Ogouee River	Gabon	21	wetland and estuary		N	n		JPL/AGEOS	Marc Simard
Barcelona	Spain	1	Beach	micro	Y	y	Y	U. Rouen/Cantabria	Imen Turki/Benoît Laignel
Carpenteria	Australia	1	beach+mangrove					Aberystwyth U.	Marc Simard/Rosemary Morrow
Tonkin/red river	Vietnam	1	Bay and delta				y	CNRS,Toulouse	Nadia Ayoub
Delaware Estuary	USA	1	estuary					Rutgers U. (Bob Chant?)/U. Delaware Rodrigo	Pascal Matte/Marc Simard

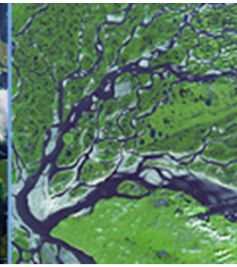
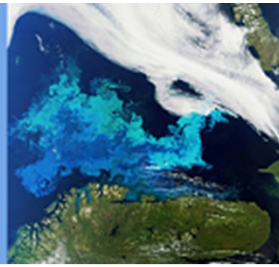


Bordeaux, June 17-20, 2019  
**SWOT**  
Science Team Meeting  
& Calval Workshop



## On site Cal / Val: Lake targets





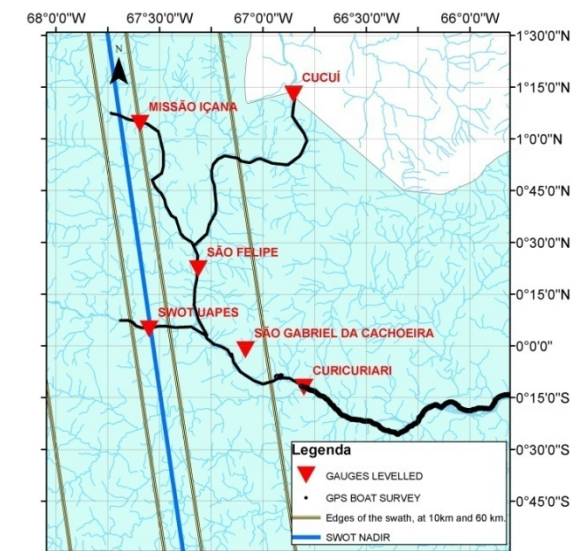
International structuring : the ScaHyLab GDRI (International Lab), gathering teams from Asia, Africa and South America around the question of Validation of SWOT (and sat altimetry) for hydrology

-Focus on “ Pilot sites” (under the 1day orbit) where to collect :

- absolute Water levels (levelled gauges)
- Discharge
- Cross section and DEM (for modelling)
- Surveys of the water surface
- run hydro model

- Pre and post launch

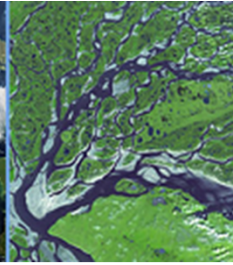
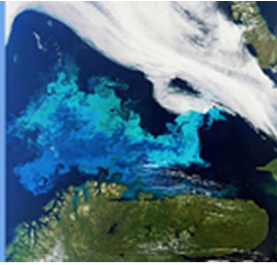
Possibility for external funding .....



Negro Pilot site

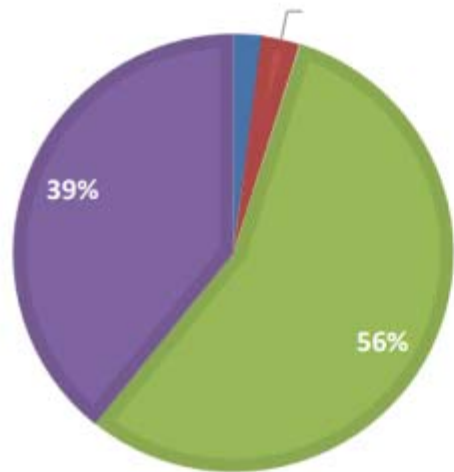


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# HYDROWEB

NUMBER OF PRODUCTS : 3156  
(INCLUDING 1829 OPERATIONAL)



- Lake operational (65)
- Lake research (90)
- River operational (1764)
- River research (1237)

