



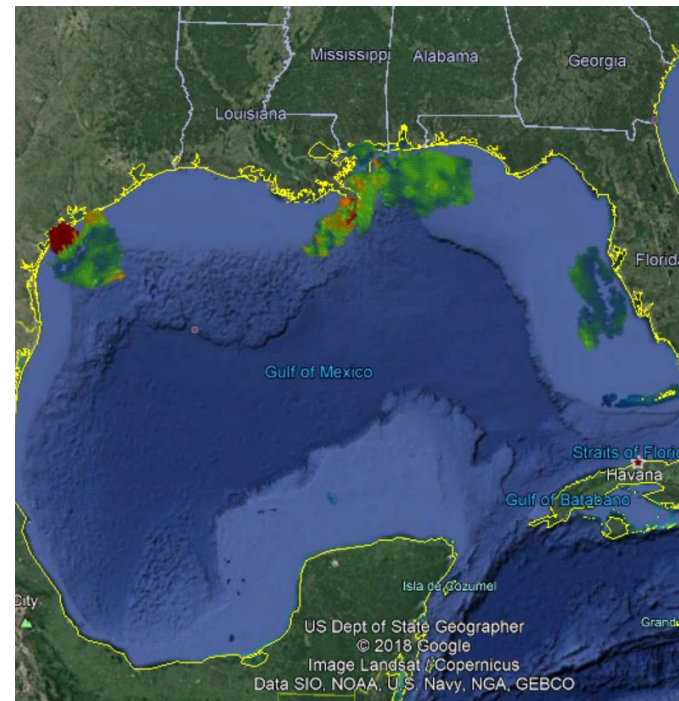
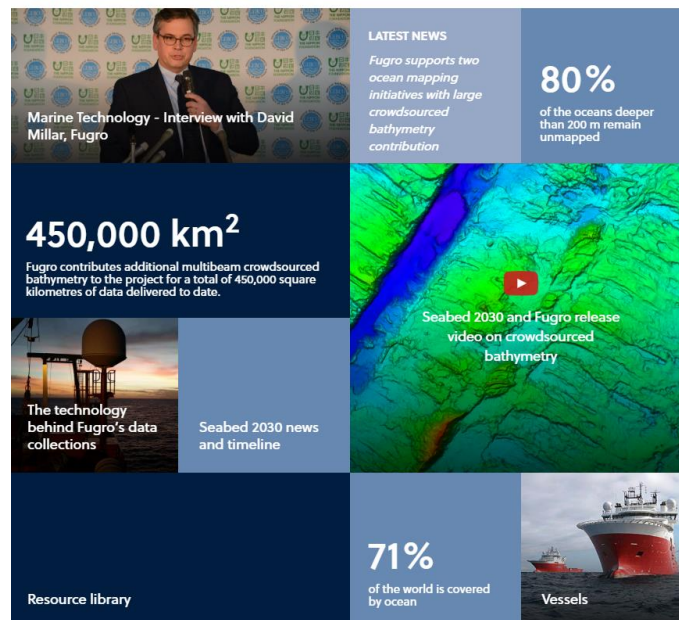
Potential Markets and Industry Ocean Data



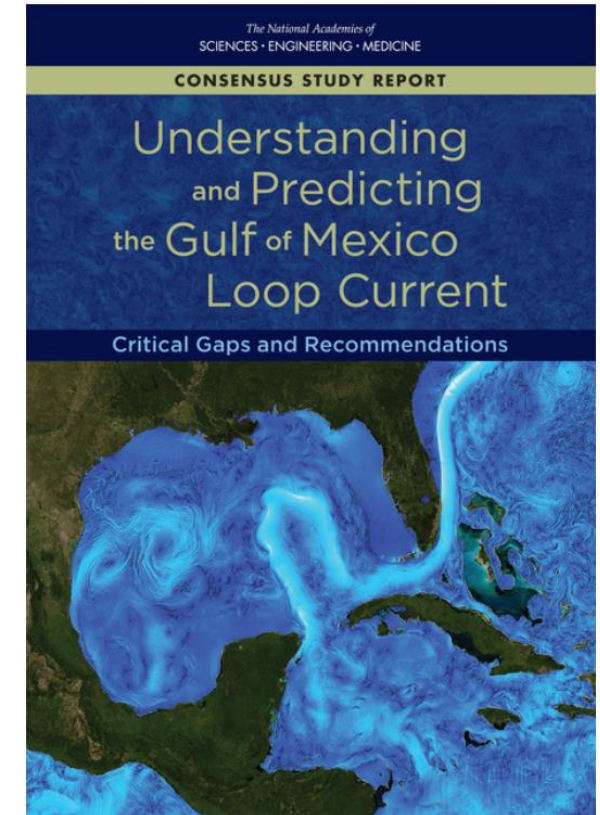
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Current Projects and Partnerships



Fugro is the only industrial partner to install and maintain a coastal radar station in the USA.



