



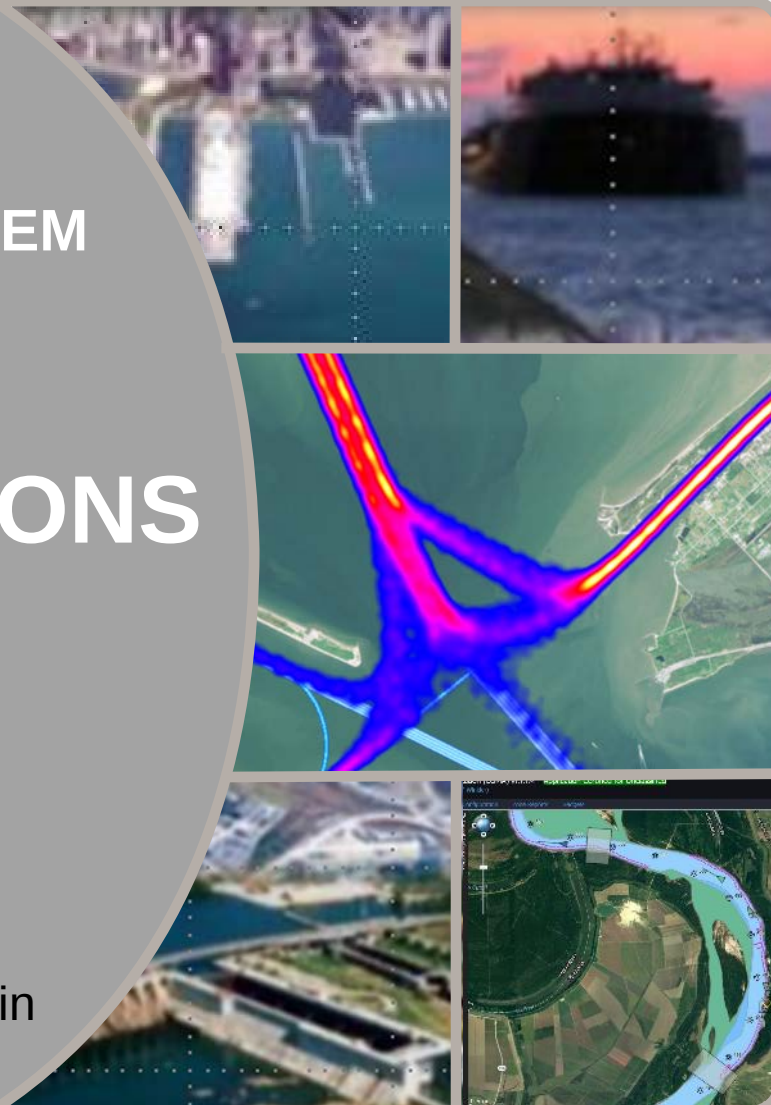
AUTOMATIC IDENTIFICATION SYSTEM ANALYSIS PACKAGE AISAP LESSON 6: CURRENT APPLICATIONS

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AISAP Training Class

8 January 2019

Team: Ned Mitchell, PhD, Brian Tetreault, Marin
Kress, PhD, SAM-OPJ, ARA



US Army Corps
of Engineers

ERDC
Engineer Research and
Development Center

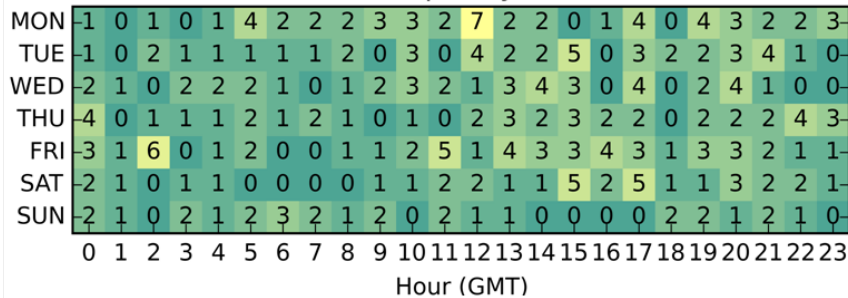
ARRIVAL PROCESS MINING

How many vessels arrive per day?

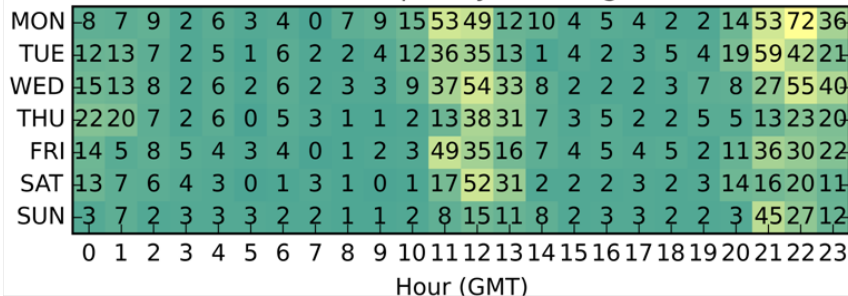
How long between arrivals?

When do they arrive?

