

Science Vessel Subsystem – FY 2008 to FY 2012 Work Plan

Background and Importance

The science vessels operating on the Great Lakes serve as mobile research and data collection stations. They travel to and operate at a variety of sites over the course of a research season, a marked contrast to buoys and other fixed sensor platforms. While this mobility reduces the time period during which vessel-derived data can be collected, it allows seasonal sampling of sites that could not support or do not justify permanent sampling infrastructure. It allows spatial coverage unachievable through buoy deployment, and provides the potential for continuous measurements while underway. It also allows investigation of short-term and localized phenomena detected by remote sensing tools and readings from fixed stations or non-research vessels. Vessel operations are clearly a significant component of the research and monitoring infrastructure for the Great Lakes, are resources that can be adapted to expanded service in support of other GLOS subsystems, and require increased support to expand and maintain this functionality.

As vessels are operated by a diverse range of public agencies, universities and other entities, vessel coordination has been a continuing challenge for as long as such vessels have been operated on the lakes. Since 1997, the Canadian-American Great Lakes Association of Science Ships (GLASS) has significantly filled this void by organizing a series of vessel coordination workshops and instituting other methods to improve communication and coordination among science vessel managers. While considerably effective, GLASS has operated on a significantly limited budget, constraining its work and long-term sustainability. Maintaining and expanding this coordinative function is a high priority of the science vessel operations on the Great Lakes.

The Great Lakes Association of Science Ships (GLASS) lists 78 research vessels active in the Great Lakes. Of these vessels, 24 are operated by various U.S. and Canadian federal agencies, 31 are operated by state, provincial or municipal agencies, 18 are operated by universities and 5 are privately operated. Vessel characteristics, crew and equipment capabilities, as well as the obligations of each ship's sponsoring agency vary widely from vessel to vessel. The vessels listed in the inventory range in length from 15 to 224 feet, with an average of 55 feet. They range in speed from 7 to 40 mph, with an average of 16 mph.

The wide variation in capabilities among this fleet of vessels results in a significantly lesser number of vessels capable of fulfilling any given task, for example protected, near-shore surveys or exposed, open water operations. Of the 76 active ships listed, less than half are 50 feet or longer and only 6 are 100 feet or longer. In addition, despite several new, welcome additions to the fleet, many ships are nearing their end of life or require significant upgrades or maintenance for their continued use. The average age of the fleet is 28 years, with a maximum of 69 years. Continued additions and upgrades to this fleet are needed to support its many important uses. Fleet modernization must be funded and carried out in order to best serve regional science needs.

Integration of vessel-based sampling with other GLOS data gathering activities (buoys and satellite remote sensing) is important to the full utilization of vessel time and capabilities. Data collected continuously during, for example, vessel steaming between fixed stations and transits between ports, could be used to substantially augment spatial coverage of water quality measurements, providing ground truth for remote sensors and potentially providing a better linkage between buoys and their surrounding basins. An effort of this type would require new instrumentation, in most instances.

To form a significant part of a standardized information collection network, such as GLOS, it is important that the equipment, methods and protocols used aboard ships for critical parameters be standardized to allow broad comparability. Great Lakes science ships can serve as a key component of the GLOS if they are given the resources to accomplish their missions, with careful consideration of additional demands to maintain and deploy new instrumentation. Vessel operating budgets must be supplemented to cover the costs of deploying and servicing GLOS instrumentation, coordination and management of the fleet. In the near-term, efforts must be undertaken to standardize key equipment types and/or data collection methods.

The GLOS can provide a repository or central access point for data collected by these vessels. Database tools and user interfaces developed for the GLOS will improve regional access to data from multiple vessels and multiple agencies, and will enhance the integration of vessel data with data from other sources (buoys, fixed off-shore and coastal stations and airborne and satellite remote sensing). Navigation, interconnecting waterway data on levels and flows, and marine weather forecasts all integrated within the GLOS will support safe and efficient vessel operations. Regional vessel coordination efforts could receive support from GLOS, which will help member agencies and researchers further coordinate vessel activities.

Subsystem Tasks

1. *Science Vessel Coordination* – Numerous agencies are involved with science vessel operations in the Great Lakes – St. Lawrence River system. Most of these agencies are active participants in vessel coordination efforts within the Great Lakes region, but those efforts have limited funding and minimal mandates for the agencies involved. Consistent with its mandate to coordinate Great Lakes data collection, management and dissemination, GLOS should strive to substantially augment the capacity for science vessel coordination within the region. Using the existing GLASS framework, GLOS will provide resources to increase GLASS staffing and functionality and coordinate closely with GLASS in achieving their shared mission. A high-priority activity will be to conduct an assessment of current needs for upgrades to vessels, additional vessels and coordinative infrastructure.

2. *Improved and Standardized Vessel Instrumentation* – Aging and widely differing information collection instrumentation aboard the science vessel fleet impairs both the quality of data collected and the prospect for employing such data on a comparable basis for regional applications. GLOS, working with GLASS, will initiate an effort to

