



Communication and Engagement Surrounding NOAA Air Gap Data

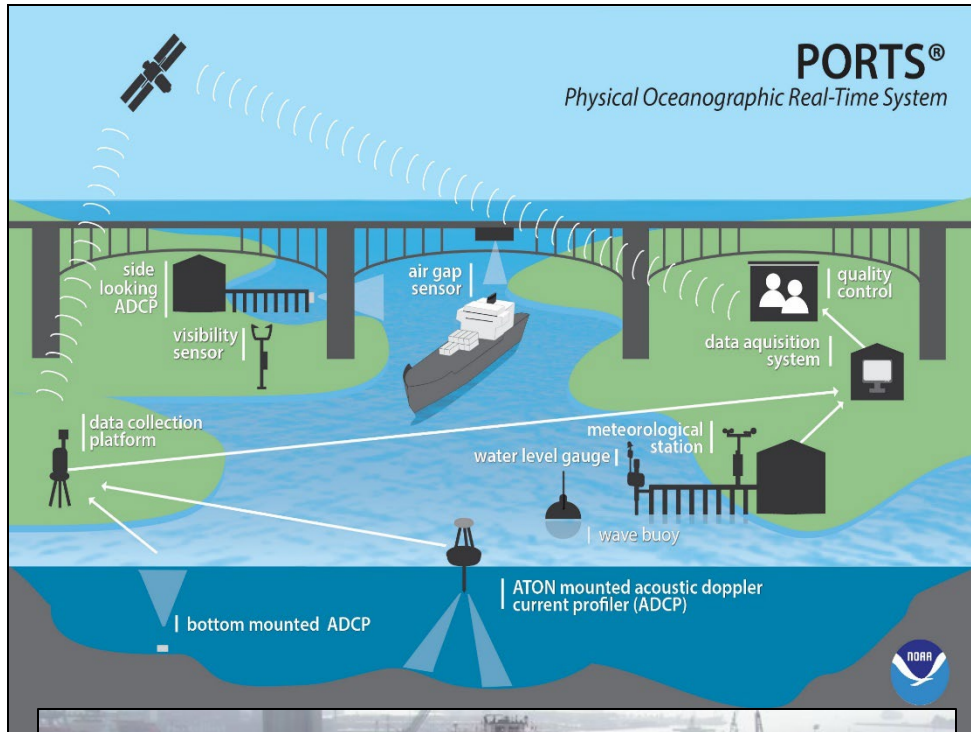
March 10, 2022– NOAA HSRP Spring Meeting

Christopher DiVeglio

Maritime Services Program Manager

NOS/ CO-OPS

Physical Oceanographic Real Time System (PORTS®)