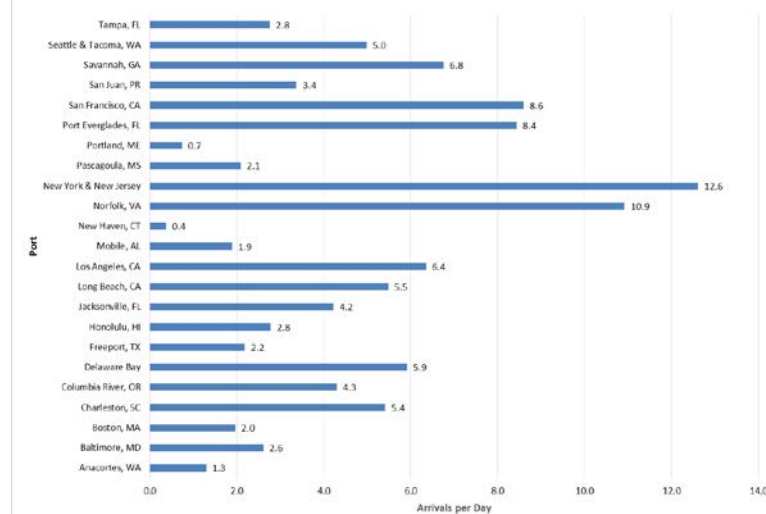
Vessel Call Frequency, Portland, ME



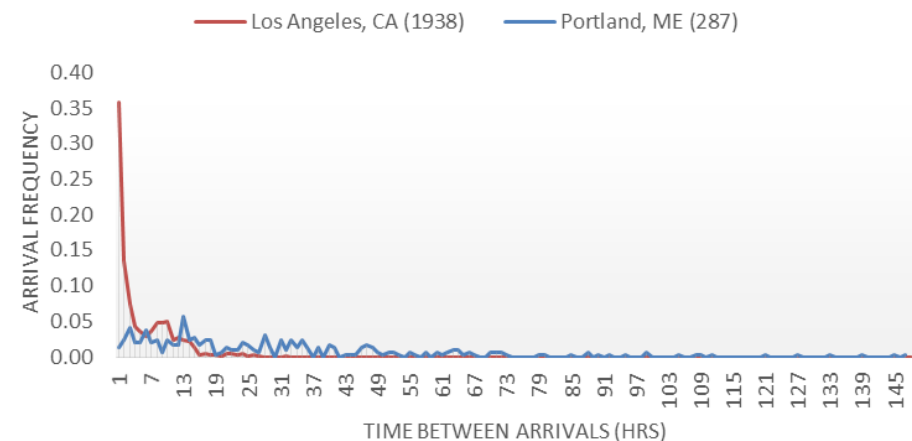
Vessel Call Frequency, Los Angeles, CA



Average Arrivals Per Day, 2012-2014



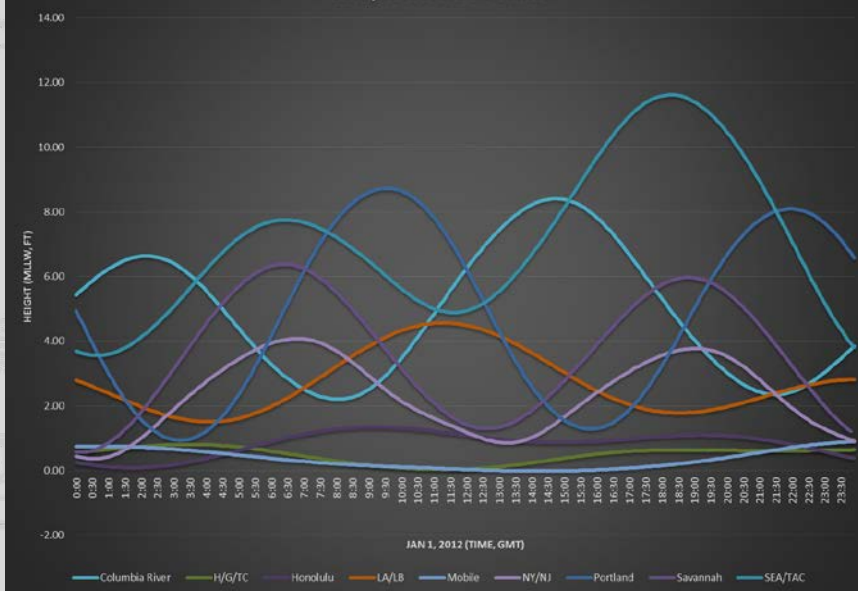
2012 Interarrival Times, Cargo and Tanker Vessels



