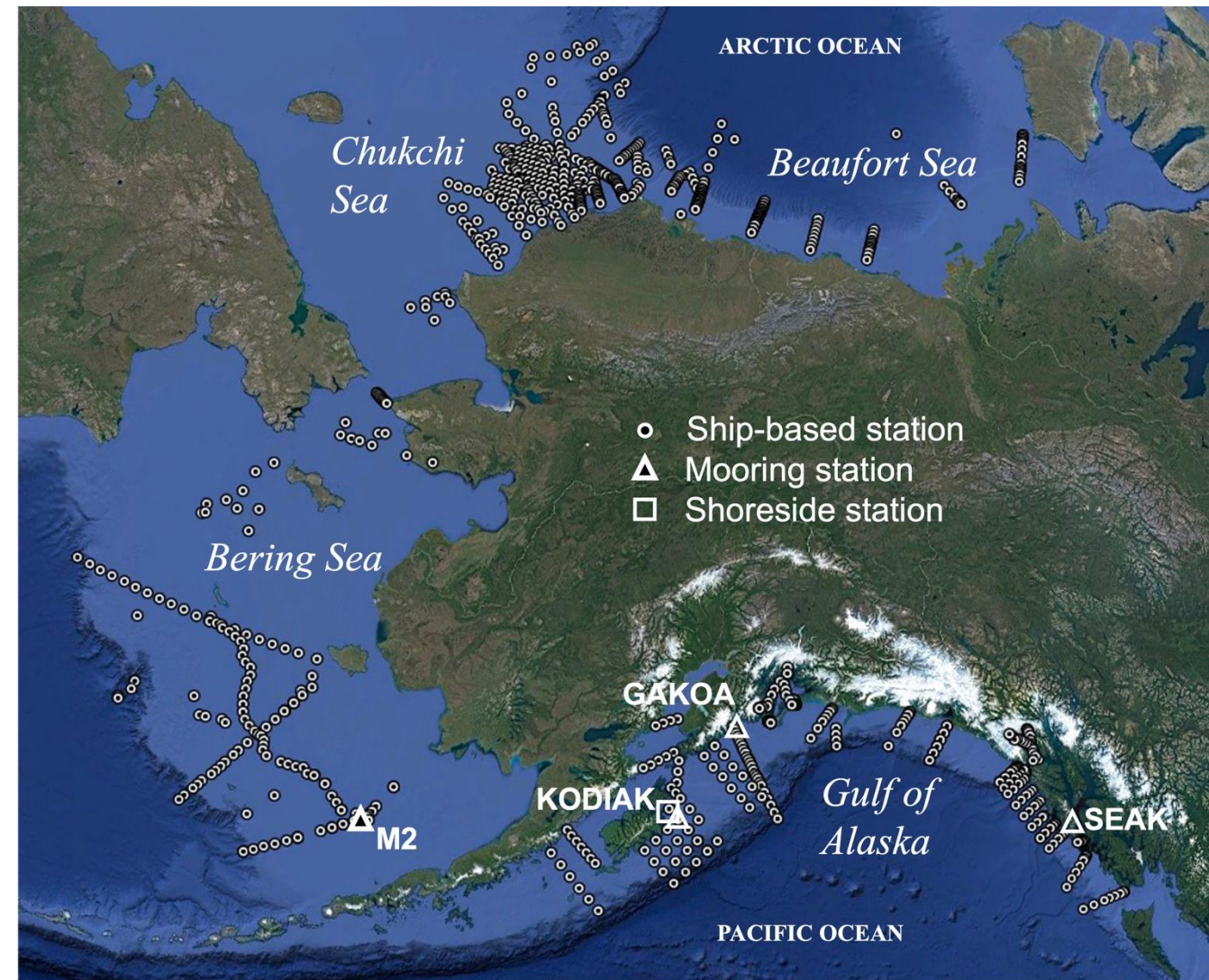




Observing Ocean Acidification in Alaska's Large Marine Ecosystems

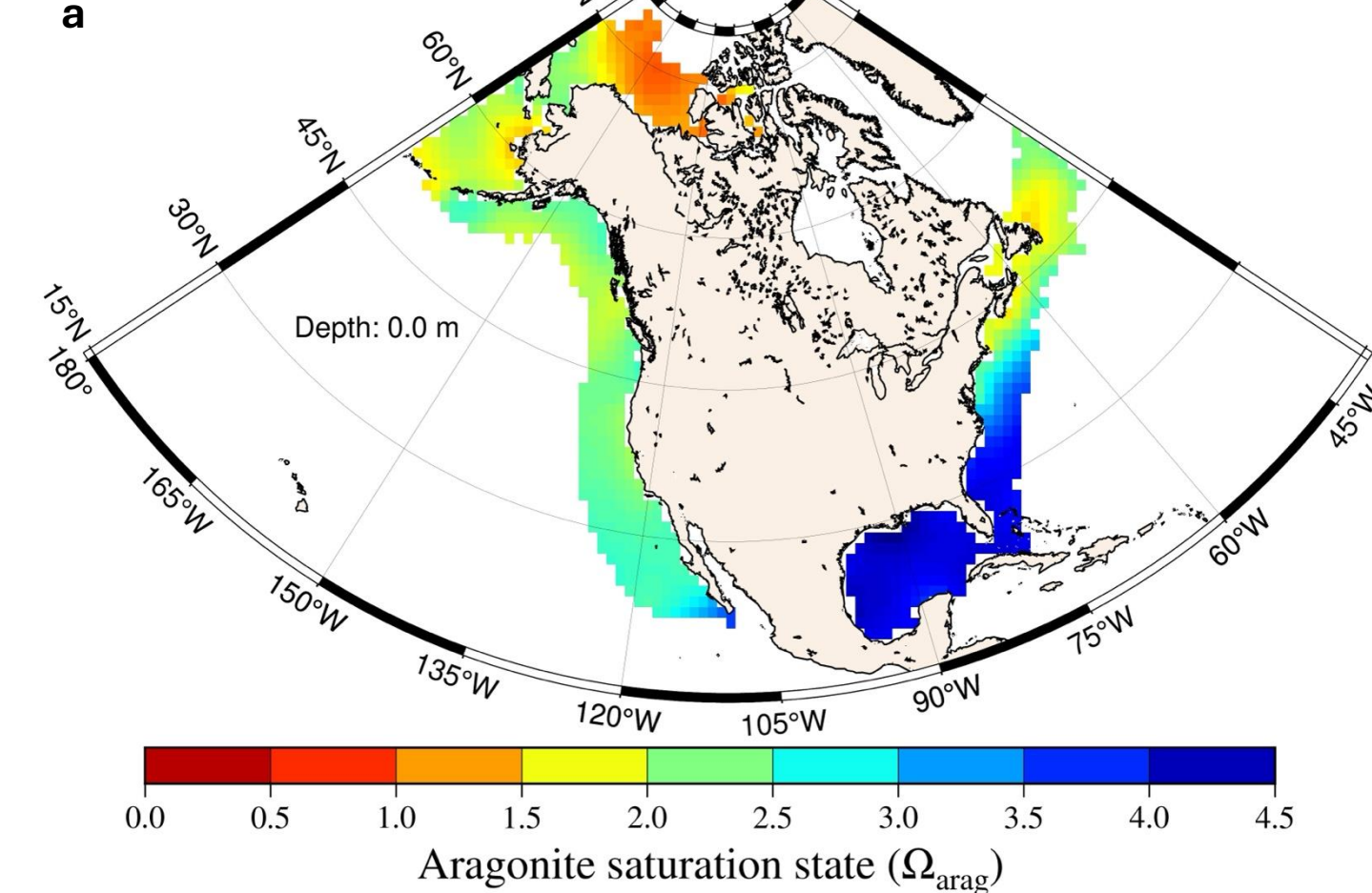
Natalie Monacci¹, Simone Alin², Darcy Dugan³, Julie Keister⁴, Darren Pilcher⁵, Phyllis Stabeno², Adrienne Sutton², Heather Tabisola⁶



Purpose

The University of Alaska Fairbanks (UAF) Ocean Acidification Research Center (OARC) is a service lab providing **climate quality observations of the marine carbonate system** as defined by best practices.

This work characterizes natural and anthropogenic trends of carbon dioxide (CO₂) in seawater to study biogeochemical processes and ocean acidification (OA) in Alaska's Large Marine Ecosystems (LMEs). Through partnerships, we contribute to climate products and tools that serve a variety of needs at local, regional, and global scales.



Seawater around **Alaska is uniquely vulnerable to OA** due to naturally high CO₂, low pH, and low aragonite mineral saturation states (Ω).