Seabed 2030

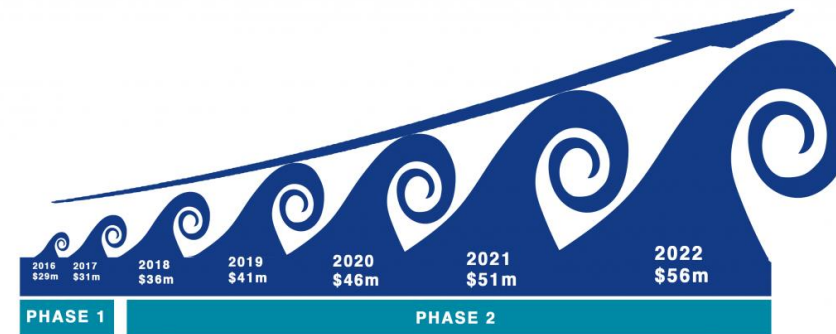
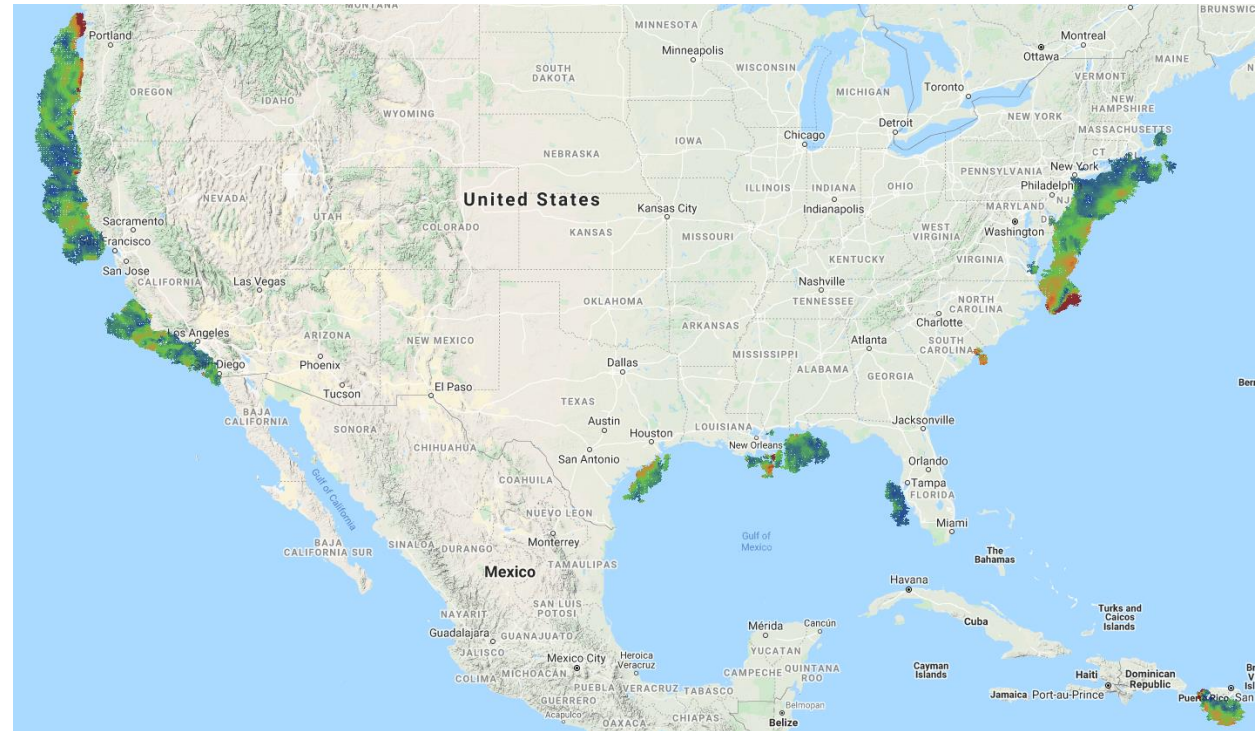
Fugro owns and operates a fleet of ocean going survey vessels and over two years ago, we initiated a crowdsourced bathymetry program, where we acquire multibeam bathymetry data during transits as we move our vessels from continent to continent and project to project. We have gradually been expanding the program across our fleet and have contributed over 450,000km² of bathymetry data to date, an area the size of Spain. This may not seem like a lot in a big ocean, but we are still scaling up our participation and we are but one company. You can imagine the power of the crowd, if thousands of other vessels were to get involved.