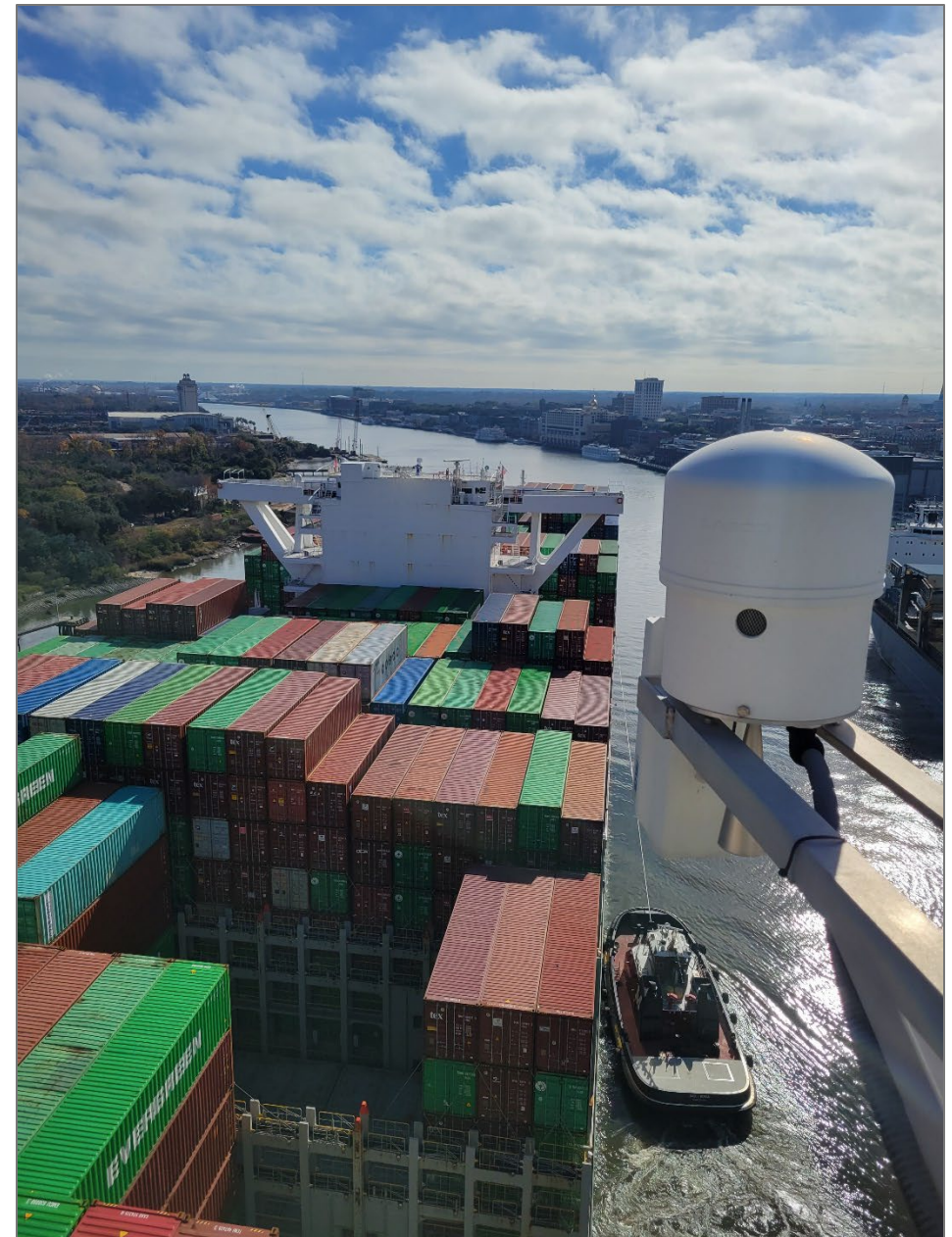


- First established in 1991
- Shared responsibility partnership program. Focuses on real-time observations, collected and disseminated in a variety of ways
- Water levels, currents, winds, temperature, visibility, salinity and bridge air gap
- Systems are tailored to the needs of local mariners
- PORTS® currently operates in various bays and harbors in the U.S.