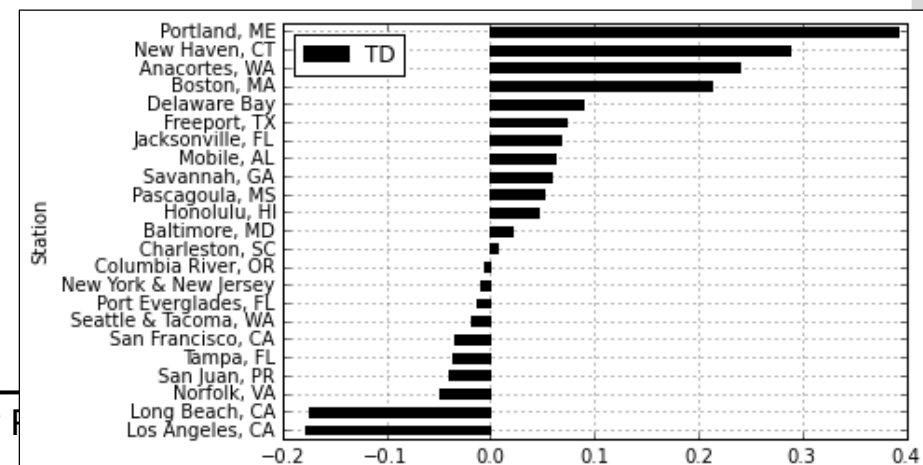
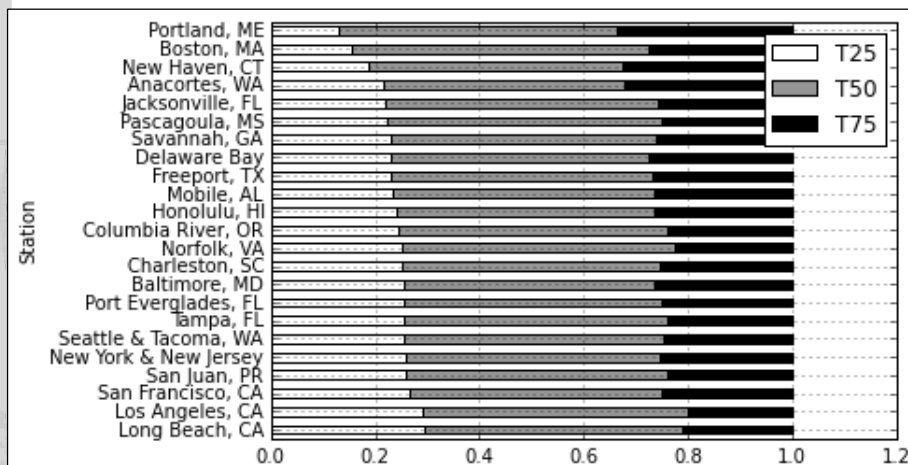
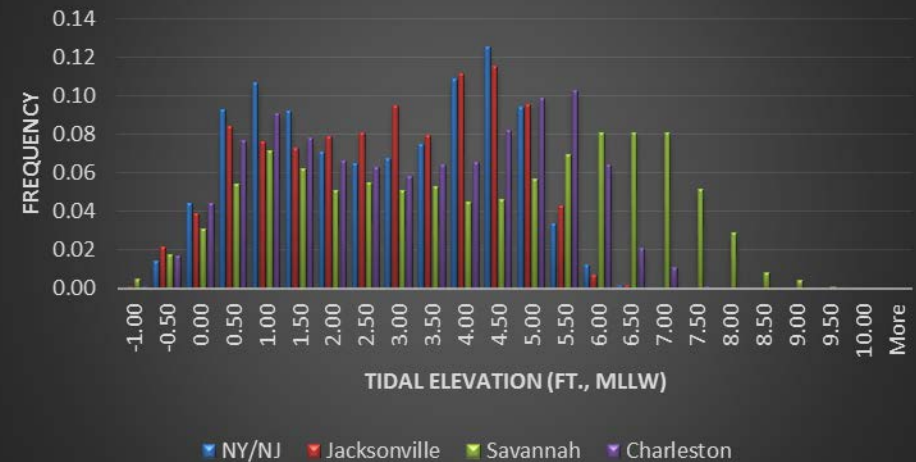
TIDAL ANALYSIS

What tide stage to vessels prefer?

