GLOS Quality Management Processes

Quality Management Overview

The following document provides an overview of the processes GLOS has developed for the quality management systems used to ensure that the GLOS projects satisfy expectations for accuracy, reliability, and efficiency. Quality system implementation is an integrated part of GLOS program management and systematic planning and review of projects for GLOS, as described in further detail in the GLOS Blueprint. GLOS works closely with contracted partners in management and implementation of quality systems. The GLOS DMAC and Observing teams work to ensure that data is of high quality, addressing quality assurance problems and solutions and overall data assessment guided by the objectives within the 2011 Quality Management Plan.

In 2011, GLOS developed a Quality Management Plan (2011 QMP) as a first step in establishing a quality management system for GLOS projects related to the collection, management, and delivery of environmental data that are of sufficient quality to meet the intended project objectives and to support environmental decisions. This document provides the blueprint for establishing and maintaining a quality management system to support GLOS programmatic and business planning, at the same time ensuring GLOS projects meet quality planning requirements by federal partners. With the 2011 QMP document as a guide, GLOS has made considerable progress on implementing quality management systems. In coordination with GLOS' strategic planning cycle, the GLOS quality management systems and processes are reviewed every 5 years. The 2011 QMP document has become outdated and has references to personnel and procedures that are not currently implemented. The next revision of the Quality Management Plan is planned for 2016 and future revisions will be updated to reflect GLOS's current projects and processes. The 2011 QMP and appendices are currently used to provide information on the quality systems, protocols and procedures and to serve as guiding standards for observing operations employed by GLOS partners. Formally documented QC Reports and summaries as referenced in the 2011 QMP documents have not yet been required, but these requirements will be included in upcoming partner contracts in conjunction with the scheduled June 2016 update.

GLOS Quality Management Organization and Roles

GLOS is a small organization, consisting of the Executive Director, two full-time staff positions (Program Coordinator and Communications and Outreach Specialist), and a contracted Business Manager. The QA reporting and communication structure (Figure 1) follows directly from the GLOS organizational structure which is further described in the GLOS Blueprint. This organizational structure can be characterized as being similar to a foundation or granting entity which solicits and manages projects as a distributed consortium through contracted services. Projects are selected and evaluated based on criteria, further described in the GLOS Blueprint, which assess the projects ability to meet programmatic and functional goals for GLOS, including quality objectives.

Project partners are independently responsible for project scoping, developing performance metrics, adopting required standards and protocols, independently verifying or validating data quality, and documenting QA/QC procedures as part of contracting/service agreement process with GLOS. GLOS staff and team leads for Observations and Data Management are responsible for the management of these projects and partners including project reporting, evaluation and assurance that they are meeting contract requirements. Due to a very small staff size, it is not possible for GLOS to create one position fully dedicated to QA management. However, GLOS has designated its Program Coordinator to serve as the QA Manager in an effort to ensure appropriate independent review. It is also important to

emphasize that projects are implemented independently of GLOS and undergo various levels of review by team leads, GLOS Staff, and the GLOS Board of Directors.

The Program Coordinator serves as the QA Manager. As GLOS staff, the QA Manager works independently from those who generate, compile, or evaluate environmental data, because those activities are done through partner organizations or through contract with GLOS. The GLOS Observing Lead is responsible for coordinating observing projects quality systems. The GLOS Data Management and Communications (DMAC) Lead is responsible for coordinating data management and communications quality systems. Other project leads are responsible for coordinating and documenting project specific quality plans. The Program Coordinator is also responsible for managing and reviewing project documentation and reporting and works with Business Manager, who is responsible for coordinating project contracting. The GLOS Executive Director is responsible for coordinating review of project plans by the Board of Directors. The QA Manager works with the Executive Director and Board of Directors to plan, assess, and improve the organization's quality system.