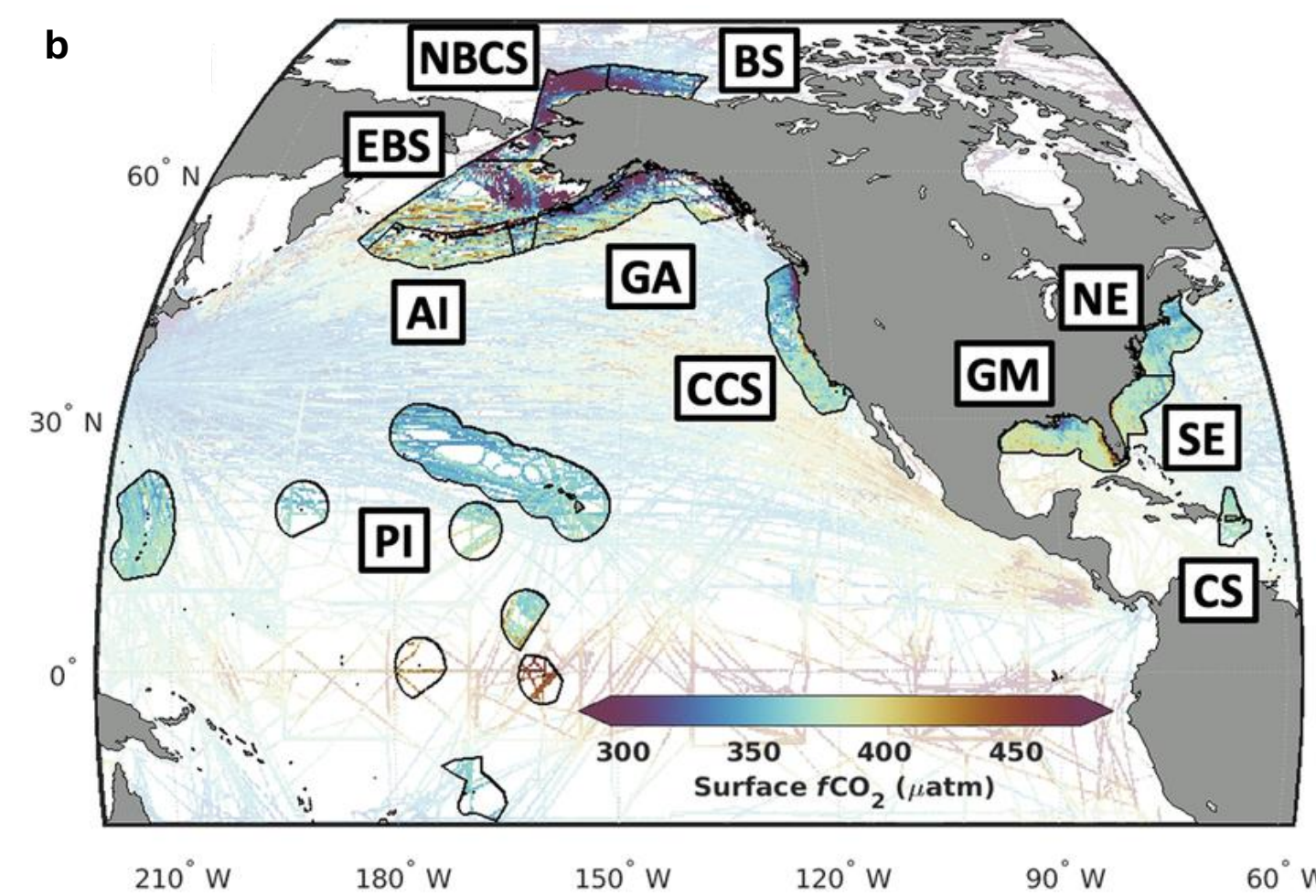
The region's **natural proximity to biological thresholds** that may negatively affect marine species will continue to decrease with the accumulation of anthropogenic CO₂ through climate change driven OA and Arctic amplification.

Partnership

Alaska's massive spatial footprint, low coastal infrastructure, and diverse cultures make it critical to form partnerships to maximize limited resources.