Sample US Tide Forms



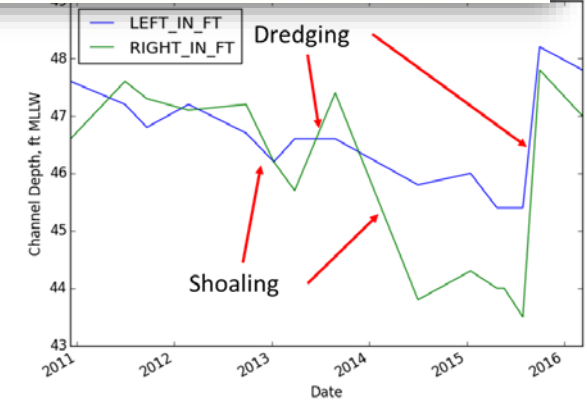
Tidal Elevation at Vessel Arrival



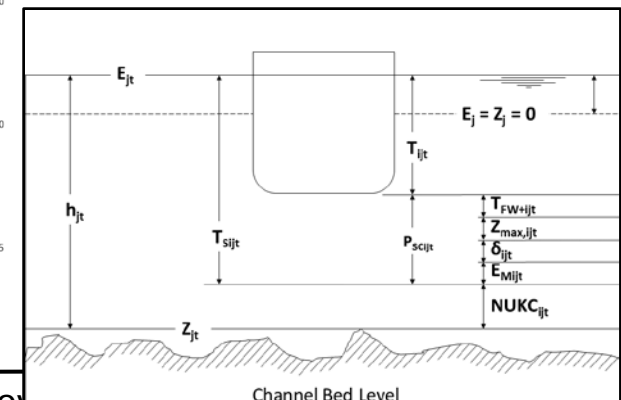
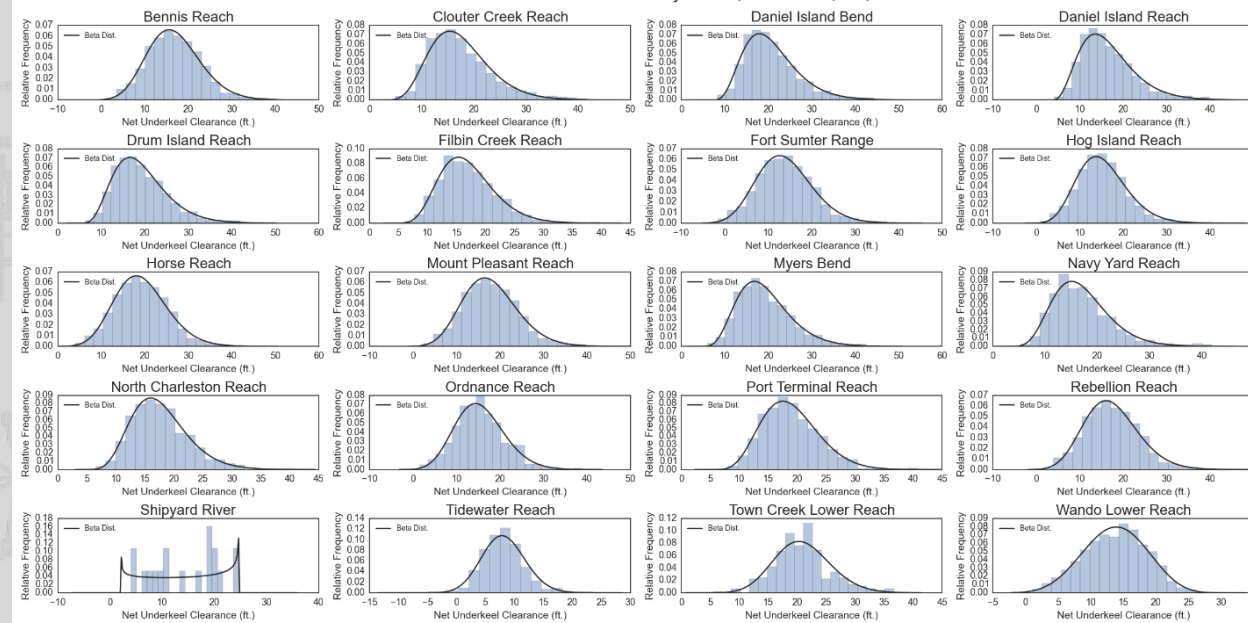
UNDERKEEL CLEARANCE

Can we estimate how much depth was available during a transit?

BALTIMORE HARBOR CHANNEL DEPTHS							
TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS - SURVEYS TO AUG 1998							
CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER (MLLW)					PROJECT DIMENSIONS		
NAME OF CHANNEL	LEFT OUTSIDE QUARTER	LEFT INSIDE QUARTER	RIGHT INSIDE QUARTER	RIGHT OUTSIDE QUARTER	DATE OF SURVEY	WIDTH (FEET)	LENGTH (NAUT. MILES)
BREWERTON CHANNEL	A47.5	50.9	50.5	A46.6	6-98	700	3.06
BREWERTON ANGLE	46.3	49.2	48.6	46.2	6-98	700-1450	0.79
FORT MCHENRY CHANNEL	A46.5	50.2	49.6	48.4	6-98	700	3.77