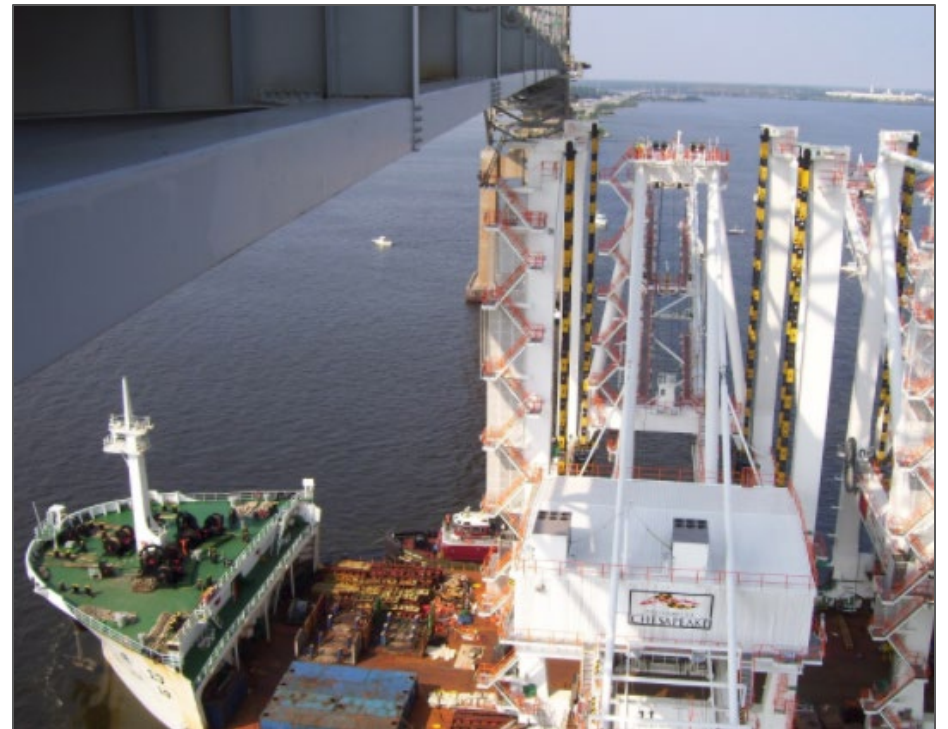
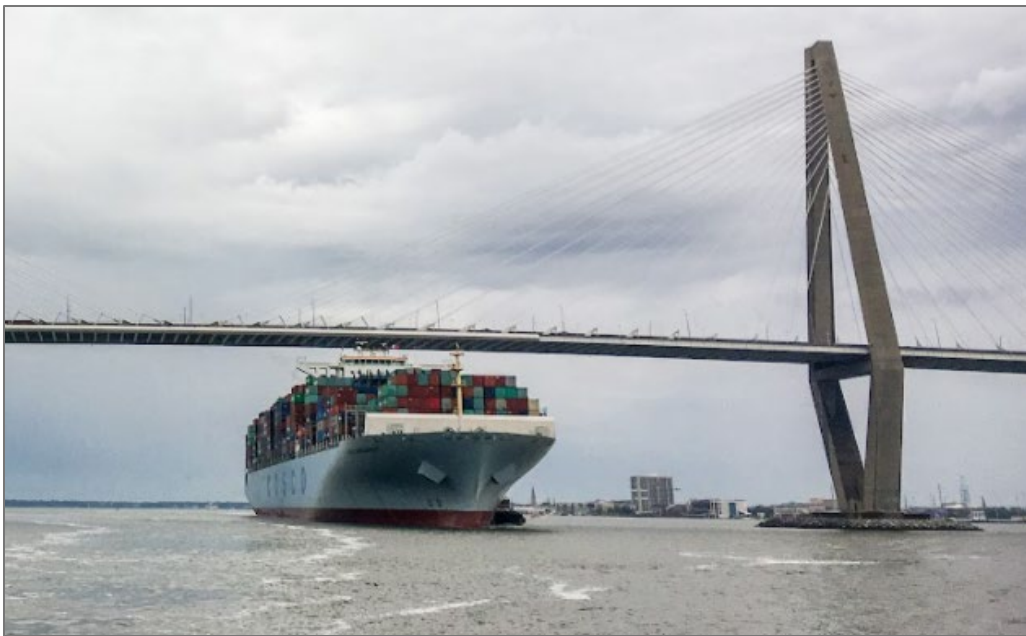
NOAA Air Gap

- A tool that measures the vertical clearance between a *defined reference point* under a bridge and the surface of the water below
- Data are collected at a high frequency and updated for the public every six minutes to account for changes in water level, vehicular loads on the bridge, air temperature, and other factors.
- Information is critical for pilots to safely navigate a ship under a bridge, especially as U.S. seaports grow and vessels continue to increase in size.



