CSBWG13 - NOAA Office of Coast Survey Update

Anthony Klemm, NOAA Office of Coast Survey

January 12, 2023 - Boulder, Colorado, USA

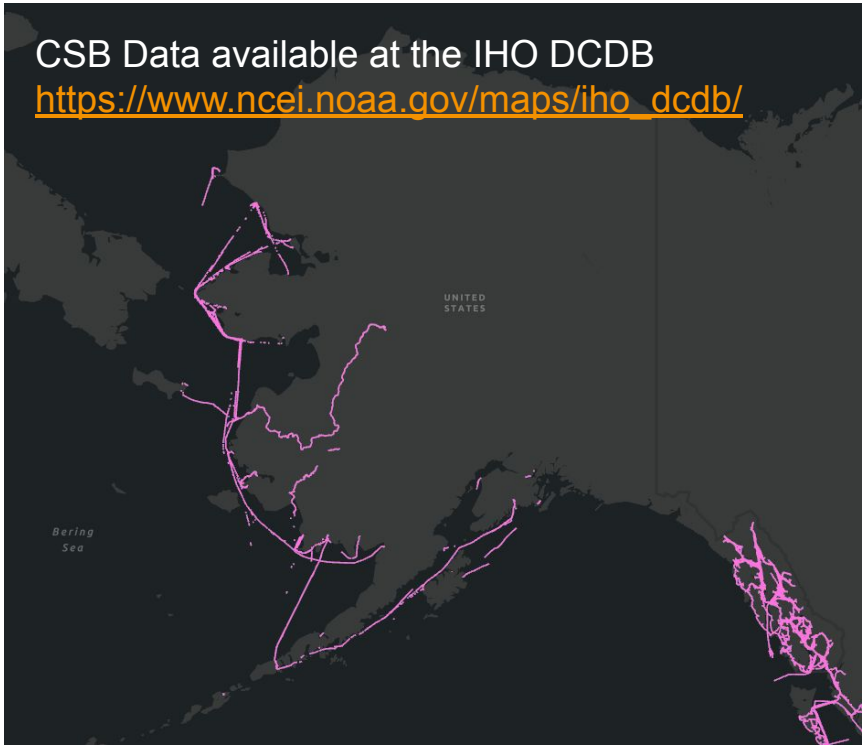
anthony.r.klemm@noaa.gov

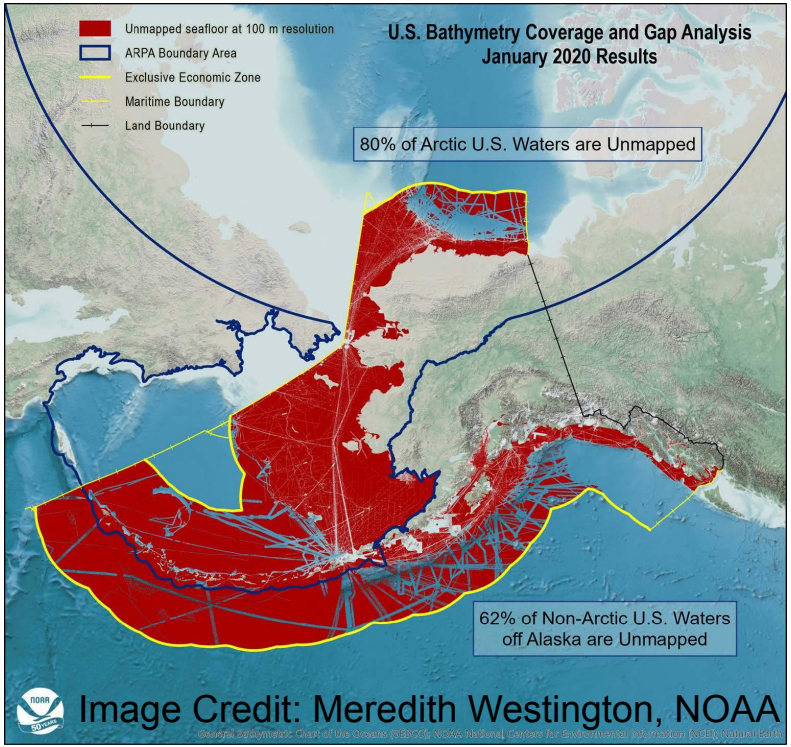
Project Goal

Develop an open-source, automated workflow to process CSB

Execute a proof of concept project to learn best practices for preparing and applying CSB to the NOAA ENCs and National Bathymetric Source (NBS).