Alaska hosts 5 of the 11 LMEs in US waters

- Gulf of Alaska (GA)
- Aleutian Islands (AI)
- Eastern Bering Sea (EBS)
- Northern Bering Chukchi Sea (NBCS)
- Beaufort Sea (BS)

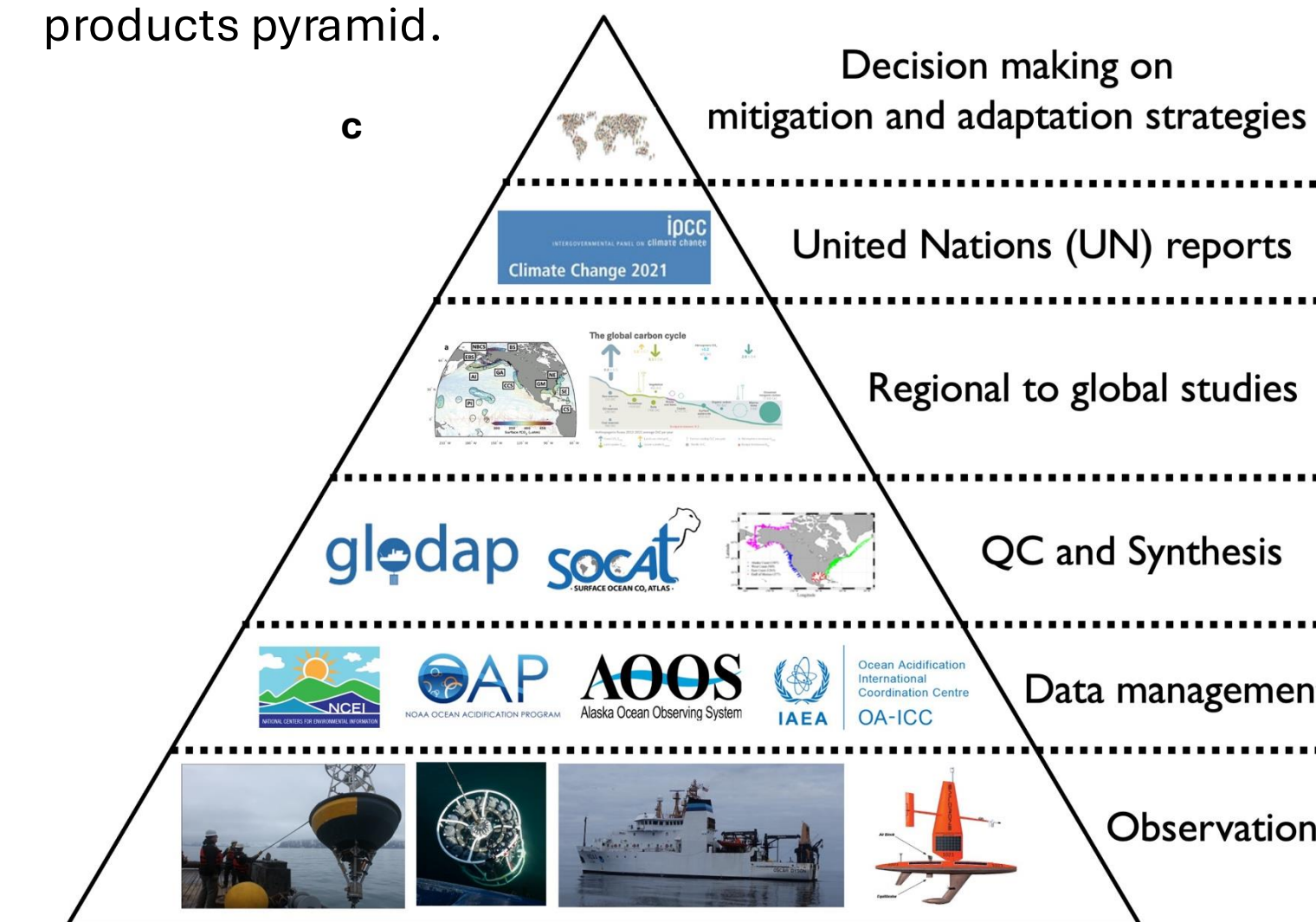


Partnerships are critical, both formal and informal, to coordinate funding, logistics, and data across monitoring programs that aim to characterize climate variability in Alaska's LMEs.

We partner with local, national, and international programs funded by government agencies, non-profits and for-profit industry on monitoring programs.

Products

All data from the UAF OARC are public and archived with the NOAA National Centers of Environmental Information (NCEI) Ocean Carbon and Acidification Data System (OCADS) and on our website. These observations and data archives form the base of the climate data and products pyramid.

