

Observing System Data Access

The Repeat Hydrography

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1. Program Definition

The Repeat Hydrography Program includes the systematic reoccupation of high quality long hydrographic observation lines, typically former WOCE Hydrographic Program (WHP) basin-scale lines. This program began at the time of OceanObs99 and has been promoted by CLIVAR and IOCCP (International Ocean Carbon Coordinate Project) since 2003. The Repeat Hydrography Program provides data and analytical results 1) to investigate inter-annual and longer-term variations in the ocean circulation and associated net property transports and their divergences, 2) to quantify net changes in water mass inventories and renewal rates on seasonal to decadal time series, and explore their relationships to estimated ocean transport divergences and air-sea exchanges. It should be emphasized that it is strongly recommended that these repeat hydrographic observations include measurements of ocean carbon parameters such as DIC, pH and Alkalinity for the global carbon study.

2. Data Flow and Quality Control

Repeat Hydrography cruises are typically declared as actions under the Repeat Hydrography Program, which was renamed the International Repeat Hydrography and Carbon Project at the GSOP La Jolla meeting in 2006. The program is endorsed by CLIVAR (<http://www.clivar.org/>) and IOCCP (<http://www.ioccp.org/>). CTD and water sample data from each cruise are submitted to the international CLIVAR DAC for hydrographic data, i.e. the CLIVAR and Carbon Hydrographic Data Office (CCHDO; <http://cchdo.ucsd.edu>). Preferred formats for the CTD and hydrographic data are the "WHP-Exchange" formats instituted during WOCE. Data originators are responsible for primary quality control for each parameter collected, hence each measured parameter should be accompanied by the data originator's Quality Flag, as during the WHP, and these should be submitted to the CCHDO as part of the CTD and bottle data files, along with all relevant cruise and data documentation. The CCHDO ensures that files are formatted and registered correctly, and provides the public data and documentation to data users and WDC-A

mainly via Internet. The CCHDO itself does not alter submitted data to remove systematic biases between cruises unless directed to do so by data originators or oversight groups following recommendations from comprehensive quality control examinations.

Repeat hydrography cruises typically collect other data, such as meteorological information, depth to bottom, water velocities from Acoustic Doppler Current Profiling, and surface seawater parameters from continuous underway observation. These are submitted to other corresponding CLIVAR DACs. Carbon related parameters, which were analyzed through bottle water sampling and underway measurements, are also collected and distributed by Carbon Dioxide Information Analysis Center (CDIAC; <http://cdiac.ornl.gov/>) via the Internet. CDIAC closely examines all ocean carbon data, and coordinates closely with the CCHDO to see that the CCHDO's on-line carbon data are up-to-date.

3. Timeline for Distribution

Each PI has a duty to submit data to the CCHDO within two years after the cruise. This data submission timeline, used during WOCE, helps to ensure that data are available for model calibration and validation, carbon system studies, heat and freshwater storage and flux studies, deep and shallow water mass and ventilation studies, and for calibration of autonomous sensors. Moreover, it makes the data available for comprehensive data quality examinations combining multiple cruises. It may take longer than two years after a cruise to prepare data from some parameters on Repeat Hydrography cruises. The CCHDO will be responsible archiving and distributing these and other data updates, and for producing revised data files reflecting newly-submitted information.

The CCHDO receives preliminary or final data, and public or non-public data. The CCHDO distributes publicly only those data for which it receives permission from the Chief Scientist and/or data originators.

Some national Repeat Hydrography programs define much shorter timeline for data submission. These should help to inspire other programs toward rapid release of CTD, hydrographic, ocean carbon, and tracer data from cruises for the Repeat Hydrographic Program. A shorter timeline for CTD data submission is also strongly recommended for possible quality control of Argo data.