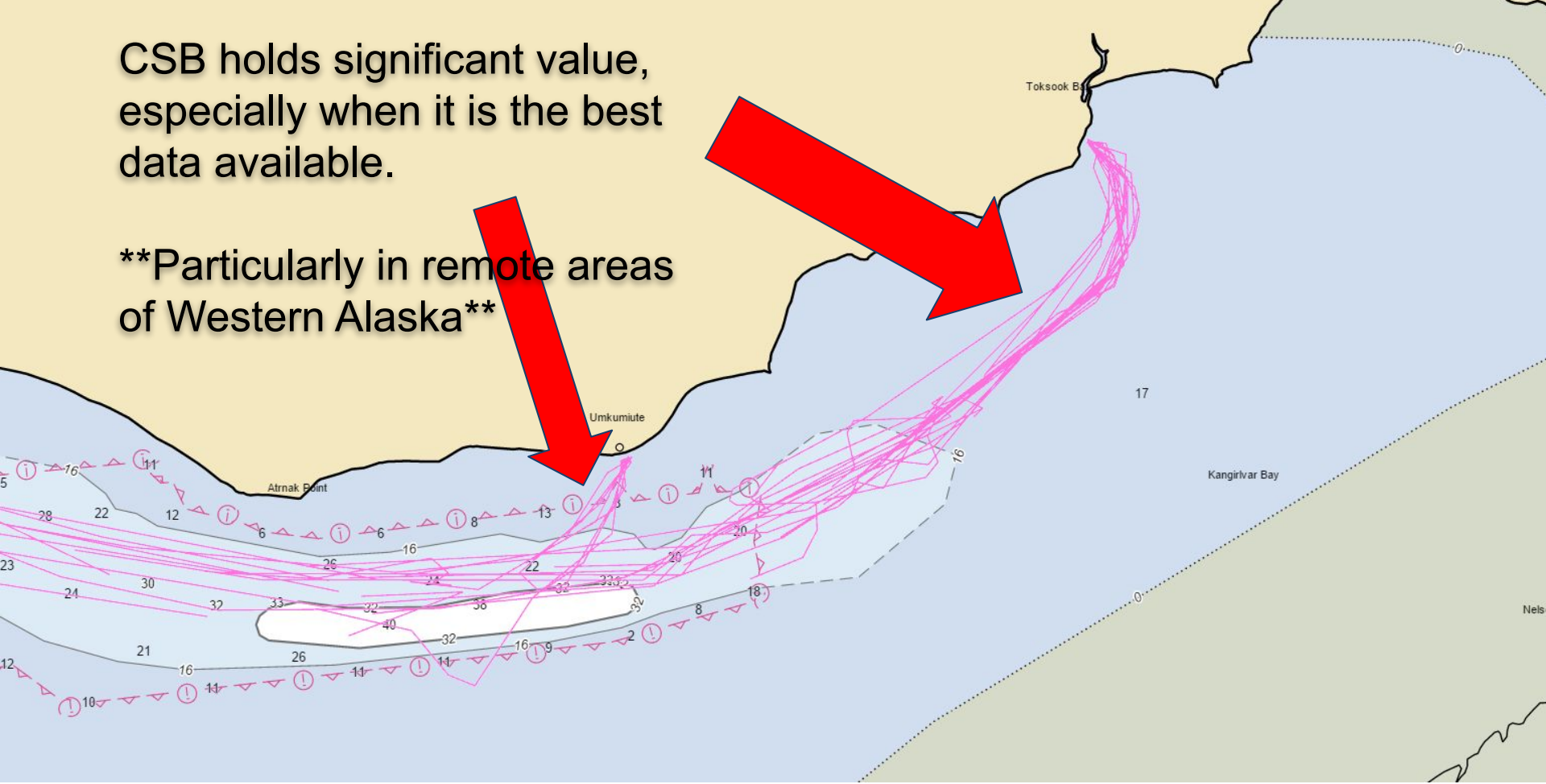
CSB: a piece of the mapping solution





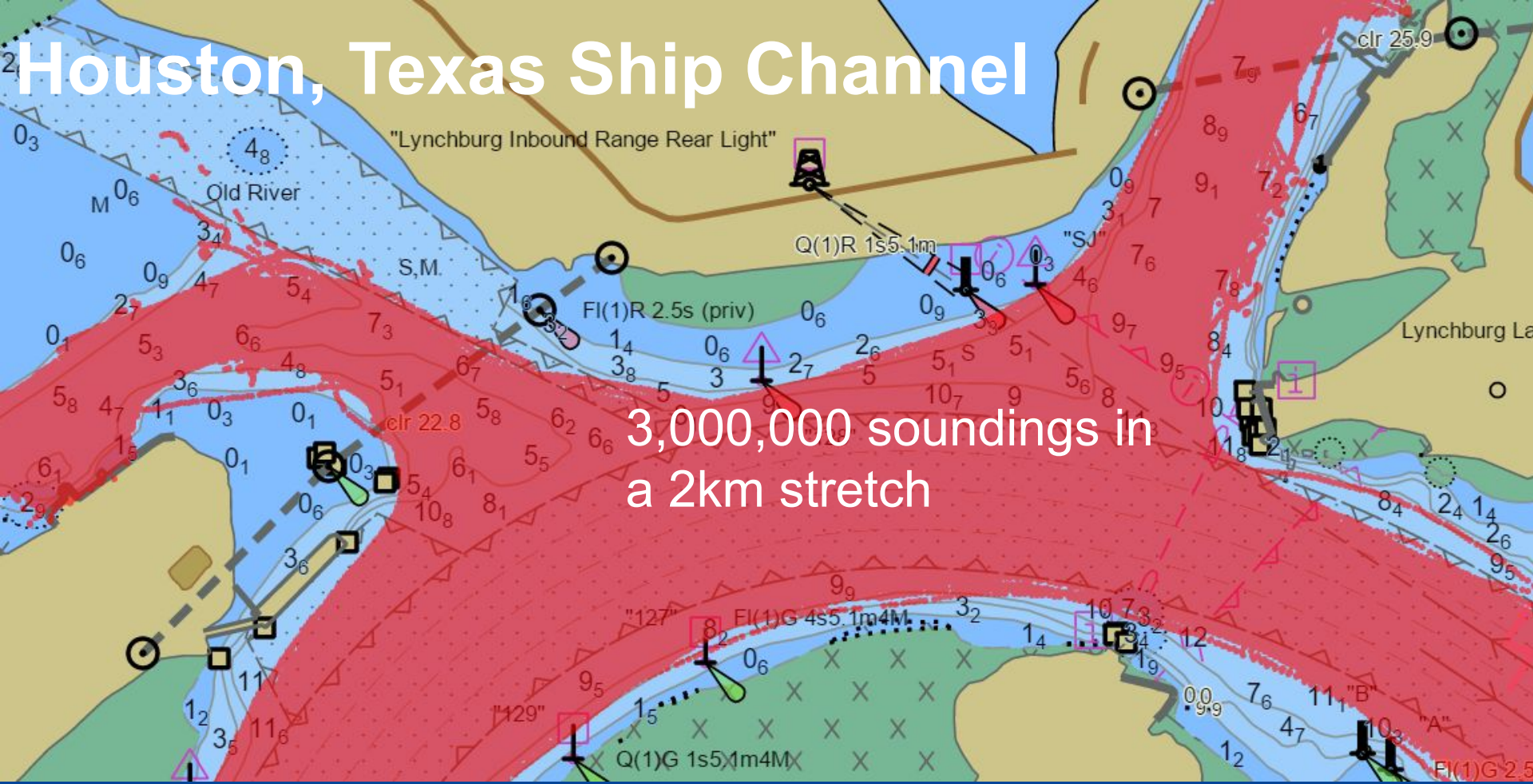
CSB holds significant value, especially when it is the best data available.

