The Mid-Atlantic Coastal Acidification Network (MACAN): Utilizing the Mid-Atlantic Ocean Data Portal to Identify Monitoring Gaps for Regional and Coastal Acidification

These efforts were funded in part by the NOAA National Ocean Service Regional Coastal Resilience Grants program (NA16NOS4730014) and the NOAA Ocean Acidification Program (NA16NOS0120020)

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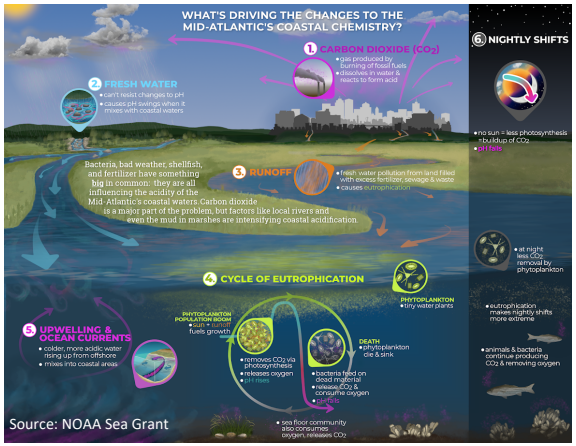
MACAN: Who We Are

MACAN, coordinated by MARCO and MARACOOS, is a nexus of scientists, federal, tribal, and state agency representatives, resource managers, and affected industry partners who seek to coordinate and guide regional observing, research, and modeling of coastal and ocean acidification from south of Long Island to Virginia.

Coastal Drivers of Acidification in the Mid-Atlantic

The coastal Mid-Atlantic is subject to great complexity due to traditional ocean acidification and many stochastic coastal drivers, leading to high temporal and spatial variability.

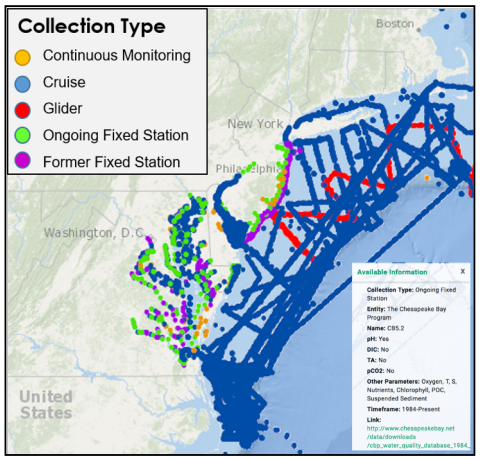


Why Monitor for Acidification?

- Assess the potential for impacts to commercially and recreationally important marine resources
- Improve understanding of the interactions between multiple stressors
- Explore the capacity for species, ecosystems, and affected industries to adapt and acclimate to acidification
- To inform regional forecasting models
- Develop an early warning system for users impacted by short-term changes in pH or aragonite saturation

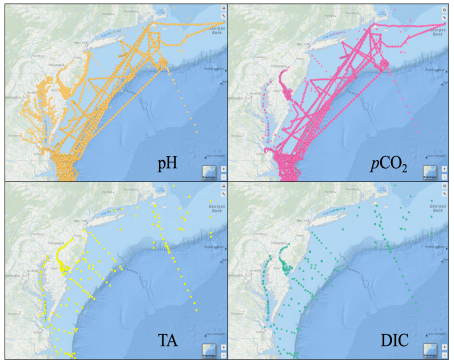
Existing Acidification Monitoring in the Mid-Atlantic

The Mid-Atlantic Ocean Data Portal's (ODP) Acidification Maps were developed in collaboration with the Virginia Coastal Zone Monitoring Program, Monmouth University, and Rutgers University. The maps identify current and former monitoring sites and highlight spatial and temporal monitoring gaps in the region.



Source: MARCO Mid-Atlantic Ocean Data Portal.

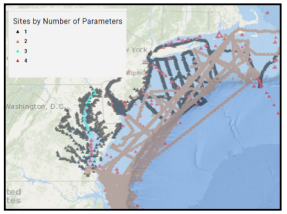
The maps also identify specific carbonate chemistry (pH, pCO_2, total alkalinity [TA], dissolved inorganic carbon [DIC]) and other water quality parameters measured at each site.



Source: MARCO Mid-Atlantic Ocean Data Portal.

Identified Gaps in Regional Monitoring

- With the exception of a few fixed autonomous stations, most sampling efforts are not conducted frequently enough to capture short-term episodic events and seasonal variability that may impact aquaculture, commercial fisheries, and decision-making by coastal resource managers.



- Often, only 1 carbonate system parameter is measured, but multiple parameters need to be measured *simultaneously* to fully characterize acidification.

- Most current sampling is done in surface waters, but subsurface waters are typically more acidic.

Priority Recommendations to Develop a More Robust Regional Monitoring Network

MACAN convened an interdisciplinary working group and hosted several stakeholder workshops to review acidification monitoring maps and begin to develop a robust monitoring network to fill data gaps in the Mid-Atlantic region (Goldsmith et al. 2019).

Expand current acidification monitoring activities to leverage existing infrastructure and funding opportunities

- Include a second carbonate chemistry parameter
- Monitor surface, subsurface, & bottom waters simultaneously

Consider other drivers that may affect acidification

- Combine carbonate chemistry measurements with other water quality and biological measurements

Focus monitoring efforts in regions with enhanced vulnerability

- Include habitats of commercially or recreationally important species

Identify best sensor technology for long-term *in situ* monitoring

References:

MARCO Mid-Atlantic Ocean Data Portal: Acidification Monitoring Locations. http://portal.midatlanticocean.org/

Goldsmith, K.A., et al. 2019. Scientific considerations for acidification monitoring in the U.S. Mid-Atlantic Region" *Estuarine, Coastal and Shelf Science 225: 106188*. https://doi.org/10.1016/j.ecss.2019.04.023.