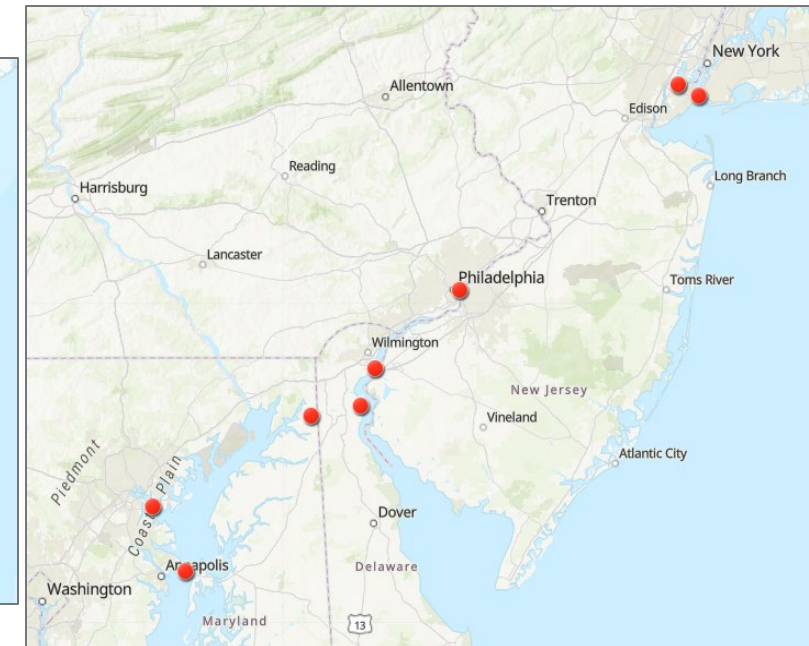
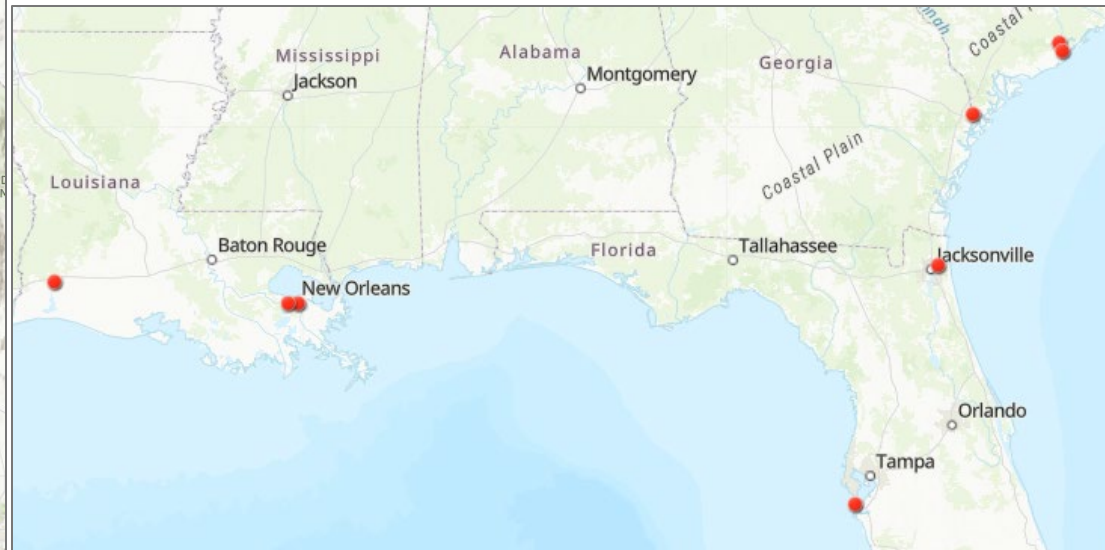
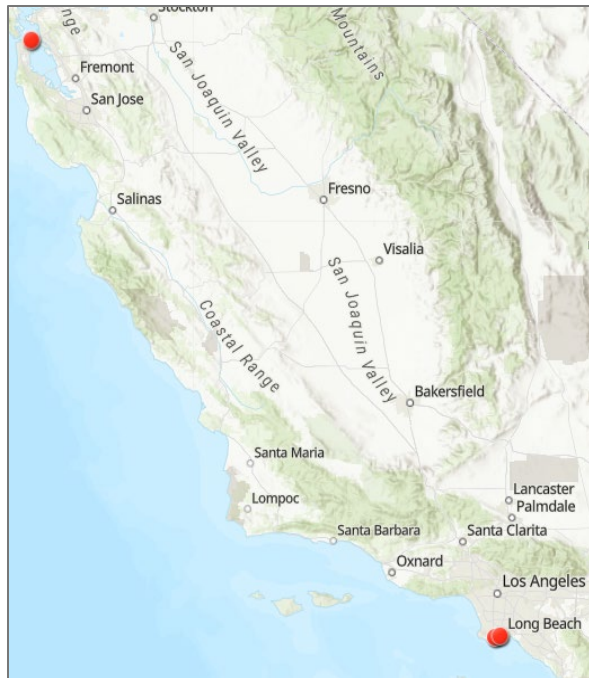
Background

- The first air gap sensor in PORTS® became operational in 2003
- Technology for collecting air gap data has changed over the years
- As ship sizes & seaports grow, so does the need and importance of air gap
- Air gap observations must be quality-controlled and verifiable to accepted standards and follow stringent requirements



Existing Air Gap observations in PORTS®

- 19 active locations + 2 more in the works + additional areas of interest
- Part of 11 PORTS® - most have more than 1 air gap sensor



