There is a general need in the ocean science community for widely accepted standards-based metadata to improve discovery and use of marine geophysical data. The need for such profiles are increasingly urgent as seagoing programs become more complex and interdisciplinary; funding agencies mandate public dissemination of the resulting data; and data centers link post-field/derived products to original field data sets. The U.S. Extended Continental Shelf and the Rolling Deck to Repository programs provided added impetus, facilitating the development of profiles that describe the basic elements of a seagoing expedition and the associated bathymetric and seismic data collected during the cruise. Drawing from the cruise-level metadata profile published by the University-National Oceanographic Laboratory System Data Management Best Practices Committee in 2008, we developed a standard implementation for cruise-level metadata. Our XML implementation is based on the ISO 19115-2:2009 standard for geospatial metadata, with controlled vocabulary terms directly embedded as Uniform Resource Identifier references. We are implementing a hierarchical framework where a single “cruise-level” record is linked to multiple “dataset-level” records, based on common templates that may be published independently. Our results, published online, will include a best practices guide for authoring records; recommended controlled vocabularies; example records; a set of Schematron rules for enhanced validation; and a set of stylesheets for crosswalking and viewing records in other formats. We draw from existing international standard dictionaries/gazetteers where possible including ICES (platforms), UNOLS (ports), IHO (sea areas), GEBCO (undersea feature names), and VLIZ (economic zones).