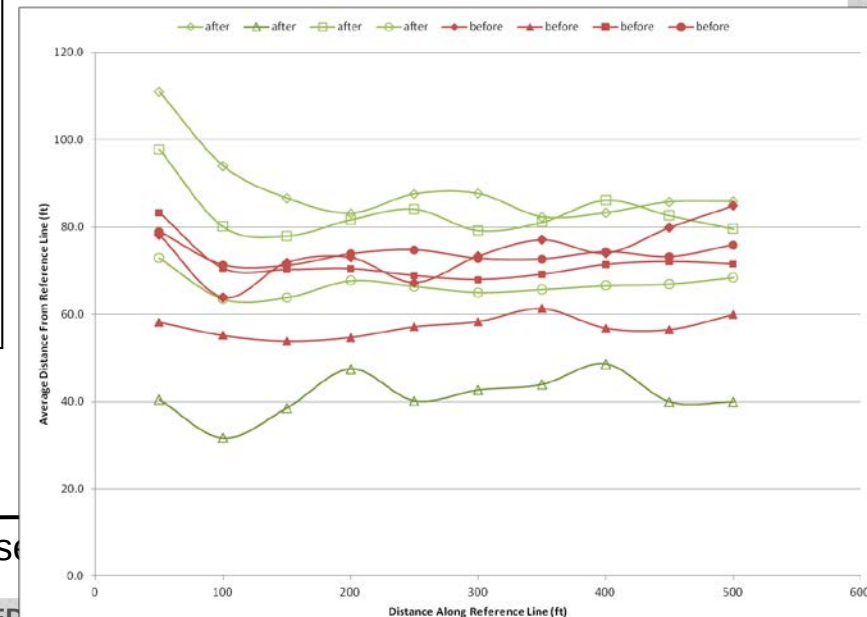
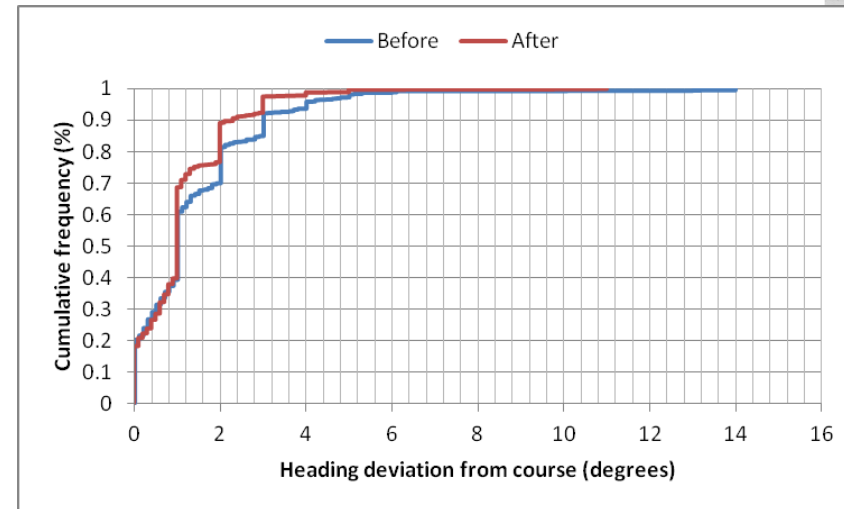


Net Underkeel Clearance Distribution by Reach, Charleston, SC, 2011



DREDGING INFLUENCE ANALYSIS

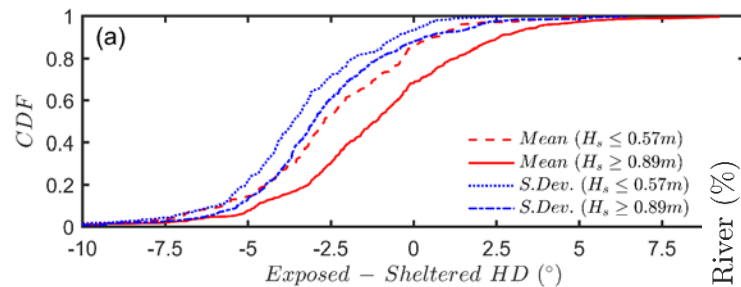
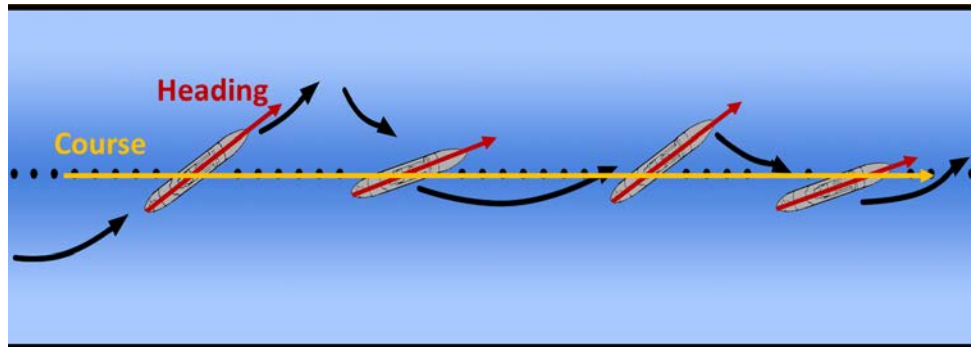
Do vessels behave differently after dredging?



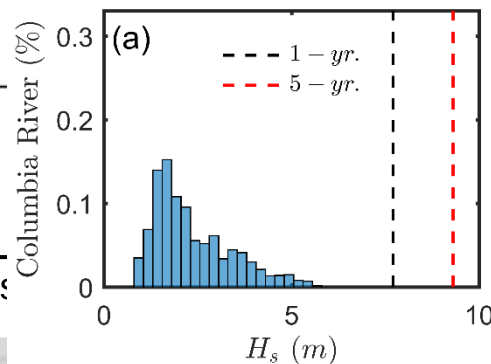
VESSEL STRUCTURE INTERACTION

Can we measure the effect of structures on vessels in transit?

Can we use these measurements to infer structure condition?