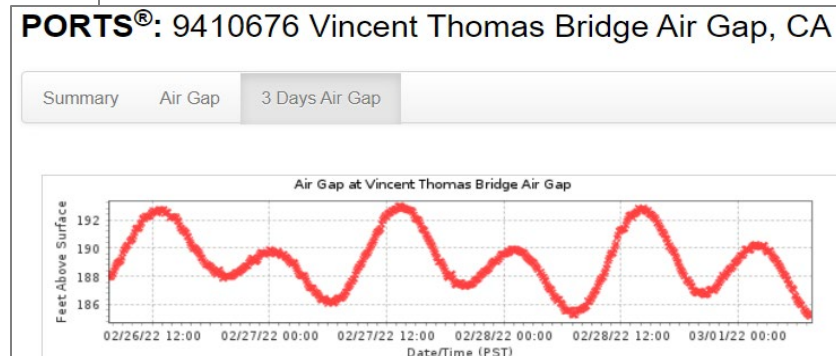
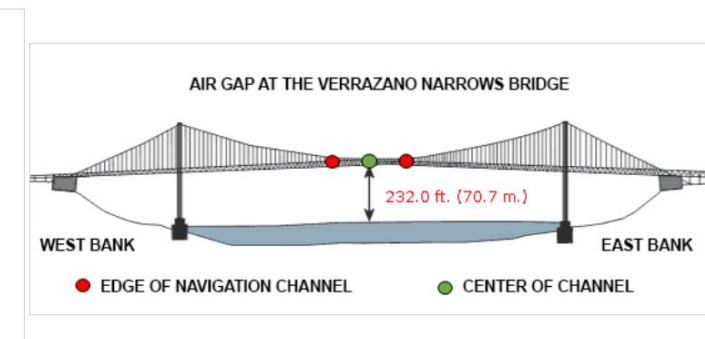
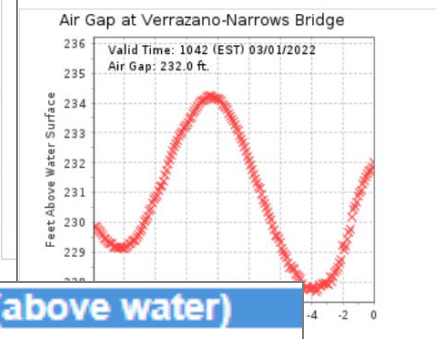
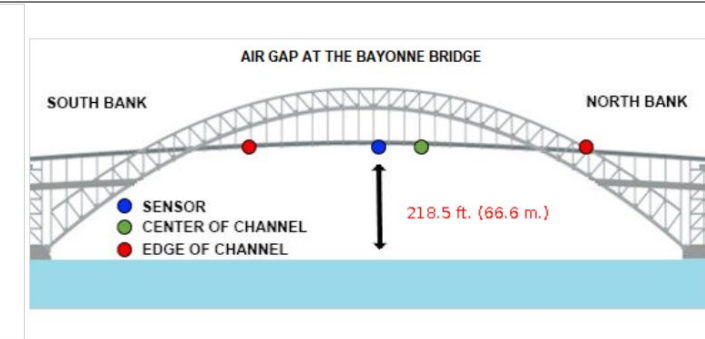
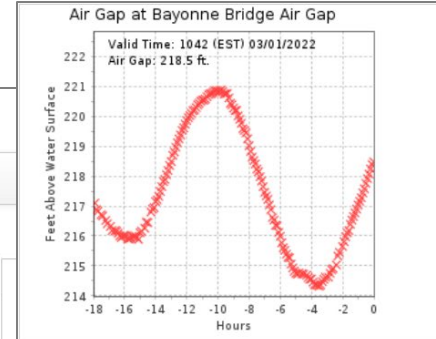
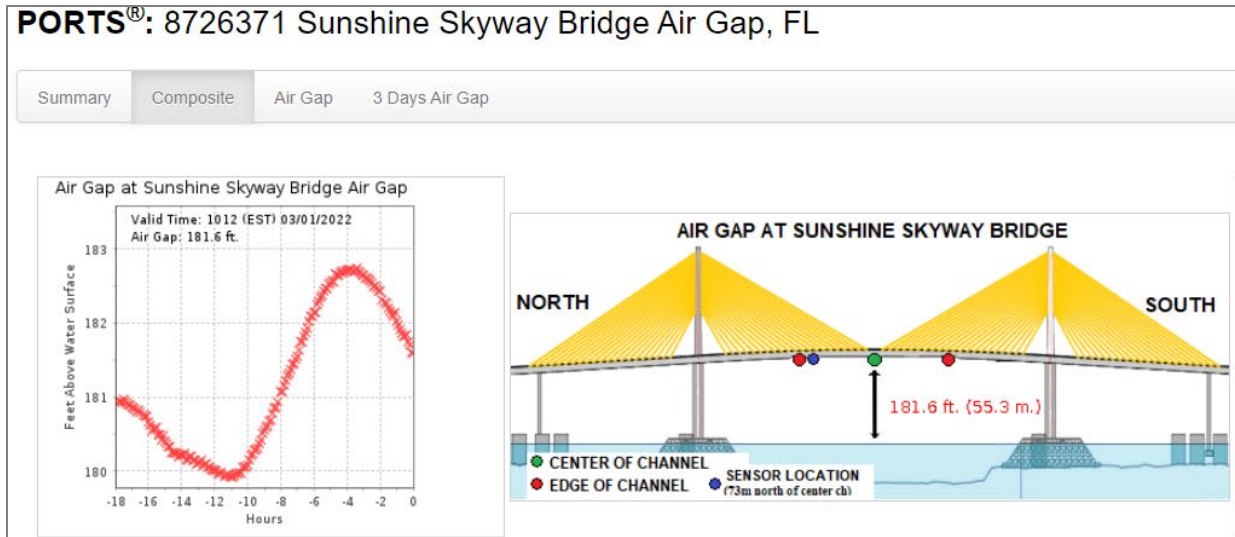
Sensors and equipment