Particularly in remote areas of Western Alaska



Ninglick River - Best Available NOAA Nautical Chart

Houston, Texas Ship Channel



Processing Workflow (Python-based)

- **Filter/Clean data** (i.e. erroneous dates, vessels named “Anonymous,” obvious depth fliers/outliers)

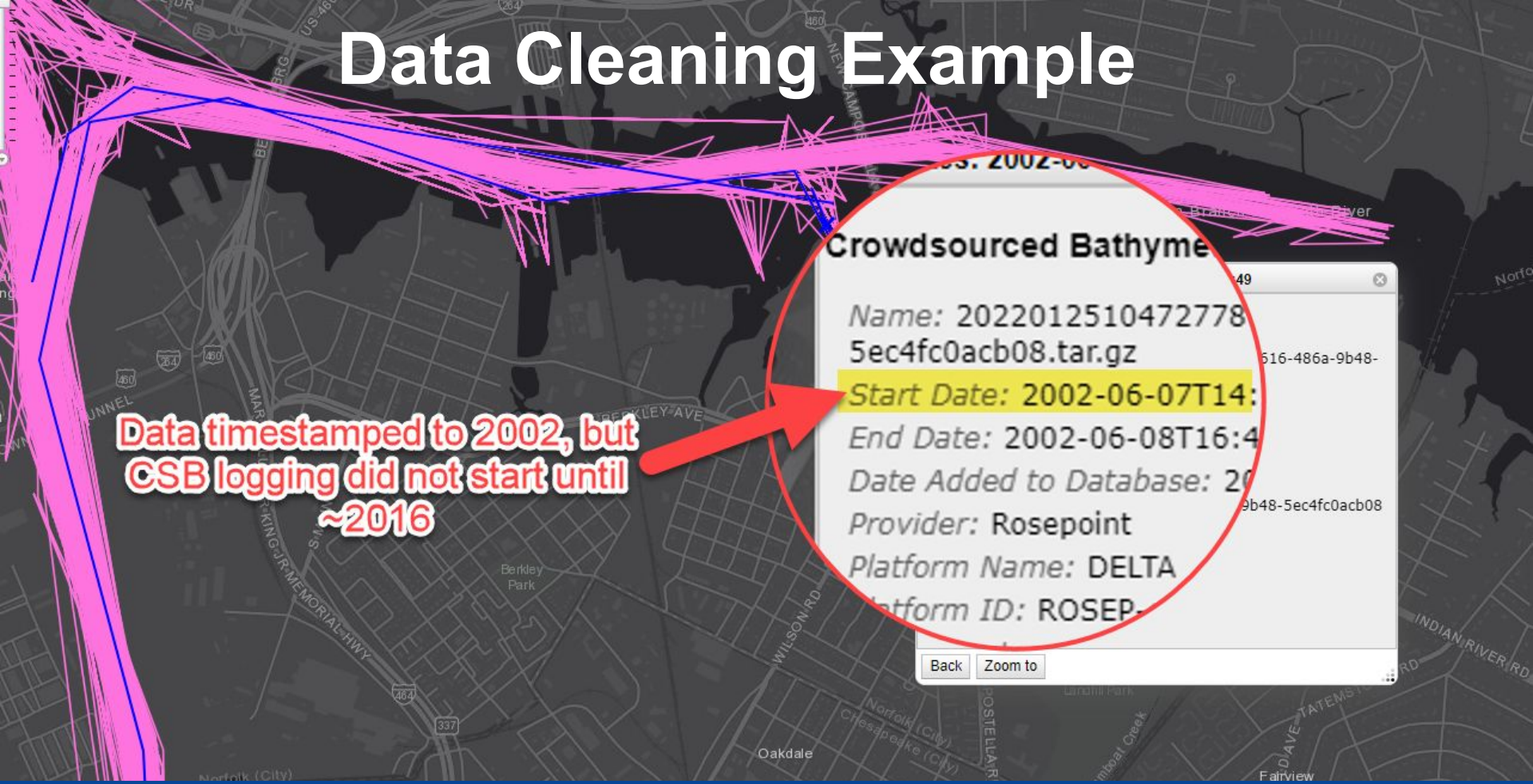
- **Tide correct** using discrete zone tide definitions (time offsets and magnitude coefficients tied to a tide gauge control station; data extracted using CO-OPS web API)
  - Currently using NOAA CO-OPS tide predictions instead of actual observations due to data gaps

- **Derive and apply estimated vertical transducer offset** (transducer draft)
  - Compare tide-corrected depths to recent hydrographic survey / known bathymetry
  - If static offset is detected (i.e. standard deviation of mean depth difference is below a certain threshold), build out master database of vessels and derived transducer drafts and apply to data

