

Toolboxes for data management in marine environmental monitoring

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Users of environmental monitoring data will always need access to highest quality of data. Advances in technology can meet these demands via technical solutions. The Swedish Meteorological and Hydrological Institute (SMHI) is the Swedish National Oceanographic Data Centre and has developed advanced systems (toolboxes) for data management and perform state-of-the-art quality controls (QC) of marine data. Specifically, the data management handles our data flows, ranging from collecting, organizing, storing data on local servers and packaging into zip archives. The QC includes outlier and range checks and comparison to historical and regional data. In addition, the toolboxes are also used for data archiving, analysis and basic/routine reports (Fig. 1).

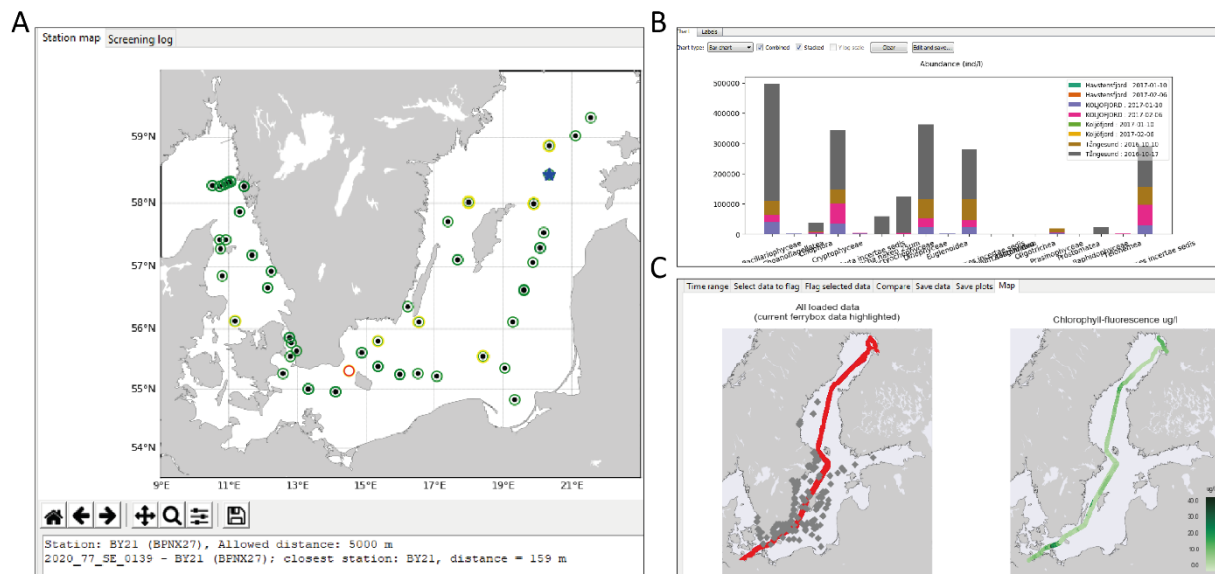


Figure 1: Graphical interfaces of the toolboxes developed by SMHI; SHARKtoolbox i.e systems for data management, quality control, data archiving and basis for reports (panel A), PLANKTONtoolbox i.e systems for data management and analysis as well as advanced counting and biovolume calculations of plankton samples (panel B), and GISMOtoolbox i.e systems for data management and quality controls of in situ ocean data from ferryboxes and fixed platforms (panel C).

All toolboxes can handle data analysis from national and regional reported physical/chemical and marine biological data. The toolboxes automate data management and reduce the amount of manual work (and human errors) to ensure higher data quality. In particular, the toolboxes combine an automatic QC system with a visual interface that interactively involves the user. Thus, the systems allow for machine and human interaction to find and resolve advanced QC issues, automate data management and perform in-depth data analysis. The toolboxes were developed using open source code and are released with an open source MIT license and are available both for Microsoft, Linux and Apple users.