

Results of an Expert Forum on Ocean Data Management in Canada

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Sound knowledge and understanding of the world's oceans is essential for mitigating human impacts on the global environment and for promoting sustainable economic use of the marine environment (CCA, 2012). Knowledge and understanding, in turn, depends on access to accurate, rich, available, open, and integrated ocean data by end-users, including academic researchers, policy- and decision-makers, private enterprise, and the general public (Gallagher et al., 2015; Hall, Harrison, & Stammer, 2010; Wallace et al., 2013). Recent reports suggest that strong regional actors capable of collecting and managing their own data, delivering benefits that are tailored to the specific needs of their communities, and pioneering innovative technologies and data management practices is one of the strengths of the Canadian ocean data management (ODM) community (CCA, 2013; OSTP, DFO, & CSA, 2011; Wallace et al., 2013). Despite this, the absence of a cohesive national network has resulted in a fragmented ocean sciences sector in Canada (OSTP, 2011). This so-called "coordination gap" has made access to data by end-users difficult, with data and forecasts collected by various programs, organizations, and agencies being scattered across a range of web-pages that can be difficult to find and hard to access – or not available at all (CCA, 2013; OSTP, 2011). A careful re-examination of our data management practices, including how we share, access, and use data, is necessary to ensure we are leveraging Canada's ocean data to best support scientific excellence, foster collaboration and innovation across sectors, and harness oceans data to inform decision-makers and other stakeholders.

To that end, an Expert Forum on Ocean Data Management (November 18-19, 2015 in Montreal, Canada) was held to bring together national and international experts and stakeholders to present and evaluate international best practices in managing data from ocean observations, the current state of ocean data collected and managed in Canada, and goals and visions for the future of ocean data management in Canada. Members of Canada's Community of Practice on Ocean Data Management (CoP ODM; oceansdata.ca), many of whom have been trying to increase coordination and data sharing for years, informed the agenda and identified guest speakers. Organized and sponsored by the Marine Environmental Observation Prediction and Response (MEOPAR) network, this forum built on previous events including a national Data Management Workshop (March, 2014) and a joint DFO-MEOPAR Workshop on Ocean Data Management in the Atlantic Canada Region (July, 2015). Over fifty participants from government, academia, and the private sector attended. The results are documented in a vision paper (Wilson, Smit, and Wallace, 2016) and summarized briefly here.

Representatives from the Integrated Ocean Observing System (IOOS; www.ioos.noaa.gov) in the United States and the European Marine Observation and Data Network (EMODnet; www.emodnet.eu) and MARUM (www.marum.de/en) in Europe presented at the Expert Forum. Each described the lessons learned in the development of their respective organizations. Both Europe and the United States, like Canada, must work within dispersed and geographically and politically diverse climates, but the system that resonated the most with Canadian participants was the U.S. IOOS, for several reasons. IOOS operates within a national, rather than international, framework, and four out of the eleven regional associations in IOOS directly share waters with Canada (BC/Alaska; BC/Washington; the Great Lakes; and Maine/Nova Scotia/New Brunswick) which has led to various Canada-US collaborations.

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The Expert Forum was designed to not only inform attendees, but also to actively engage the audience – who collectively brought substantial expertise in ODM and the Canadian context – as participants in the conversation about how to advance the state of ODM in Canada. During facilitated breakout sessions, participants (including representatives from every member of the CoP) were asked to describe what they envisioned for the future of ODM in Canada and what they would be willing to commit towards the realization of this vision. There was a clear consensus: we need to take action; Canada needs a national integrated ocean observing system, funded and supported with appropriate long-term resources, and it needs to be done sooner rather than later. More importantly, there was a willingness to work together, and with the government and private sector, to realize this goal.

The vision that emerged from the discussion was the formation of a Canadian Integrated Ocean Observing System (CIOOS): An integrated OOS for Canada that would bring together and leverage existing Canadian and international ocean observation data, programs, and projects to generate value-added data products on an open web-based platform that maximizes utility to end-users (e.g., government, science partners, industry, and the public). The system as described would include a national coordinating body that would federate the data currently collected by the diverse regional groups across Canada into a publically-accessible web-based platform, without altering ownership of the data. A sustainable funding model would provide stability to existing regional OOSs, incentivizing sharing. The proposed system would also include several regional OOSs with areas of responsibility to be defined. Regional nodes would have the mandate to engage smaller groups within their region, ranging from academic research projects and regional science networks to indigenous and local communities. Such a system would also ensure that international standards for data collection, storage, and documentation are followed while allowing regional self-management. CIOOS would provide a common system for government, scientists, and partner organizations to integrate, access, share, and preserve data, thereby granting access to a wider breadth of information to make predictions and inform decision-making.

Results from the Expert Forum revealed that: 1) despite being on the cutting-edge of ocean observation with many mature OOS projects currently in operation, Canada is one of the few developed coastal nations in the world that does not have a national integrated OOS; 2) there is a unanimous desire among the ODM CoP for more national coordination and integration particularly when attached to committed resources; and, 3) the CoP is willing to work together and with the government, committing time, energy, and resources towards this initiative. Canada's world-renowned scientific experts, extensive science infrastructure, and thriving ocean technology industry are amongst its most valuable resources. The time has come for national science leadership, cooperation, and efficient coordination of regional efforts towards a cohesive CIOOS. Progress will rely on an extensive engagement process, including consultations with the CoP, and a phased approach, allowing for stakeholder input and user feedback to be incorporated at each level. While this system will be the first of its kind in Canada, we have access to a wealth of experience internationally. A continued willingness to collaborate, sensible organization and governance decisions, sufficient resources, and innovative technical solutions will pave the road to a national ocean data infrastructure that will provide ongoing value to researchers, governments, industry, and the general public for generations.

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