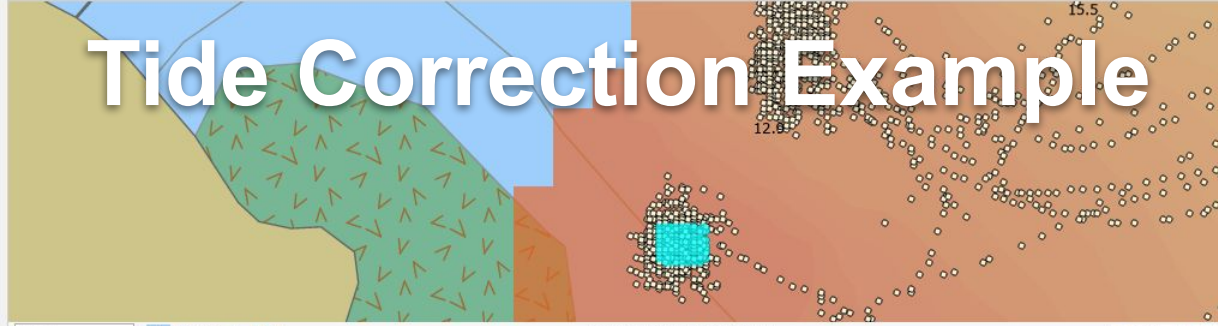
- **Grid/interpolate data** - Currently use IDW interpolation algorithm

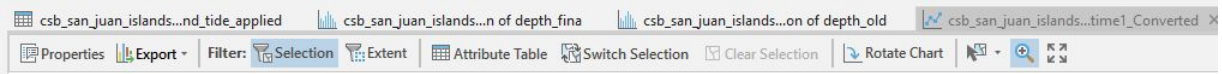
- *Future work may include Butterworth heave corrections and rating individual contributors based on data quality, with the potential for higher-rated contributor data to be be weighted more in interpolation algorithm.*

