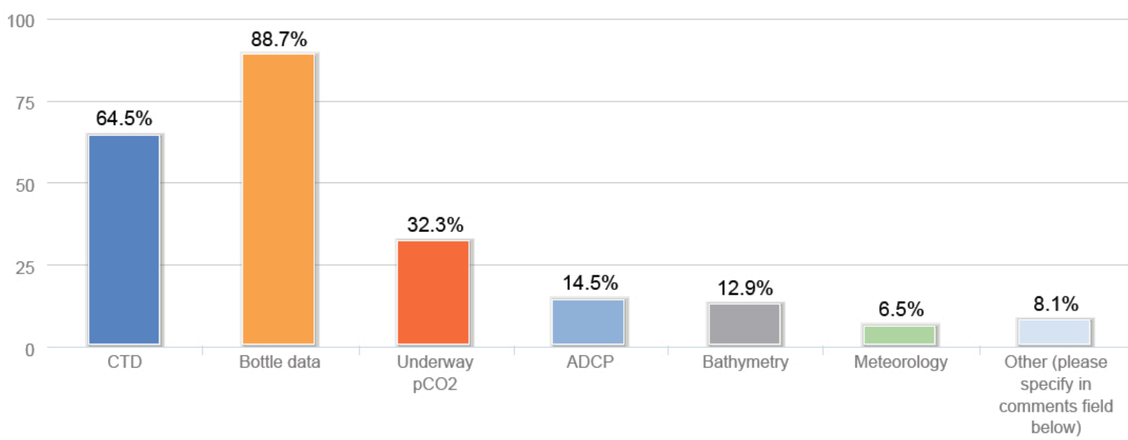
A Community Survey on CLIVAR/CO2 Repeat Hydrography Program Data Usage

This survey was conducted by the Ocean Carbon & Biogeochemistry Program in March-April 2012. The data below are based on 62 survey responses received as of April 10, 2012.

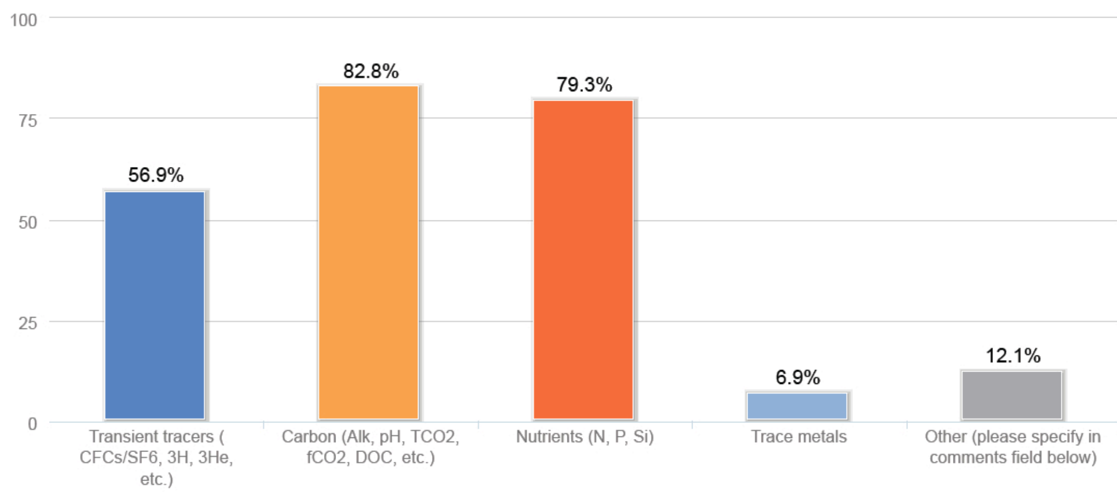
1) Please indicate which of the following CLIVAR/CO2 Repeat Hydrography data sets (either in raw form or in synthesized form) you have used or are currently using. **Note: This only includes recent (2003-present) data and synthesis products - i.e. post-WOCE/JGOFS and GLODAP**

- CTD
- Bottle data
- Underway pCO2
- ADCP
- Bathymetry
- Meteorology
- Other (please specify in comments field below)



2) If you selected bottle data, please specify which data below:

- Transient tracers (CFCs/SF6, 3H, 3He, etc.)
- Carbon (Alk, pH, TCO2, fCO2, DOC, etc.)
- Nutrients (N, P, Si) 45 78.9%
- Trace metals 4 7%
- Other (please specify in comments field below)



3) Please feel free to provide specific information and/or comment further here on your CLIVAR/CO2 Repeat Hydrography data usage.