- Combination of radar and laser technology; sensor technology has evolved quite a bit!
- Overall system costs much less than it used to
- Traditionally utilized a single data collection platform
- Now employing very similar Microwave Radar technology used for water level
- Microwave radar high accuracy readings to 70 m/ 230 feet distance
- Implementing changes to standard installs moving forward



How data is visualized and disseminated

- Through typical PORTS® pages -- Graphically, text, voice
- Data Application Programming Interface (API)



Air Gap/Bridge Clearance (above water)	
Reedy Point Bridge	135.1 ft Decr.
Delaware Mem. Bridge	185.5 ft Decr.
Ben Franklin Bridge..	133.8 ft Decr.

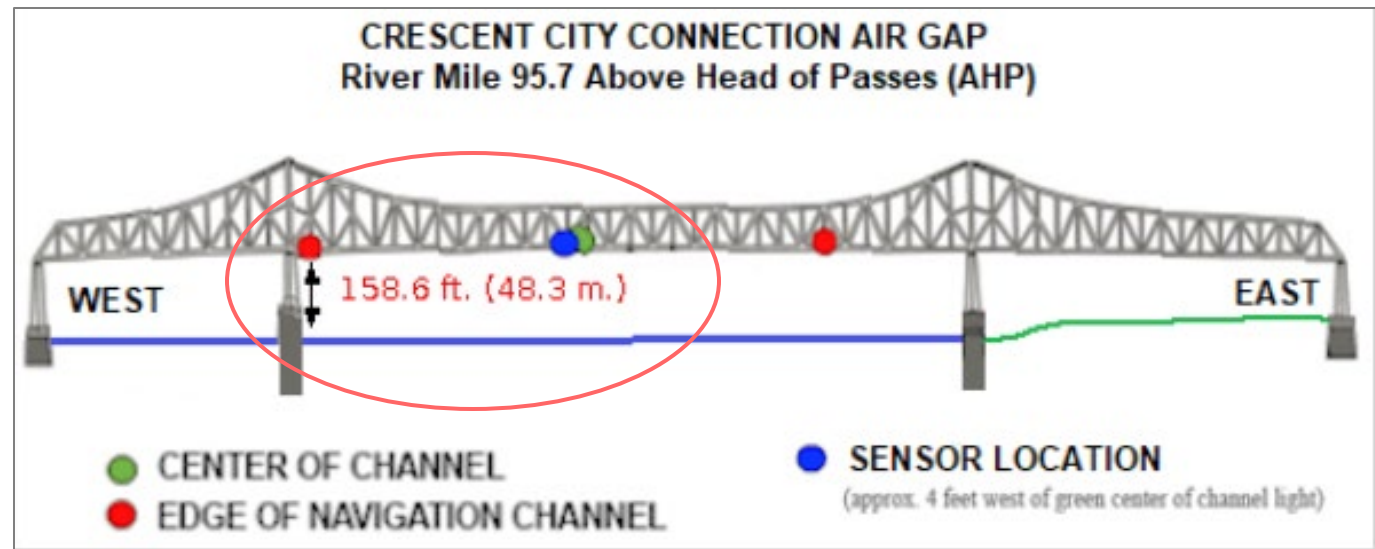
-----Air Gap/Bridge Clearance (above water surface)-----			
Chesapeake Bay Brdg	187.6 ft, Stdy.	Francis Scott Key B..	185.5 ft, Stdy.
Ches. City Bridge	139.4 ft, Incr.	Reedy Point Bridge	135.1 ft, Decr.

DISCLAIMER: The air gap systems have been created by NOAA/NOS to provide the maritime community with improved information of bridge clearances. These real-time data are accurate to within ±1 inch. They are released for limited public use as preliminary data to be used only with appropriate caution when clearing the bridge.



