The Semantic Sea Ice Interoperability Initiative

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Rapid and profound changes in the Arctic have highlighted its crucial role in the overall global climate system. Sea ice is a fundamental component of the Arctic system, interacting with almost all of its other components. Accurate predictions of future climate will depend strongly on a better understanding of sea ice dynamics. Achieving this understanding will involve multi-disciplinary approaches requiring researchers to access, understand, and assess data that may be outside their fields of expertise. Effective use of these various data sources requires some disciplinary expertise, including knowledge of assumptions and metaphors. Cross-disciplinary data users spend undue time and effort seeking and assessing data outside their area of expertise, and even risk using data inappropriately. SSIII, the Semantic Sea Ice Interoperability Initiative, is an NSF-funded effort to enhance the interoperability of sea ice data by engaging a network of polar research scientists, computer scientists, and Arctic residents to collectively work on enhancing semantic interoperability of all Arctic data. This network is building on the work initiated under the International Polar Year (IPY) and being furthered as a community of practice working to improve interoperability within the Polar Information Commons (PIC), the Sustained Arctic Observing Network (SAON), and broader global systems. SSIII will help interdisciplinary and local communities find, assess, and use heterogeneous, distributed, and evolving Arctic data. We report on our work to develop a sea ice ontology, working initially from a scientific perspective, but over time, seeking to incorporate the knowledge and perspectives of Arctic residents. Our goal is to develop a broadly useful sea ice ontology, linked to relevant marine, polar, atmospheric, and global ontologies, and to foster the development of a network of active practitioners working to make their data more semantically interoperable. Eventually we hope to improve the discovery, understanding, and use of sea ice data by enabling faceted searches of sea ice data in multiple existing and developing search interfaces. SSIII is more than an exercise in knowledge engineering. The support and ongoing evolution of this effort will rely on and engage the people and communities who use, enhance, and maintain information infrastructures. Ultimately, the network will be sustained when members see how their activities in the context of the network benefit their immediate scientific and practical needs. The project engages the diverse Arctic community, including Arctic residents and indigenous people, who contribute to and use its outputs.