HF Radar Network USA

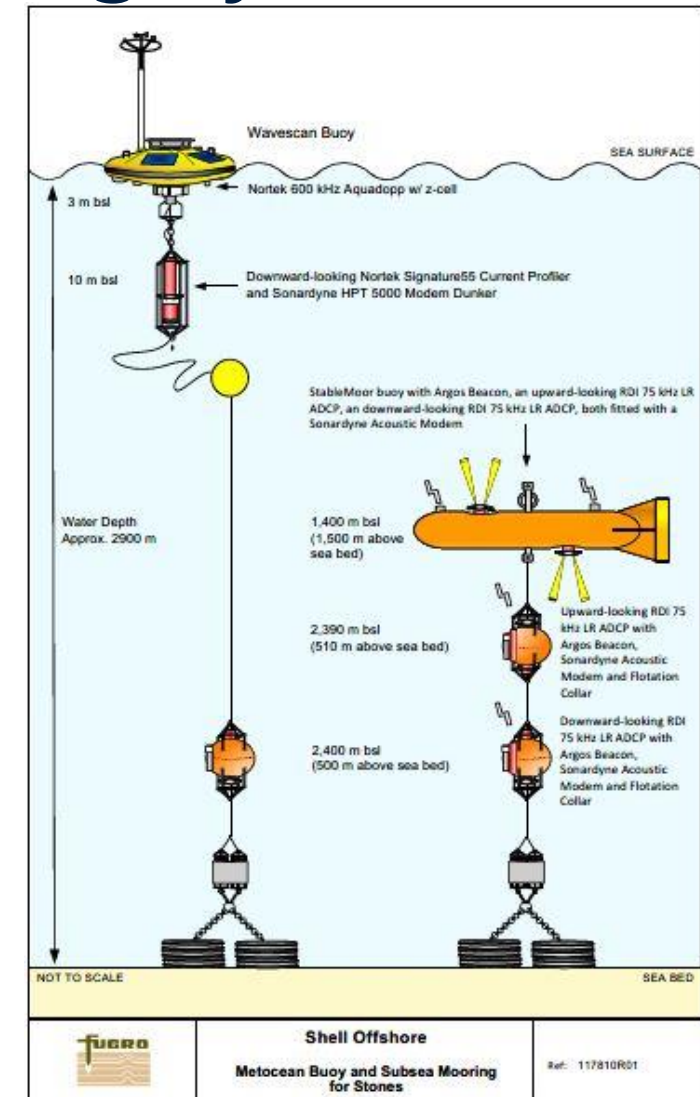
2018 Fugro was the first industry partner to be awarded an HF Coastal Radar in the US as part of the NOAA IOOS "Closing the Gaps" campaign.

Fugro was well positioned to support the new installation of the 2 radar sites in Louisiana. We are leveraging partnerships with University of Southern Mississippi and Texas A&M University to enable the project as well as Industry partners in Chevron and the SW Pass Bar Pilots.