OLTC in  
Jason3  
SENTINEL 3A &3B

Objectives :  
20-30 k of SV by end of 2020

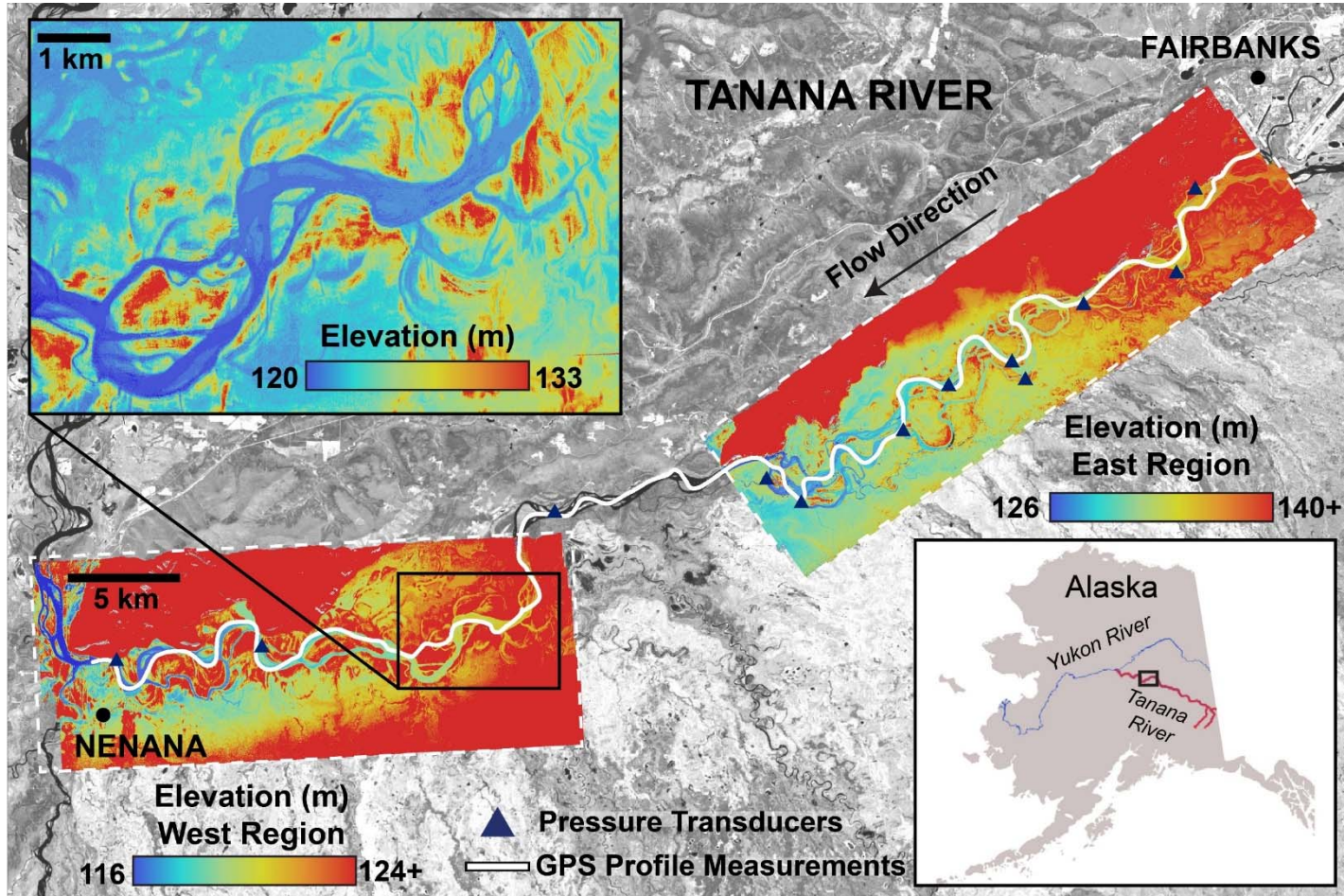
Reprocessing of 1000s of  
SV for archive missions  
Discharge (including for pilot sites  
as much as possible )  
Auto. download of large dataset

Supplemental slides



# AirSWOT 2015 Results

## AirSWOT Results: Tanana River, AK (June 9, 2015)





# AirSWOT 2015 Results



## Water Surface Elevation (WSE) Results: Tanana River, AK