The nature of GLOS' mission and function requires that a majority of the programmatic work GLOS undertakes will need to be managed through a quality system. Specifically, any observations, data management, modeling or tool development project is subject to compliance with the GLOS protocols and processes for quality assurance and quality control. With the exception of the Data Management and Communication (DMAC) services GLOS undertakes, projects and related technical activities will change in accordance the priorities identified in the GLOS Blueprint. However, these projects will be implemented through contracts, MOUs, or cooperative agreements with members, partners, or private contractors. GLOS will use this contract process as a mechanism for enforcing, overseeing and evaluating data quality assurance. The Program Coordinator/QA Manager will work with individual project leads as well as the GLOS Business Manager, Observing and Data Management and Communications Leads to ensure that applicable projects meet quality systems requirements by reviewing project proposals and scope according to a QA/QC Reporting checklist that is incorporated into the GLOS contracting process.

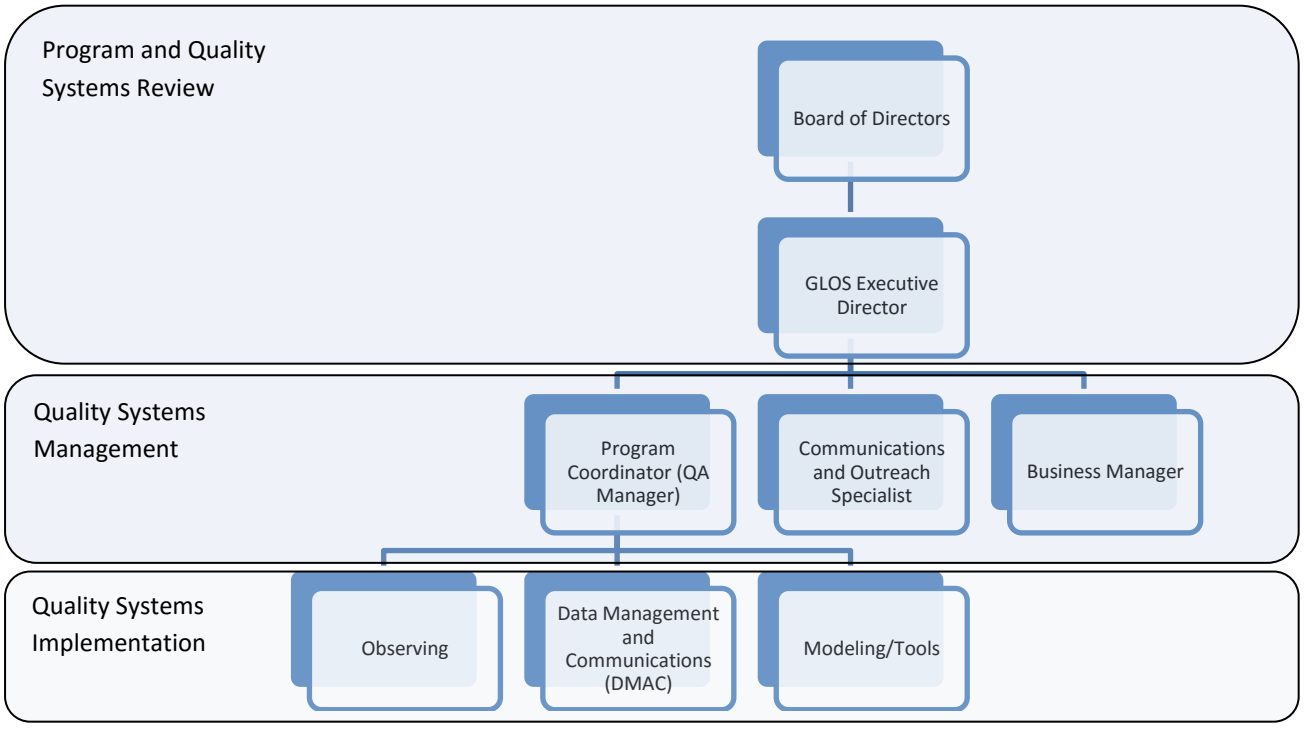

Figure 1: GLOS Organizational Chart (2015)
Program Team Leads and other project partners or contractors report to GLOS through the Program Coordinator. The Program Coordinator serves as an independent QA Manager to provide review and evaluation of quality systems in addition to the other levels of project review provided by the team leads, GLOS staff, and Board of Directors.