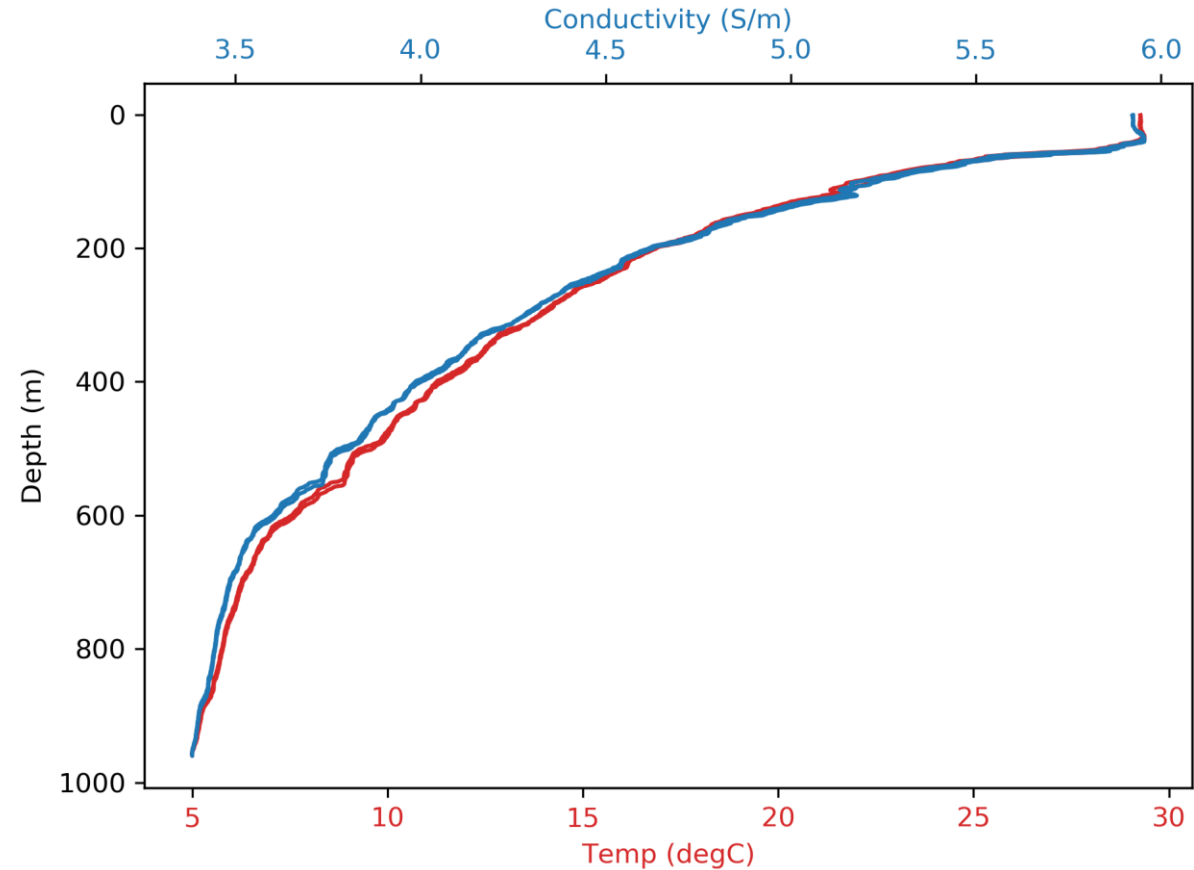
Shell Stones / NAS Ocean Observing System

- National Academies of Science Gulf Research Project funded the expansion and collaboration of the Shell Alcyone buoy
 - Unique research opportunity in the Gulf of Mexico
 - Grown from a single buoy to fulfill the NTL requirement, to a dual mooring monitoring station
 - Provide long term data to scientists to better understand our oceans
 - Hurricanes, Loop Current effects, marine mammals and weather patterns
 - Help scientist make significant break throughs to better understand the dynamics and complexities of the Gulf of Mexico



Industry CTD casts

- Fugro setting up an automated system to take the CTD casts completed for Multibeam and USBL calibrations
- Plan to deliver to the public space for scientific use via JCOMMOPS (WMO-IOC) in BUFR format
- Plan to expand to all industry to use the same processing workflow.



