



Best practices in QA/QC

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One of the today's big challenges is the need to maximize the full potential of observing networks and use them into a vast range of services supporting the 'blue growth'. This requires a harmonization of the qc procedures in order to make all data of the same parameter compatible and comparable. The production of comparable and compatible data requires that laboratories adopt good field and laboratory procedures as part of Quality Assurance/Quality Control (QA/QC) regimes. This includes the selection of validated methodologies for sampling and analysis, mandatory use of reference materials and participation in 'blind' international intercomparison exercises. A number of quality control procedures and documents from NODCs and major international projects are existing. Most of them mainly deal with physical data. Other documents exist for qc for sea level and met-ocean data – current meter data, waves, meteorological data. In addition, the ICES Working Group on Marine Data Management guidelines are in use in a number of data centres. There is also the QARTOD effort in the USA, initially dealing with real time qc. Data quality control essentially and simply has the following objective: "To ensure the data consistency within a single data set and within a collection of data sets and to ensure that the quality and errors of the data are apparent to the user who has sufficient information to assess its suitability for a task." (IOC/CEC Manual, 1993). If done well, qc brings about a number of key advantages:

- Maintaining Common Standards
- Acquiring Consistency
- Ensuring Reliability

Intercalibrations, availability of certified reference materials, clean room techniques, etc., are not sufficient to assure good quality of data. Sampling, sample pre-treatment, transport and storage, are an integral part of the analysis. These sample-handling procedures have not received much attention in terms of quality assurance and good measuring practice. From an historical point of view, although the problem was present from the pioneer analysis made by Redfield in 1934, the urgent need for nutrient standards was demonstrated during the World Ocean Circulation Experiment (WOCE) and the Joint Global Ocean Flux Study when measurements were made by different laboratories.

The internal consistency of nutrient data was evaluated by comparing measurements made in deep waters at nearby stations on different cruises. Offsets were found among the results of different laboratories indicating inconsistencies in the preparation of calibration standards. In the 1970s the Japanese Sagami Chemical Research Center provided nutrient reference material for the Cooperative Study of Kuroshio Current. Today certified reference materials are provided by many institutions, such as:

- Canadian National Research Council
- IAEA
- Scripps Institution of Oceanography
- Australian National Association of Testing Authorities

In the EC project JERICO-NEXT it was provided an insight on activities carried out within some initiatives such as QUASIMEME, the Scientific Committee on Oceanic Research, QARTOD, QA/QC procedures adopted or developed in international programs and EU projects. QC procedures are also carried out within EMODnet Physics. Documentation is listed at url.wiki.sp.ismar.cnr.it.