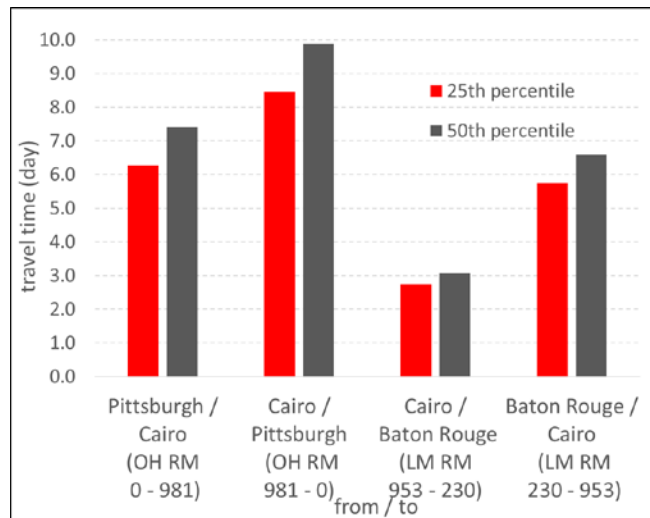


US Army Corps of Engineers

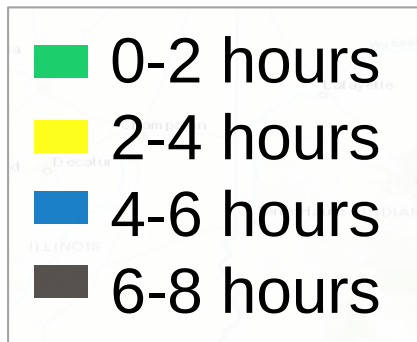


WATERWAY TRANSIT TIME STATISTICS AND TRENDS

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VESSEL TRAVEL TIMES – OHIO RIVER, 2017



OH RM 59-79		Downstream Direction					
Time Unit	Time Pd.	Count	Travel Time Estimate (hour)				
			Percentile			Avg.	Std. Dev.
			25th	50th	75th		
Y	2014	802	2.7	3.1	3.7	3.9	3.2
Month	Jan	79	2.7	3.0	3.4	3.5	2.0
	Feb	85	2.6	2.8	3.3	3.4	2.1
	Mar	85	2.8	3.2	3.6	4.0	3.5
	Apr	78	2.6	2.8	3.4	3.4	1.7
	May	104	2.6	2.9	3.5	4.2	3.9
	Jun	95	2.8	3.2	4.1	3.9	2.8
	Jul	84	2.8	3.3	4.9	4.9	4.9
	Aug	11	2.8	3.1	3.9	3.4	0.9
	Sep	0	-	-	-	-	-
	Oct	3	17.6	28.2	28.6	21.4	10.2
	Nov	71	2.7	3.1	3.9	3.8	2.0
	Dec	107	2.7	3.0	3.5	3.5	1.8
	1	11	2.6	3.0	3.5	3.2	0.7
	2	16	2.8	3.3	3.8	3.8	1.9
	3	20	2.5	2.8	3.1	3.6	2.7
	4	21	2.8	3.3	3.5	3.7	2.0
	5	15	2.7	3.1	3.2	3.0	0.3

VESSEL TRAVEL TIMES – OHIO RIVER MILE 59-69

ONLINE TRAVEL TIME ATLAS

- Automated, near real-time estimations
- Travel time estimates accessible on publically available website
- Travel time predications

Select the waterway reach starting point and destination for which you want travel time estimates.

Choose starting point:

RM 0 Ohio River's Upstream End / Port of Pittsburgh Upstream Boundary
 RM 1 Emsworth L&D: 5 miles upstream
 RM 4 Emsworth L&D: 2 miles upstream
 RM 8 Emsworth L&D: 2 miles downstream

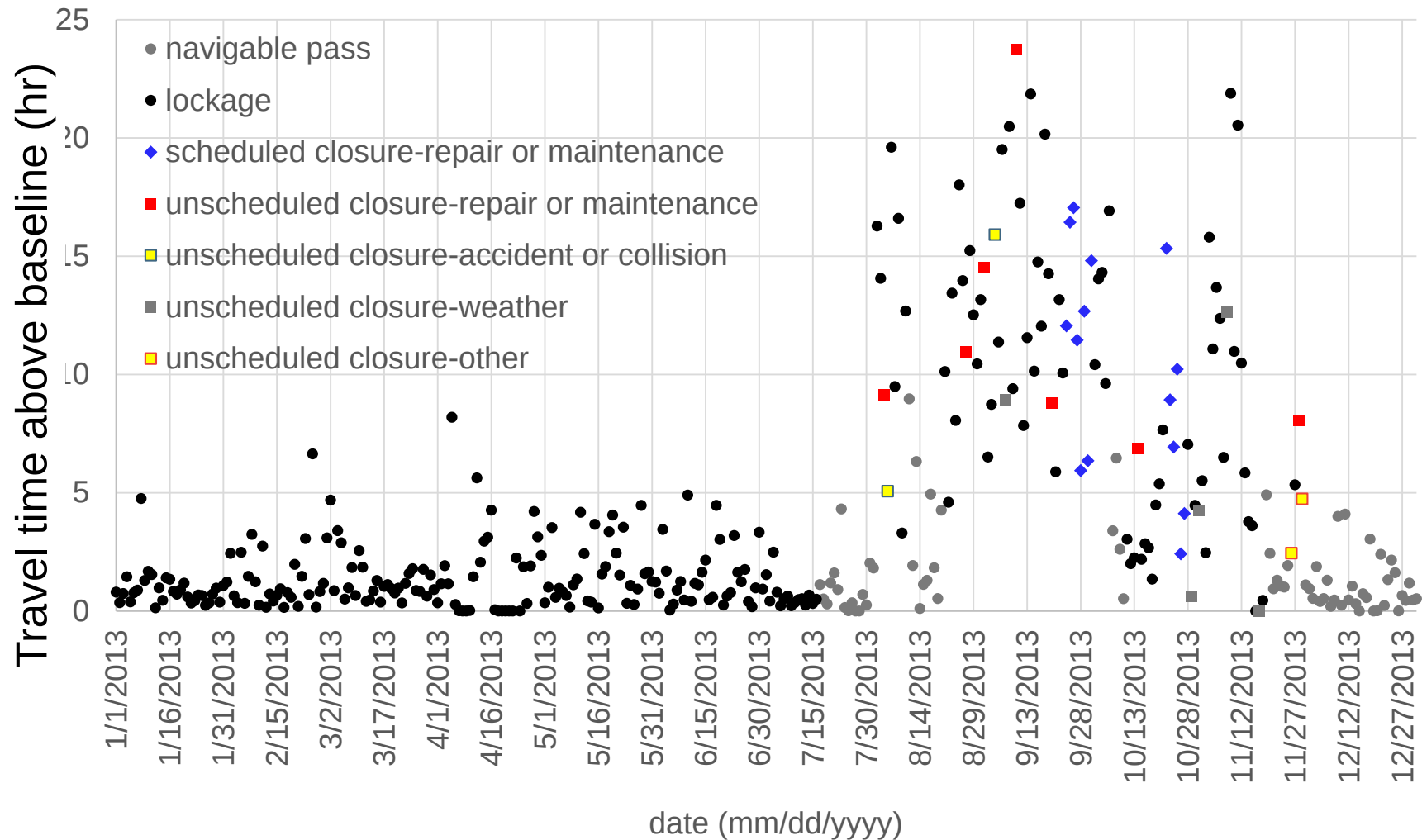
Choose time period:

October 2018						
SU	MO	TU	WE	TH	FR	SA
30	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Choose destination:

RM 0 Ohio River's Upstream End / Port of Pittsburgh Upstream Boundary
 RM 1 Emsworth L&D: 5 miles upstream
 RM 4 Emsworth L&D: 2 miles upstream
 RM 8 Emsworth L&D: 2 miles downstream

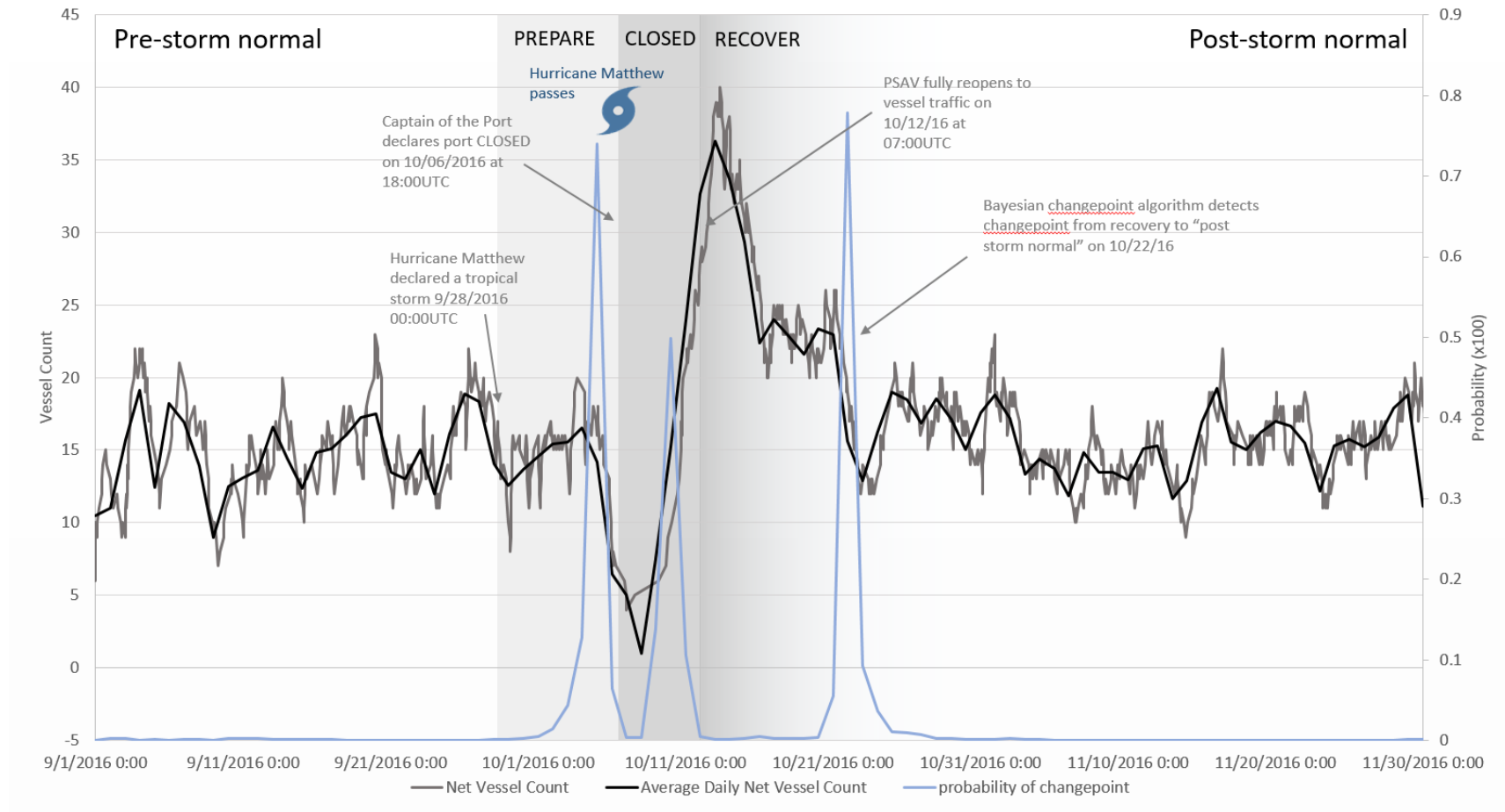
CORRELATE LOCK EVENTS AND DELAY



RESILIENCY STUDIES

HURRICANE MATTHEW 2016 – NET VESSEL COUNT

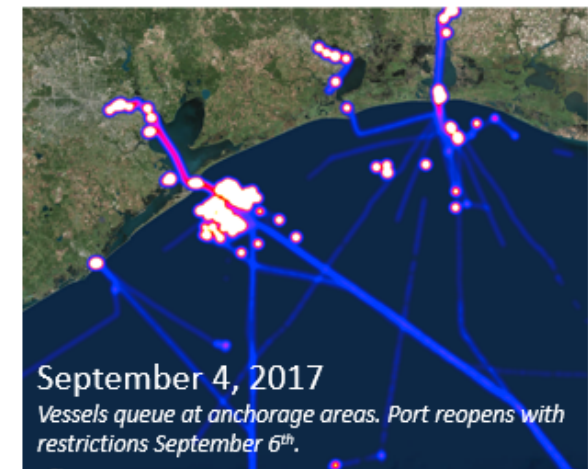
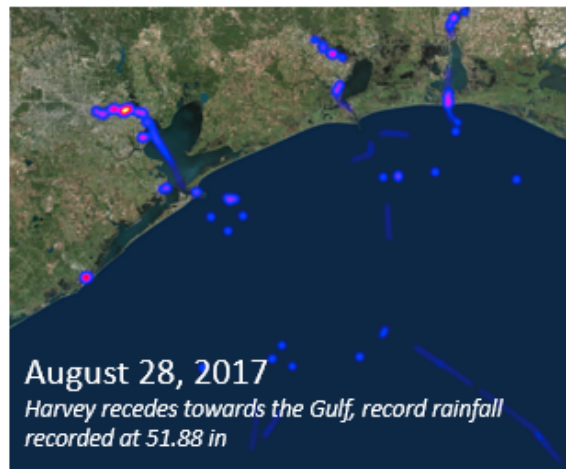
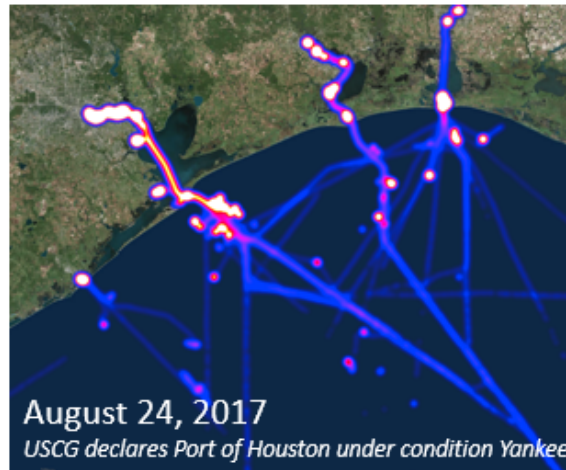