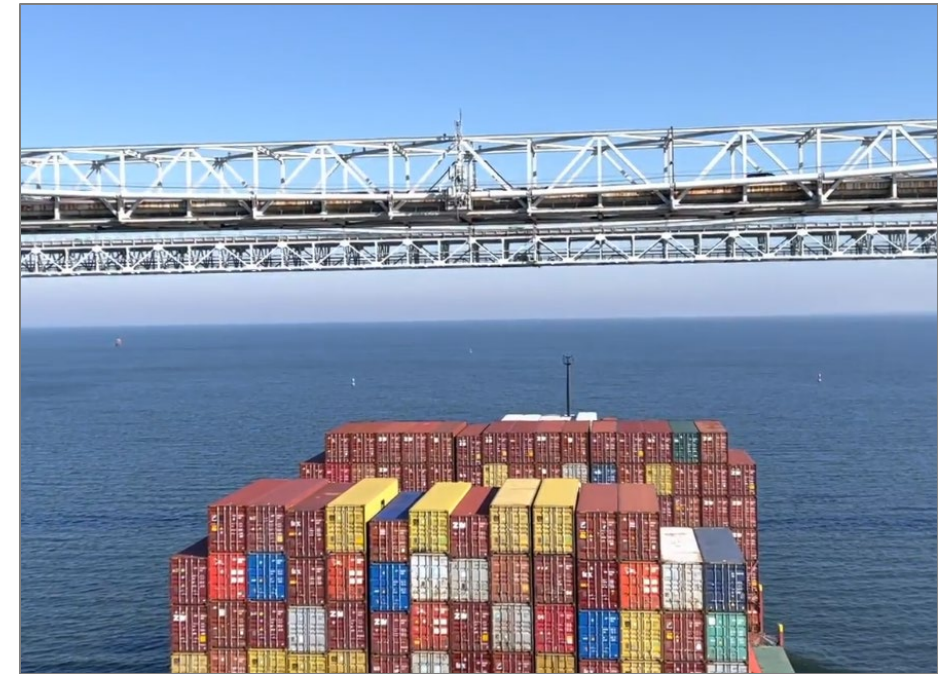
Challenges in conveying air gap specifics

- Every bridge design and waterway is different
- Limited widespread understanding of bridge specifics
- Definition or understanding of 'Low Steel' on specific bridges differs
- Charted bridge clearances are sometimes referenced to different datums from one region or waterway to another
- Often a desire in some areas to determine air gap 'manually' (water level vs charted clearance)
- Most cases the bridge owner is different than the air gap sponsor/ users



Air Gap data considerations

- Prior to installation of an air gap sensor and dissemination, NOAA works closely with our PORTS® partner and other local users to define an 'air gap reference point'
- The 'air gap reference point' on the bridge might or might not differ from low steel, as defined by the USCG
- Real-time air gap measurement on the PORTS® webpage will vary from the fixed vertical bridge clearance value displayed on the associated NOAA Nautical Chart
- The point on the bridge designated as the air gap reference point is not necessarily directly below the air gap sensor
- Other non-structural components such as navigation lights, radar beacons/RACON, etc. attached to the bridge that extend below the point designated reference point
- Pilot groups often implement their own business rules/ buffers in air gap data