<u>Other usage:</u>

- dissolved oxygen (deemed VERY important in multiple comments, was mistakenly omitted from the bottle data list)
- Argo reference data base
- track deep ocean water mass changes
- validate autonomous mooring data
- ^{14}C and $^{14}C/^{13}C$
- research and education (training grad students on use of large oceanographic data sets)
- NASA-funded process study of interannual variability of air-sea carbon fluxes and surface ocean productivity using CLIVAR/CO2 data, satellite ocean color, and numerical models
- calibrate paleo-pH proxies (from coretop sediments)
- I have had samples collected for NO_3^- isotopes during a few legs and the nutrient, tracer, and carbonate system data are important for interpretation
- DOC/TDN
- Model initialization and model-data comparison and validation

<u>Comments:</u>

- I would love to see more data within 500km of the coasts and fewer data in the center of gyres, with the data in the center of gyres sampled to optimize coverage of the gyre volume instead of along sections. This would improve mapping and allow for a better handle of transport along boundary currents
- The experimental synthesis product currently hosted at NOAA Coral Reef Watch that provides a synoptic monthly estimate of surface carbonate chemistry was developed, in part, using CLIVAR/CO2 data. This product is available at http://coralreefwatch.noaa.gov/satellite/oa/
- The hydrography data distribution web on CLIVAR is not well designed. The

data page on CCHDO is better, but not well linked from CLIVAR data page, and need easier linkage to CCHDO

- Most research is currently focused on "change" of one type or another. To investigate change one needs two high quality realizations of the parameter field (what is being generated) and/or a model. Without data for reference, the models have little value. Stated alternately, most model investigations have value only if the model has been calibrated against high quality data. Two data realizations are more than twice as good as one set of measurements. So far we are still in the "measurement phase." The true value of the GO-SHIPS data will only be apparent once the data have been assembled - that is, when we have a "GLODAP" for CLIVAR. That time is approaching, but still needs funding and a lot of work. The product will need data from oceanographers from around the world - no one country can afford to generate the needed data set.
- In my case, this program is essential to develop my research as I study the temporal evolution of inorganic carbon and other biogeochemical variables in repeated lines with the aim of separating natural and anthropogenic variability using gathered data.
- I'm looking specifically at changes in carbon and nutrients in time, so the repeat nature of the sections is essential.
- Calculating anthropogenic CO_2 on S4P line for masters thesis work at University of Washington/NOAA PMEL
- The value of these data should not be assessed only on current usage by the community. Their main value will lie in comparisons made over time frames even longer than one decade. Without the repeat hydrography program we will probably never be able to answer fundamental questions as to how and why the oceans are changing in response to acidification, circulation changes, and other natural or human causes. Answering these questions will be even more urgent a decade or two in the future.
- CLIVAR has done perfect work in the field. Moreover, it is regretful that few in situ observations are carried out in the west Pacific.
- CCHDO data website is great. I like that the correspondence that goes along with data submission from the various measurement groups is displayed and is in chronological order and that the data are available in different formats. Additional QC by comparing CLIVAR cruises with earlier cruises along same section and recommendations for adjustments (O_2, nutrients, etc.) would be helpful, but maybe that's asking too much.
- It has been very helpful to me in analysis of cruises on container ships where I have only surface data. The CLIVAR/CO_2 repeat hydrography data has been invaluable to me in making assumptions about what is going on below the mixed layer.
- Used several post-2005 cruises for study for PhD-thesis concerning CO_2 storage by Southern Ocean
- Adoption of nutrient reference materials would greatly improve the utility of future versions of CLIVAR/GOSHIP for my research
- These data are a central part of ongoing studies of low-frequency changes in the ocean. This kind of work cannot be done without sub-thermocline measurements

of high quality, and this program is essentially the only source for such data post-WOCE.

4. Please list any publications that resulted from your use of CLIVAR/CO2 Repeat Hydrography data.

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<u>Comments:</u>

- I have a paper that is ready to submit on the surface radiocarbon distribution in the Pacific. There will be a companion paper on the Atlantic that will hopefully be submitted by the end of this summer (2012).
- Repeat hydrographic data have been used in conference papers and posters presented at AGU, IUGG, WCRP Climate Conference and in seminar to national (Australian) and international research institutions.
- PACIFICA (PACific ocean Interior CArbon) (in preparation)
- I am composing one paper about the relation between CO2 and phytoplankton in the South China Sea using CLIVAR/CO2 data. It is soon to be finished.