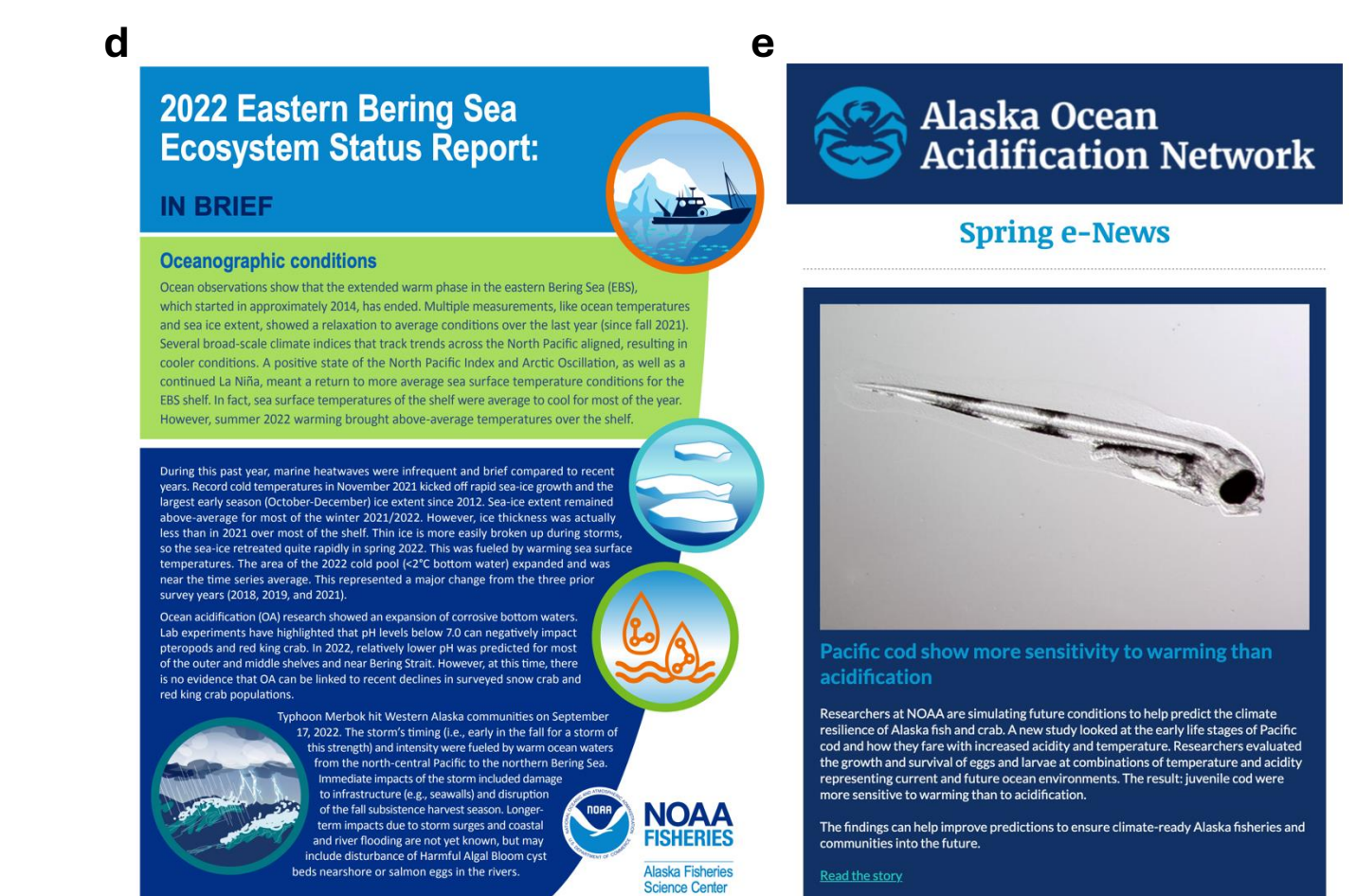


Figures a, b, and d are examples of products that include UAF OARC observational data. Not shown are global products such as the Global Ocean Data Analysis Product (GLODAP) and the Surface Ocean CO₂ Atlas (SOCAT), which are included in the data value pyramid adapted from Jiang et al. (2021) in Figure c.

These efforts lead to the possibility of the regional studies in Figures a and b and the **Global Carbon Budget** and provide context to weather quality observations.

People

Ultimately, observational efforts are for people to understand and **plan for the effects of climate change** on marine ecosystems. This includes decision making on mitigation and adaptation strategies, which are led by our data pyramid partners.



UAF OARC is foremost **accountable to Alaskans**, making our partnership with NOAA Fisheries and the Alaska OA Network crucial to disseminating information. They produce Ecosystem Status Reports (Figure d), newsletters (Figure e), and outreach materials.

Together, we connect information to various user groups including Tribal, local, and state governments; commercial, private, and subsistence fishers; and industry. We are proud of our collaborations and **welcome new partners**.