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## Community-based observations help interface Indigenous and local knowledge, scientific research, and education in response to rapid Arctic coastal change

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Arctic coastal sea-ice environments are undergoing some of the most rapid changes anywhere in the Arctic, with implications for coastal communities' food security and infrastructure, marine ecosystems, and permafrost. We argue that responses to such rapid change are most effective when informed by Indigenous and local knowledge and local observations to provide understanding of relevant processes, their impacts, and potential adaptation options. Community-based observations in particular can help create an interface across which different forms of knowledge, scientific research, and formal and informal education can co-develop meaningful responses. Through a broader literature review and a series of workshops, we have identified principles that can aid in this process, which include matching observing program and community priorities, creating sufficient organizational support structures, and ensuring sustained community members' commitment. Drawing on a set of interconnected examples from Arctic Alaska focused on changing sea-ice environments and their impacts on coastal communities, we illustrate how these approaches can be implemented to provide knowledge sharing resources and tools. Specifically, in the context of the Alaska Arctic Observatory and Knowledge Hub (A-OK), a group of Iñupiat ice and coastal marine ecosystem experts is working with sea-ice geophysicists, marine biologists, and others to track changes in coastal environments as well as the services that the ice cover provides to coastal communities. The co-development of an observing framework and a web-based searchable database of observations has provided an interface for exchange and an education resource. An annual survey of hunting trails across the shorefast ice cover in the community of Utqiagvik serves to further illustrate how different, response-focused activities such as the tracking of ice hazards – increasingly a concern with loss of ice stability and shortening of the ice season – can be embedded within a community-based monitoring framework.

