

*Statement for the 2018 Arctic Observing Summit*

***The need for collaborative, stakeholder-based Arctic observing networks***

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Despite scientist claims and billions of dollars spent on environmental change research, there is little evidence of improved decision-making (Cash et al. 2003; Dilling and Lemos 2011; Lemos et al. 2012, cited in Ford et al. 2013; Wall et al. 2017). Coproduction, a collaborative method where stakeholders are involved in all phases of research, increases the likelihood of practitioner uptake by enhancing perceptions of saliency, credibility, and legitimacy (Cash et al. 2003). Stakeholder interaction to enhance usability is emerging in Arctic observing network (AON) programs with efforts to advance the AON dual role of scientific understanding and decision support (e.g. Eicken et al. 2011, 2016a, b; Lovecraft 2013, 2016; Brigham n.d.). Currently, science priorities dominate AON design (cf. SEARCH 2005; ADI 2012; Lee et al. 2015), but collaborative research to address stakeholder needs is emerging as a best practice to transform AON science and monitoring activities into usable information products (Pearce et al. 2009; Lovecraft et al. 2013; NRC 2014; Eicken et al. 2016a). However, effective stakeholder engagement is costly, and coproduction is potentially not a practical systematic approach (Sutherland et al. 2017). Given the importance and challenge of effective stakeholder engagement to achieve usability, the Arctic Observing Summit should identify best practices and evaluate the costs and benefits of collaborative approaches to support strategies to realize societal benefits (cf. IDA 2017).

Arctic system services, or ecosystem services (cf. MA 2005) relevant to the Arctic, is a useful construct put forward by AON researchers to identify observation parameters that are important to stakeholders at local and regional scales (Eicken et al. 2009, 2016a; ADI 2012). The necessity of the ecosystem services AON design approach to include stakeholders in the design process positions it as a methodological pathway to AON coproduction and usability. The ecosystem services approach opens opportunities for the AON research community to engage the myriad of existing and emerging stakeholder collaborations in the Arctic that identify observing priorities ranging from initiatives at the federal level such as the U.S. Committee on the Marine Transportation System Arctic Integrated Action Team to local communities, which are known to be particularly challenging to engage effectively (cf. Lee et al. 2015; Eicken et al. 2016a; Johnson et al. 2013, 2015). Stakeholder-based AON design also opens opportunities for collaborations with research communities that are advancing methods for effective stakeholder interaction for environmental information usability (e.g. Wall et al. 2017; Lathrop et al. 2017).

The AON decision support goals challenge current observation design approaches that emphasize science priorities. While the need for stakeholder-based AON design has been voiced by the AON research community (Eicken et al. 2009, 2016a; ADI 2012), knowledge about cost effectiveness of implementation is lacking. What we know from the usability literature is that stakeholders must be included in the research process for environmental information to influence decision outcomes, even if overall scientific credibility is diminished from the

perspective of other stakeholders and researchers (Cash et al. 2003; Mitchell et al. 2006). In light of AON decision support goals including advancing relevant societal benefit areas (IDA 2017), the AON research community would benefit by identifying collaborative research best practices and evaluating associated costs and benefits with scaling them for integration into AON programs. Stakeholder-based AON cost-effectiveness themes to explore include:

- a. *Enhancing stakeholder access to AON data and resources.* Often environmental observation data are used for a single purpose such as addressing a science question. Collaborating with stakeholders in the process of addressing science questions to also address decision support information needs would benefit society by promoting multiple uses of data created from AONs. Lee et al. (2015) explains how pooling of AON resources can occur at the tactical level in AON implementation where communities of practice emerge from mutual interest in observing Arctic system variables. Adapting existing AONs to also address stakeholder needs is one way that stakeholder access to AON resources can occur without changing core scientific questions that currently dominate AON design. Other determinants of access including data storage and management, metadata, software usability, and user capacity also need to be addressed in the context of designing AONs to realize societal benefit areas.
- b. *Enhancing usability of AON information products.* While stakeholder engagement is costly, it is necessary to achieve decision support outcomes using AONs. What are the cost and benefits associated with engaging with existing “boundary organizations” such as Alaska’s Landscape Conservation Cooperative? What are the costs and benefits associated with engaging existing stakeholder collaborations for proof-of-concept or sustained interaction? What are the best practices for engaging Arctic stakeholders while balancing saliency, credibility, and legitimacy of AON information products?
- c. *Enhancing AON program effectiveness.* Evaluating the costs associated with enhancing stakeholder access to AON data and resources and information usability should be compared against the possibilities for demonstrated societal benefit outcomes that would justify sustaining AON programs.

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