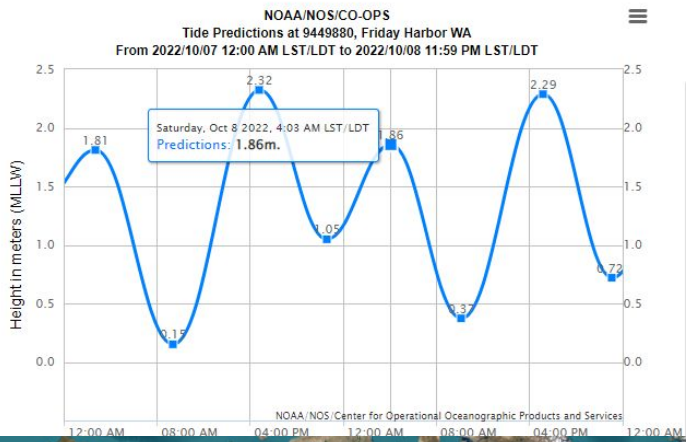
Data Cleaning Example

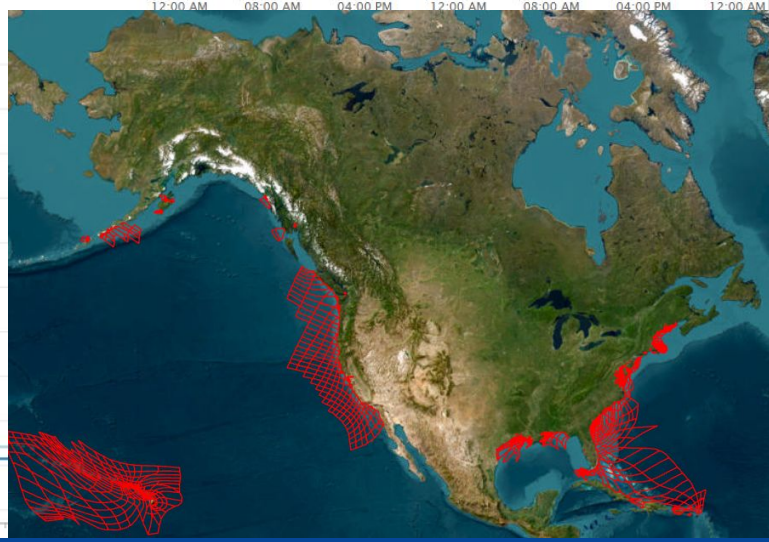


Tide Correction Example

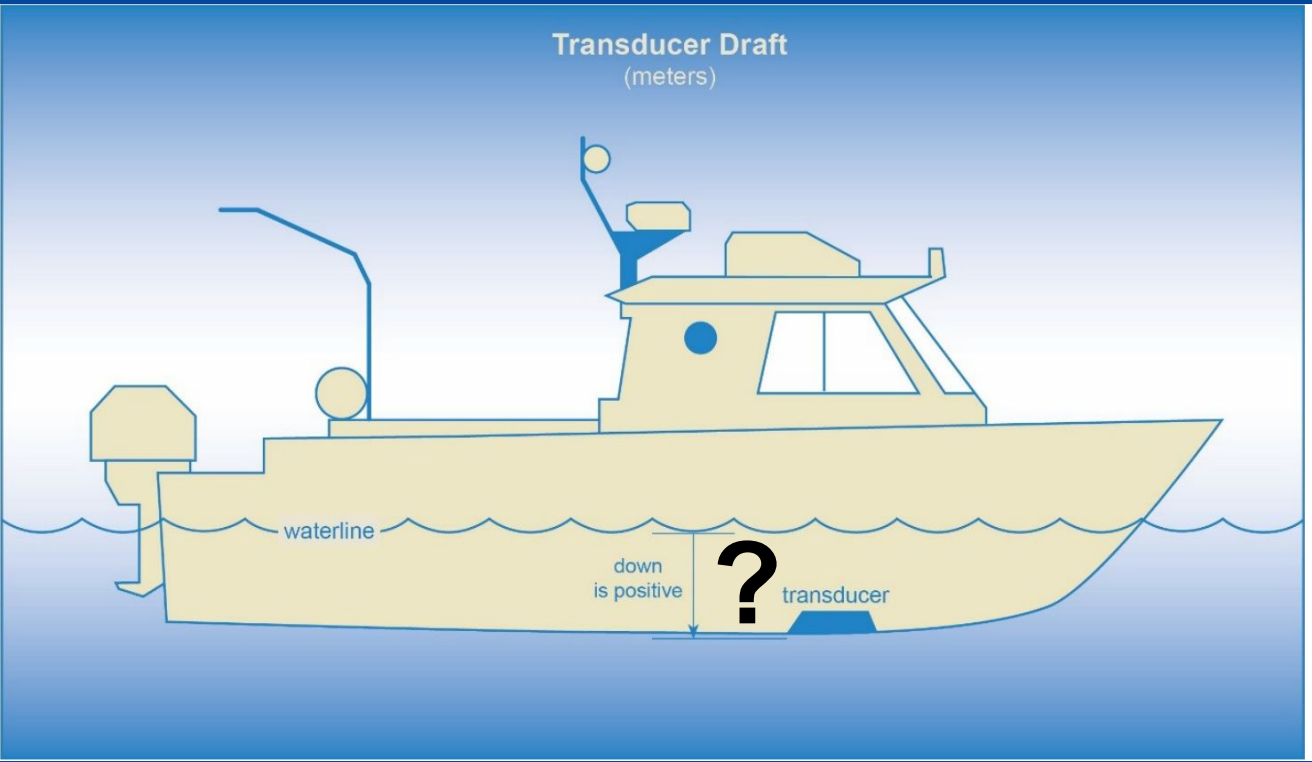








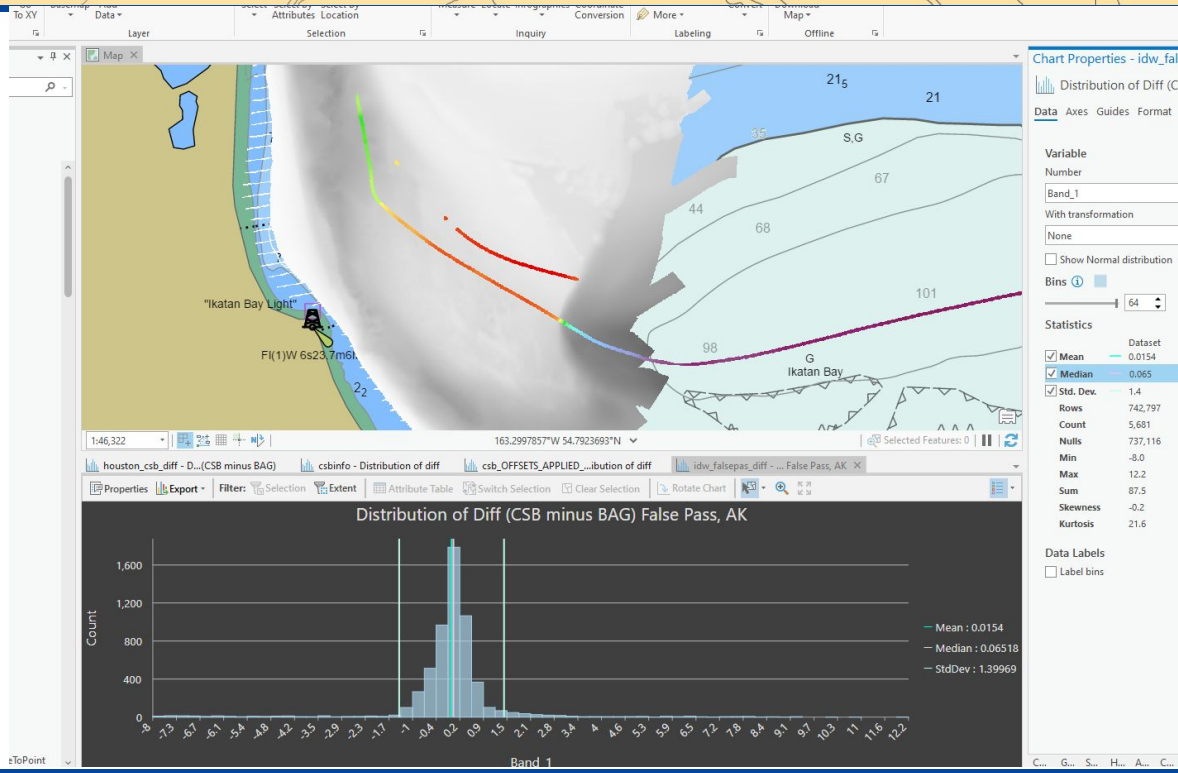
Data-Derived Transducer Draft



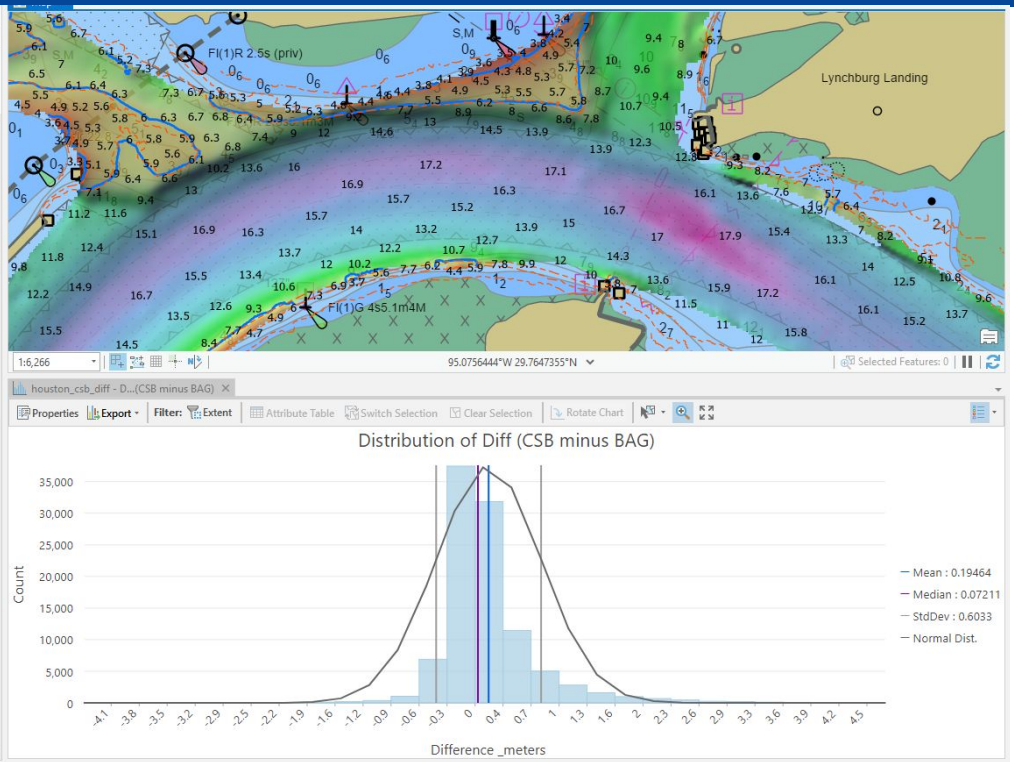
We compare tide-corrected CSB depths to a recent hydrographic survey to derive an estimated static vertical transducer offset for each vessel, and then apply that to the data