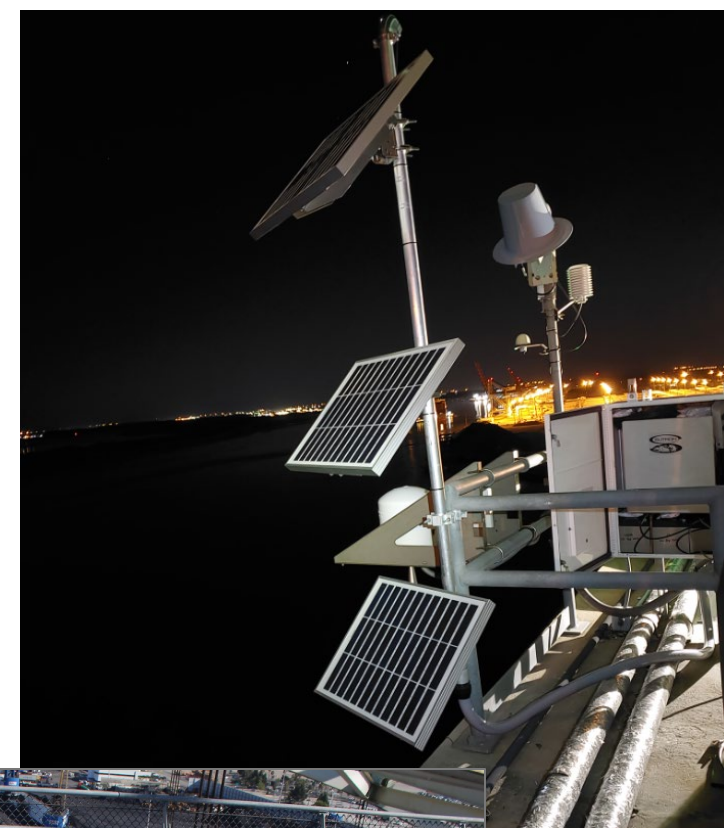


Air Gap Notice Letters

- Initiative that began in 2019 in order to standardize how air gap information is shared with the wider maritime community and that all users understand parameters.
- Allowed comprehensive documentation audit of all air gap installs
- Developed a very strict workflow/ checklist for letter generation
- Letters now officially on file for all operational air gaps – consistent format
- Any offset changes or equipment relocation codified through updates to letters, distributed
- Each letter highlights the following:
 - Exactly where air gap equipment is located on the bridge
 - Defines each bridge's determined 'air gap reference point' / relation to navigation channel
 - Where equipment is located in relation to 'air gap reference point'
 - Precise leveling and measurement procedures
 - Station photos, diagrams and schematic
- Distributed broadly to wide range of maritime stakeholders: Harbor pilots, port authorities, shipping agents, USCG, USACE, Bridge owners/operators, marine exchanges

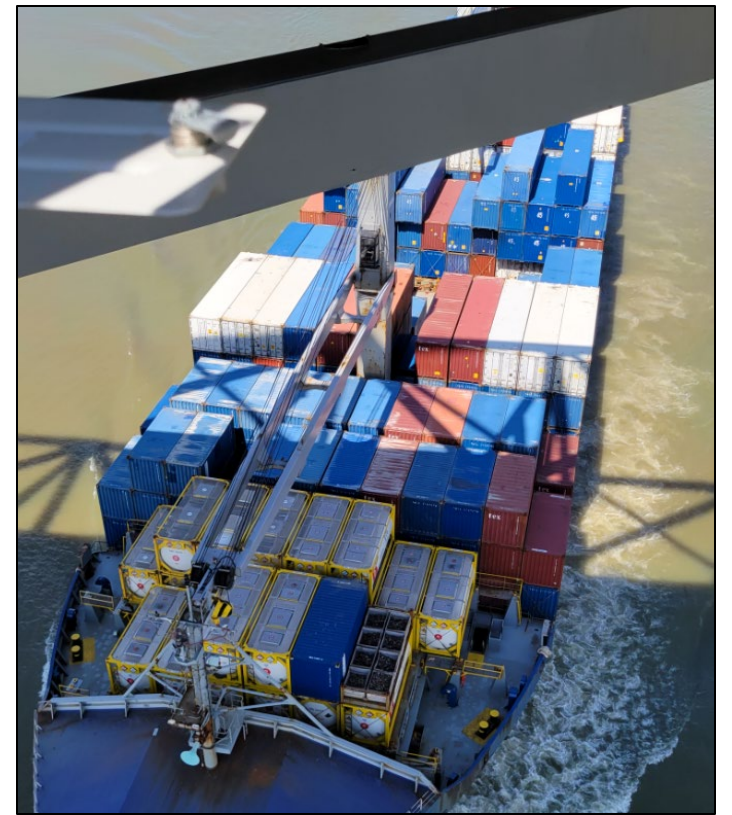
Air Gap data reliability

- Consistency in equipment, hardware, software implemented across the network
- Approved standard for new installs moving forward is Dual data collection platforms (DCP) each with their own MW radar sensors and two modes of comms
- Dual comms methods and dual DCP alleviates data down time!
- More connections to bridge AC Power
- Opportunity offered to existing partners with legacy installs to upgrade to the new standard setup. Consistent interest so far!



Summary

- Air gap data is very valuable and highly relied on
- Widespread outreach and connection with the local maritime community is key with communicating the specifics of air gap data and usage
- Conveying the importance of the ‘reference point’ and what it is and is not
- NOAA makes sure to stay out of any local development of navigation business rules
- Long standing high confidence in accuracy of air gap data being disseminated
- Any questions or confusion surrounding air gap data speaks to the wider need for consistency of referenced datums and charted clearances along U.S. waterways



Thank you!

christopher.diveglio@noaa.gov

240-620-6919

NOAA - Silver Spring, MD 20910