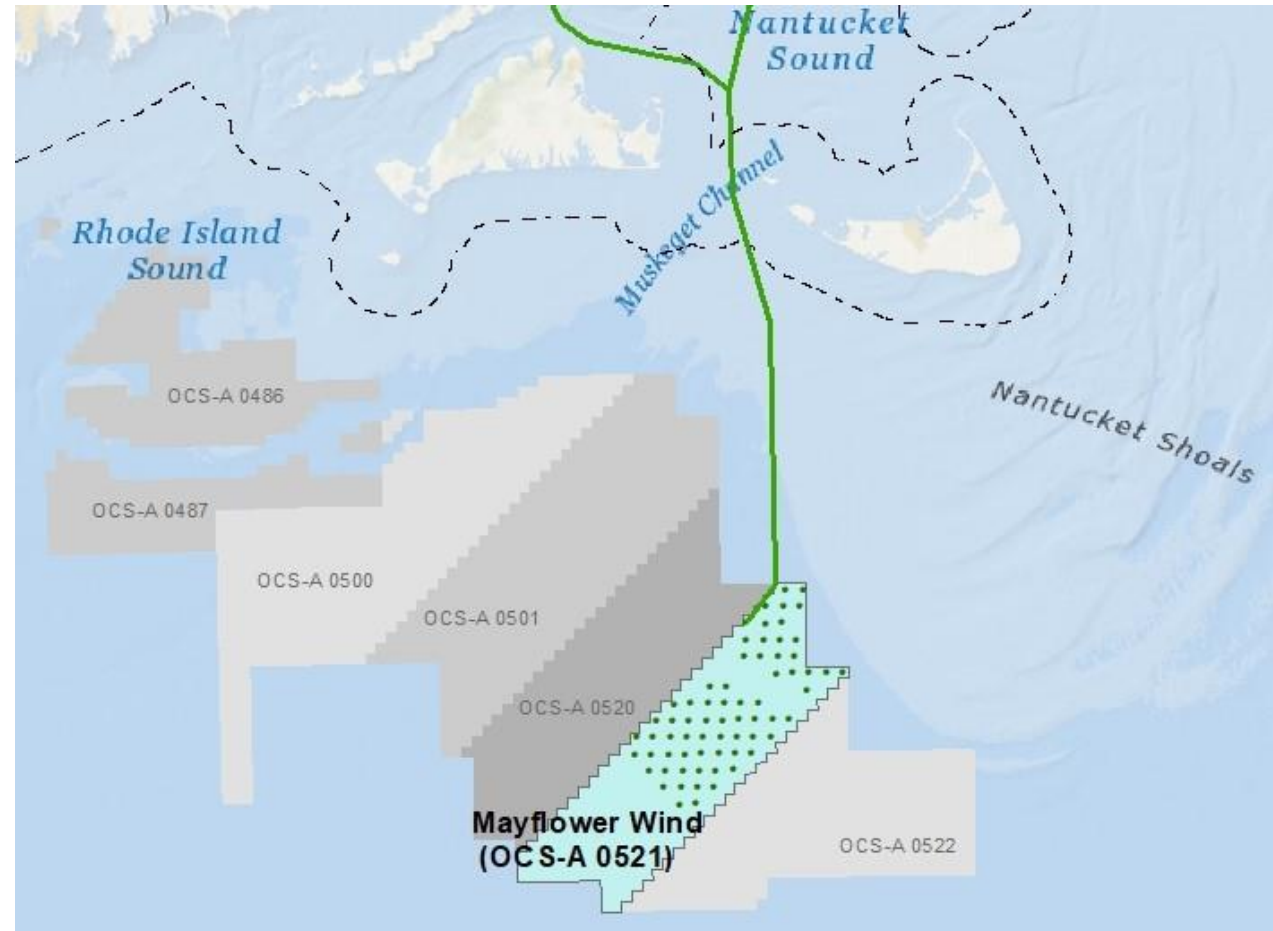
Fugro Support for Navy Glider recoveries

- Glider in distress call from GCOOS to Fugro 13 Sept.
 - Recovery vessel identified and fueled and on fully insured charter completed prior to 00:01 14 Sept.
 - Glider recovered and returned to port 2:45pm on 14 Sept
- Glider in distress call from GCOOS to Fugro 27 Sept.
 - Recovery vessel identified and fueled and on fully insured charter completed prior to 00:01 28 Sept.
 - Glider recovered and returned to port on 1 Oct. Glider was on edge of Mexican EEZ.



