



## **A Modern Operating System for Near-real-time Environmental Observatories**

John Orcutt and Frank Vernon

University of California, San Diego, Scripps Institution of Oceanography, La Jolla, United States (jorcutt@ucsd.edu)

The NSF Ocean Observatory Initiative (OOI) provided an opportunity for expanding the capabilities for managing open, near-real-time (latencies of seconds) data from ocean observatories. The sensors deployed in this system largely return data from seafloor, cabled fiber optic cables as well as satellite telemetry. Bandwidth demands range from high-definition movies to the transmission of data via Iridium satellite. The extended Internet also provides an opportunity to not only return data, but to also control the sensors and platforms that comprise the observatory. The data themselves are openly available to any users. In order to provide heightened network security and overall reliability, the connections to and from the sensors/platforms are managed without Layer 3 of the Internet, but instead rely upon message passing using an open protocol termed Advanced Queuing Messaging Protocol (AMQP). The highest bandwidths in the system are in the Regional Scale Network (RSN) off Oregon and Washington and on the continent with highly reliable network connections between observatory components at 10 Gbps. The maintenance of metadata and life cycle histories of sensors and platforms is critical for providing data provenance over the years. The integrated cyberinfrastructure is best thought of as an operating system for the observatory – like the data, the software is also open and can be readily applied to new observatories, for example, in the rapidly evolving Arctic.