Data-Derived Transducer Draft

	A	B	C	D	E
1	Column1	platform	mean	std	count
2	0	ATB GENESIS PATRIOT			0
3	1	Blue Note	-0.23	0.89	1434
4	2	Gray Eagle	-0.48	0.19	475
5	3	Hank The Tank			0
6	4	JOE PYNE			0
7	5	Joe Pyne			0
8	6	Kairos	-1.64	0.12	222
9	7	Lay Time			0
10	8	Magnolia	-0.15	0.18	872
11	9	Maverick			0
12	10	NOAA Ship Thomas Jefferson	-0.87	0.31	772
13	11	Okeanos Explorer	-5.78	0.42	1440
14	12	One With The Wibd			0
15	13	Paragon			0
16	14	R/V Bay Hydro II	-0.86	0.43	1006
17	15	Ren Chai	-1.88	0.43	6426
18	16	Rockhopper			0
19	17	SAILS	-0.04	0.45	7162
20	18	SERENITY	-1.51	0.32	423
21	19	Sea Dweller	-0.41	0.25	1331
22	20	Sea Saga			0
23	21	Sempre Avanti	-0.14	0.33	2129
24	22	Silence Rising	-0.08	0.45	1776
25	23	Tapestry	-0.41	0.35	1551
26	24	Tootega	0.07	0.40	4561



Preliminary results are promising

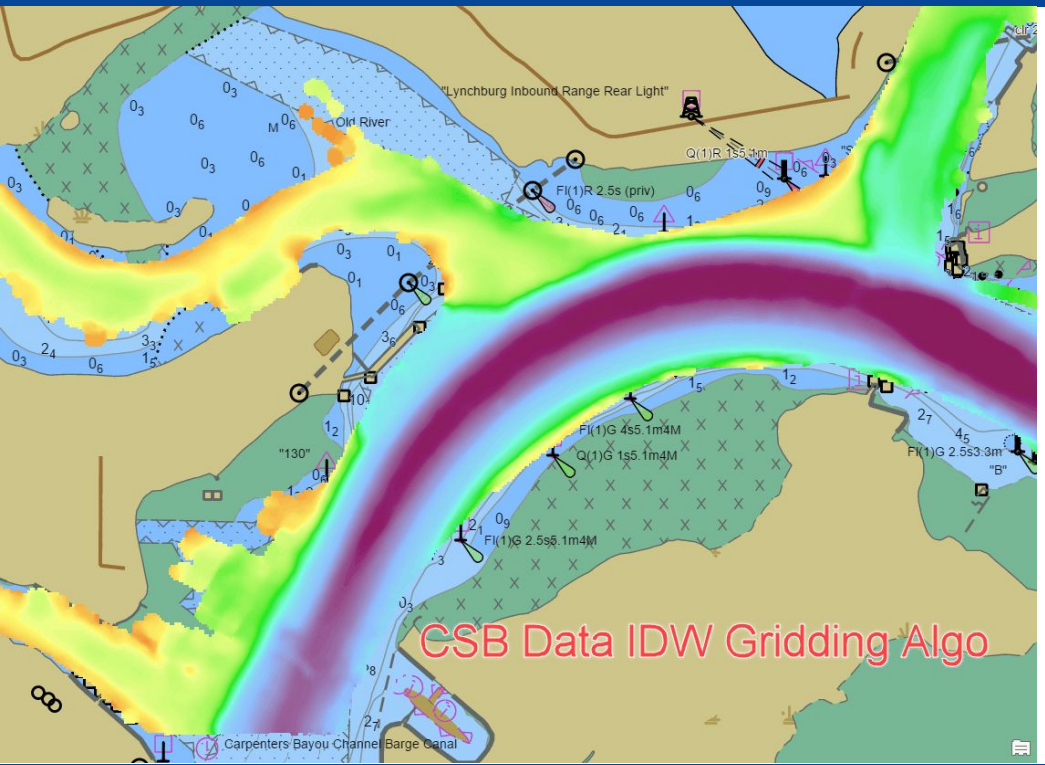


Houston, TX

Comparison of CSB to recent survey:

Mean difference: 0.19 m
Standard deviation: 0.60 m

Preliminary results are promising

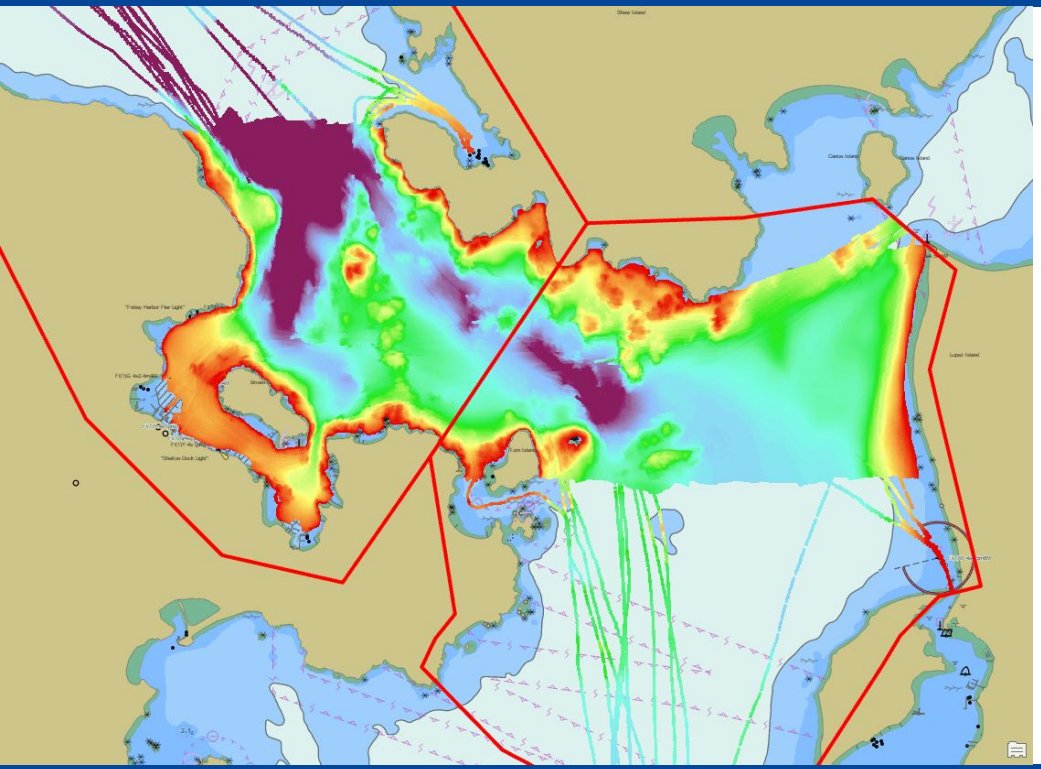


Houston, TX

Comparison of CSB to recent survey:

Mean difference: 0.19 m
Standard deviation: 0.60 m

Preliminary results are promising

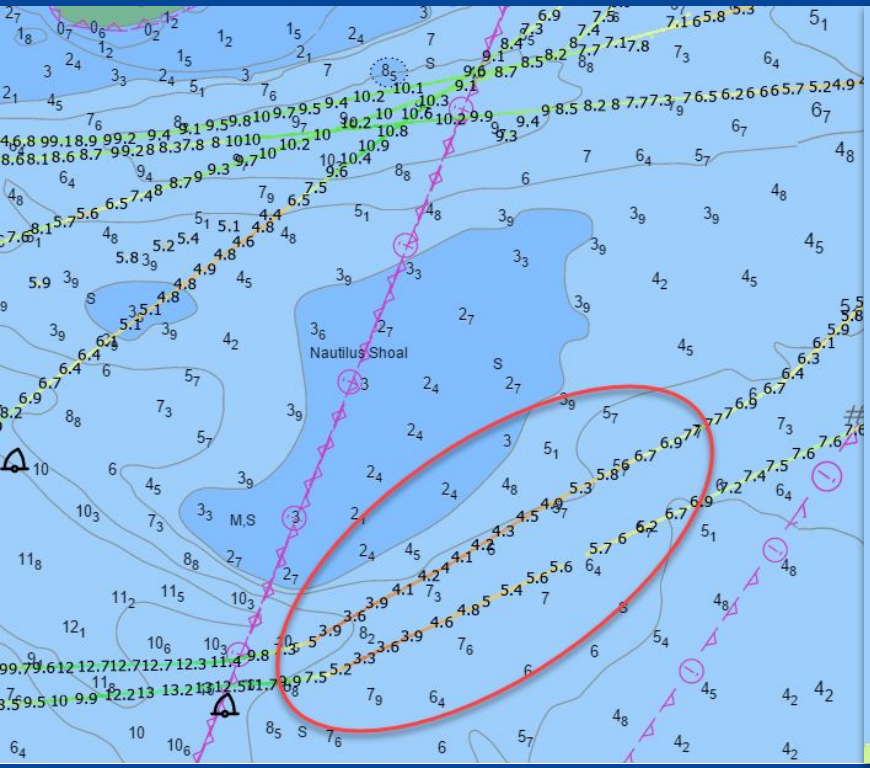


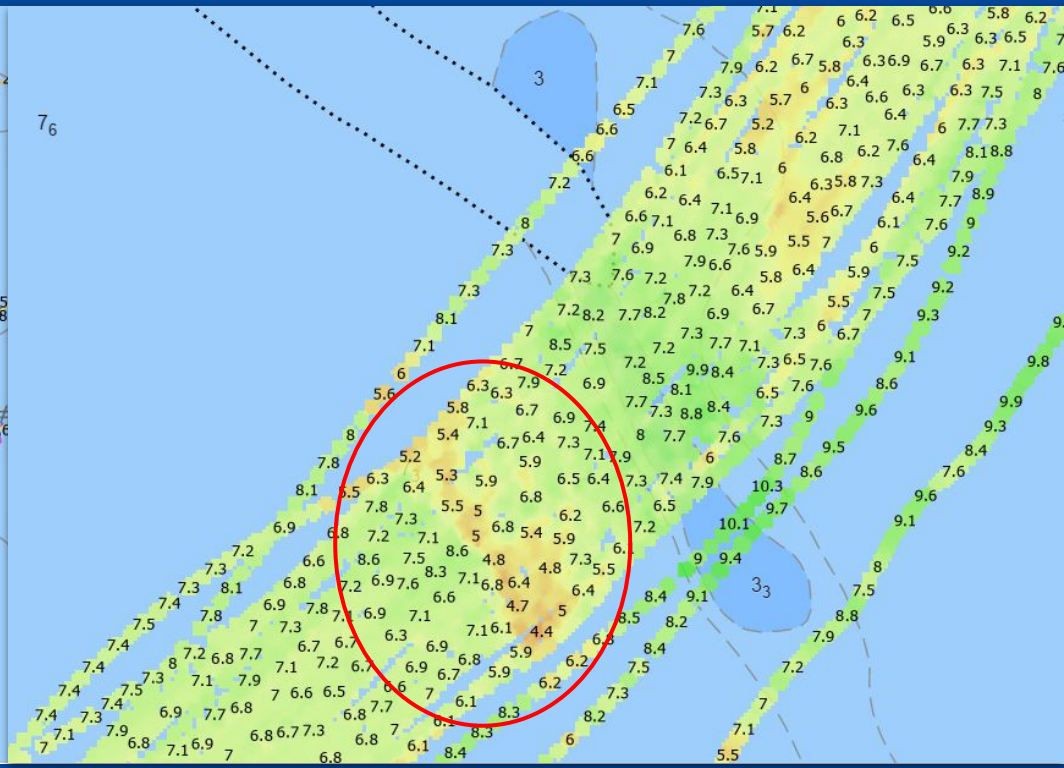
San Juan Islands, WA

Comparison of CSB to recent survey:

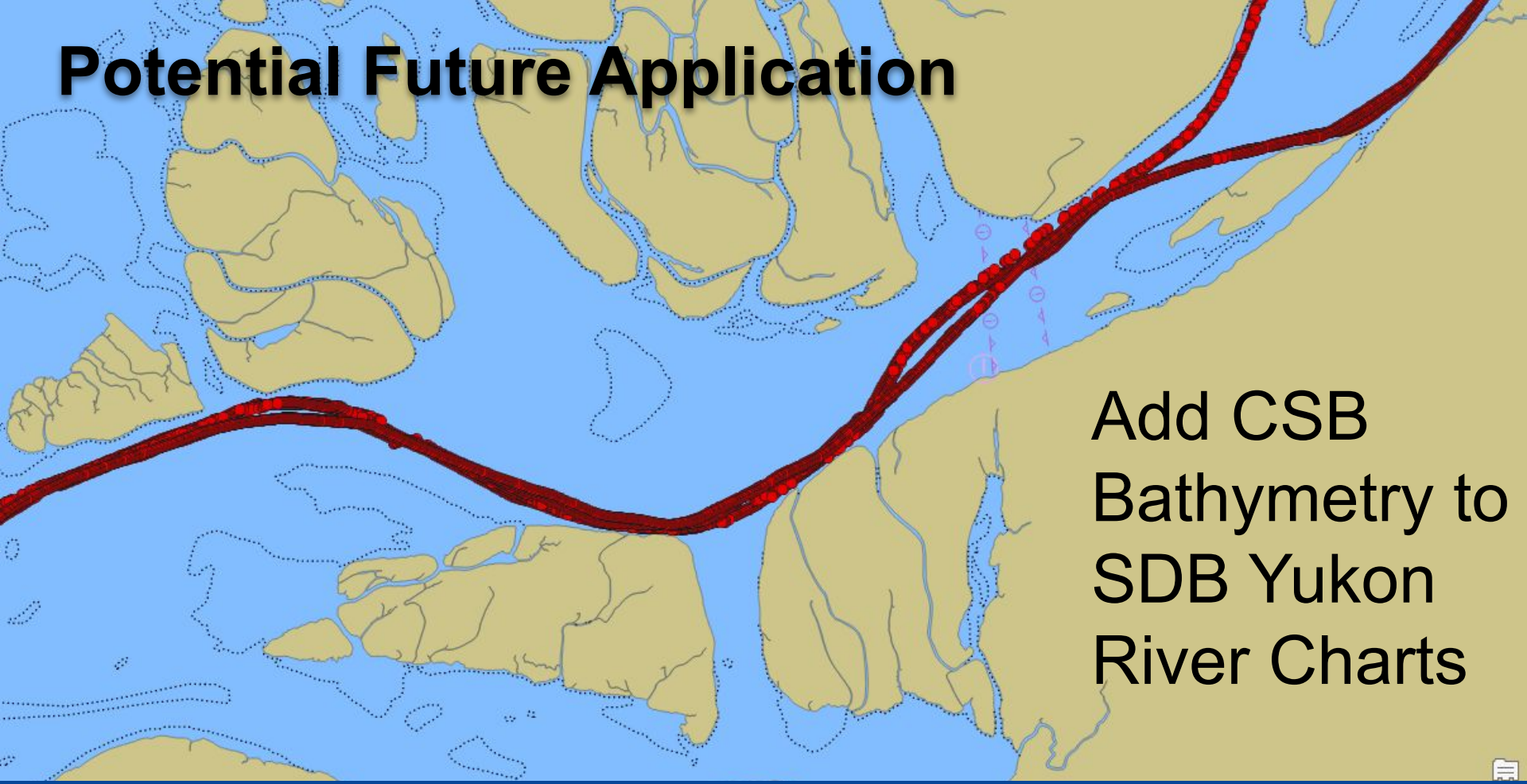
Mean difference: 0.03 m
Standard deviation: 1.50 m

Mischarted Shoals Detected in Chesapeake and Delaware Bays





Potential Future Application



Add CSB Bathymetry to SDB Yukon River Charts

Thank you! Please reach out for questions or collaboration requests

anthony.r.klemm@noaa.gov