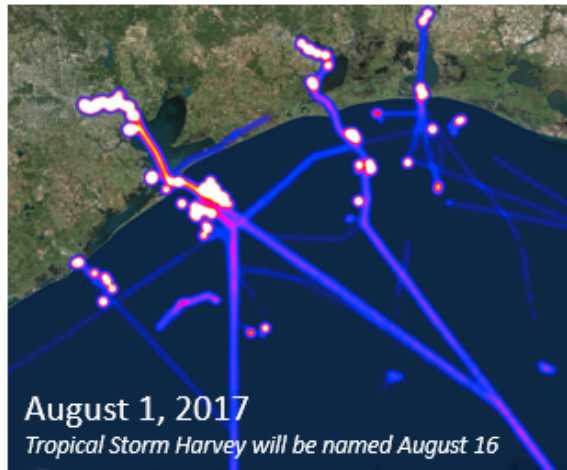
Port of Savannah - Cargo and Tanker Net Vessel Count



HURRICANE HARVEY 2017 VESSEL LOCATIONS

Hurricane Harvey Cargo and Tanker Vessel Signal Density Plots

Created with ERDC Automatic Identification System Analysis Package (AISAP)



ERDC Navigation Data Performance Team: Katherine Touzinsky, Kenneth N. Mitchell, Patricia Dijoseph, Marin Kress

THANK YOU

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<http://cirp.usace.army.mil/techtransfer/workshops/AIS2019/AIS-Workshop.php>