Quality Assurance and Quality Control Process

Because project implementation is carried out primarily though contracted activities, development and implementation of QA/QC protocols and processes are the responsibility of the contracted parties GLOS supports. To manage these multiple project and their related QA/QC systems, GLOS utilizes its project planning and contracting processes to establish, manage, and enforce its quality system. The GLOS quality management system is essentially a set of documentation, implementation, and evaluation procedures integrated into the GLOS project planning process to ensure the effectiveness of projects and activities. The quality management system is designed to protect the integrity of each GLOS project and adherence to the following goals:

- Project results can be contributed to the GLOS DMAC system
- Project results are accurate, reliable, and practical
- Project results are obtained in a timely manner
- Project results are designed in a practical way for ease of implementation
- Problems/issues that may arise throughout the project are addressed

Currently, GLOS observing activities are coordinated and managed through a partnership with NOAA's Cooperative Institute for Limnology and Ecosystem Research at University of Michigan (CILER). CILER serves as the Institutional Partner that manages and executes the sub-awards for each of the academic institutional participants on the project. They execute the sub-awards through an existing Cooperative Agreement with host lab NOAA-GLERL. Partner institutions include: University of Wisconsin-Milwaukee, University of Minnesota Duluth Large Lakes Laboratory, Great Lake Regional Consortium located at the SUNY College of Environmental Sciences and Forestry, Michigan Technological University, and Michigan Technological Research Institute. CILER handles quality assurance and quality in two ways. The first step is selecting instruments that have a proven track record. Prior to each deployment and after buoy retrieval each sensor is checked to ensure that it meets the manufacturer specifications. Secondly, there are certain quality checks that are "hard coded" into the data logging software to flag out of bounds data and then there are manual data checks performed on the data throughout the deployment. This is an evolving area of research and participants are actively improving these quality checks.

Quality control activities have been developed for the various GLOS observing systems based on manufacturer's operating procedures and recommendations, current practices of existing continuous monitoring systems, and professional judgment. GLOS relies on contracted partners (e.g., CILER) to provide the best practices for QA on specific instruments. These investigators are internationally recognized scientists with a great deal of experience making in-situ and remote sensing observations in their particular field. All instruments are deployed and maintained by their research groups, and they advise the GLOS DMAC Team as to quality assurance. For all external partners providing data to GLOS, the provider is screened during the proposal and reporting review phase to ensure they are an authoritative source and that they are maintaining the observational equipment that collects the original source data according to published manufacturer standards and according to scientific best practices. To date, contract management via CILER has limited the ability to utilize the contracting process as a management mechanism. At this time, GLOS contracted partners report on their QA/QC

procedures informally through annual in-person meetings, semi-annual progress reports, and in consultation with the GLOS DMAC team. As part of the scheduled update of the 2011 QMP, GLOS will be working with CILER to revisit and improve this process.

The DMAC system provides an added level of QC, oversight, and coordination of project level data as these contributions are integrated for easy retrieval, storage, access and/or interoperable use in tools and applications. DMAC activities are guided by QARTOD, and other standards and protocols adopted by IOOS. The 2011 QMP serves as a guidance document for GLOS data providers on standard operating principles and manufacturer recommendations on calibrations, operations, and maintenance to ensure that data meet the quality objectives. Performance evaluations are conducted at the GLOS level and at various stages of the project, over an annual and semiannual time frame in coordination with annual work plan development and reporting periods.

Additional detail on the QC performed is included in the GLOS QA/QC document portion of this application.