Mayflower Wind Lidar Buoy

- Wind Lidar Buoy mobilized to support the development of Mayflower Wind Farm
- All metocean parameters including Wind Lidar Profile to be publicly available via NERACOOS
- 2 years sustained measurements to be made with possible extensions to 5 years



Atlantic Shores Wind Lidar Buoy

- Wind Lidar Buoy mobilized to support the development of Atlantic Shores Wind Farm, NJ
- All metocean parameters including Wind Lidar Profile to be publicly available via MARACOOS
- 2 years sustained measurements to be made with possible extensions to 5 years



Fugro Vessels to VOS

- All Fugro Survey vessels will contribute to the Voluntary Observing Ships
- Global Coverage of vessel fleet and on going care for calibration and accuracy by metocean team



Industry needs for Ocean Data

- Criteria for Operational activities
 - Measurements to develop this criteria
- Criteria for Design of offshore structures / facilities / vessels
 - Measurements and hindcasts to enable the development of criteria
- Measurements to monitor field conditions during operations
- Forecasts to support operational planning

These are not unique to any industry operating in the ocean. They are important to Oil & Gas , Offshore renewables, commercial fishing, recreational fishing, port facilities, cruise ships, etc., etc.

If we can get all the stakeholders engaged, it is easier to sustain measurements.

Future Opportunities

- Expand Industry CTD data delivery to make it publicly available in near real-time
- Data mine project archives for the past 10 years of CTD casts to provide the same
- Get all Fugro vessels on the VOS program

- Engage with Offshore Energy companies to expand basic measurements to ocean observing systems
- Engage with Offshore Energy companies provide archived data sets to the public space
- Promote the UN Ocean Decade and Seabed 2030 and participation in both
- Promote importance of a wholly mapped ocean to the UN Decade and SDGs

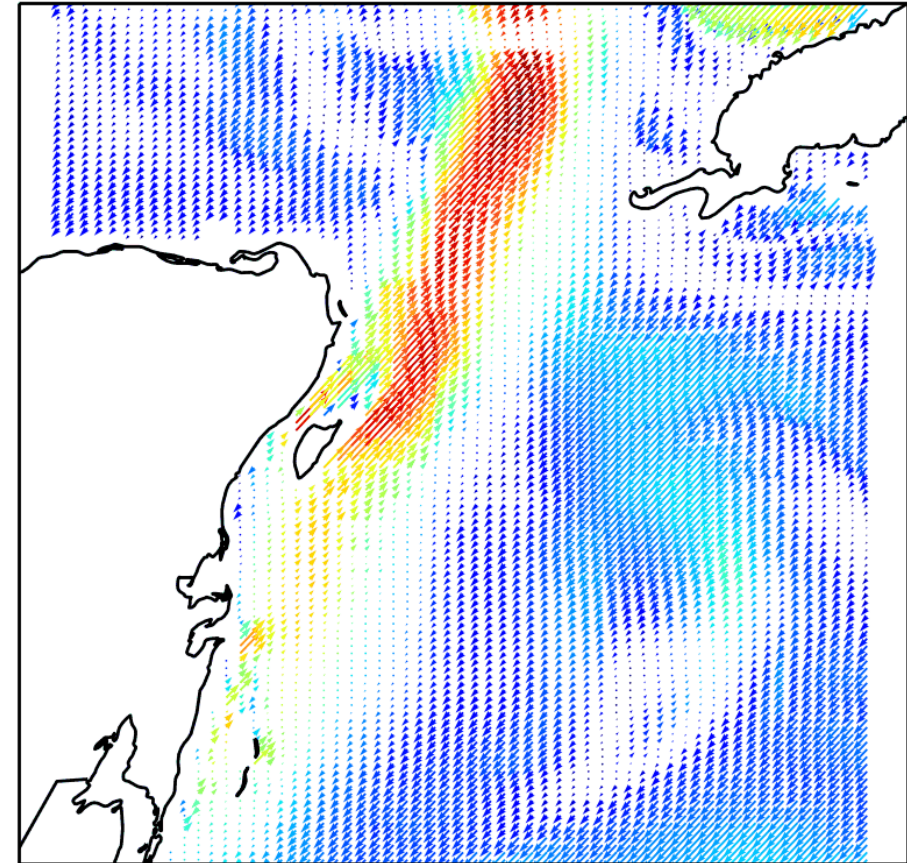
A Fun example

Recreational Drift Diving in Cozumel is concerned with currents.

Here is a simple example that is helping with diver enjoyment and safety.

In exchange the dive operator is supporting lagrangian drifter deployments to inform Yucatan inflow measurements.

Currents @ 2020-02-04 01:00



"All models are wrong, but some are useful."
George Box



Thank you



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