

NOSAMS: Radiocarbon Studies

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World Ocean Circulation Experiment (WOCE)

The facility was initially established in 1989 for analysis of radiocarbon in samples collected during the World Ocean Circulation Experiment. [Detailed reports \(pdf\)](#) of these analyses including ancillary information have been regularly reported by NOSAMS to the WOCE principal ^{14}C investigators and to the WOCE Hydrographic Office (WHP). These data are available electronically through the [WHP](#).

For references to publications and reports resulting from this research including access to the original text of final data reports for the various WOCE legs and copies of several grey literature reports see the [Global Ocean Data Analysis Project web pages](#). The "Data and Data Visualization Tools" provides access to graphics as well as downloads of data compilations and mapped fields. Under "Publications" the following two pubs are the most useful descriptions of the work and can be directly downloaded from the site:

Key, R.M., A. Kozyr, C.L. Sabine, K. Lee, R. Wanninkhof, J. Bullister, R.A. Feely, F. Millero, C. Mordy, T.-H. Peng. 2004. A global ocean carbon climatology: Results from GLODAP. *Global Biogeochemical Cycles*, Vol. 18, GB4031.

Sabine, C. L., R. M. Key, A. Kozyr, R. A. Feely, R. Wanninkhof, F. J. Millero, T.-H. Peng, J. L. Bullister, and K. Lee. 2005. Global Ocean Data Analysis Project: Results and Data. ORNL/CDIAC-145, NDP-083. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, 110 pp.

Related Files

[#0187 DATA REPORT INFORMATION FOR WOCE, Supplemental WOCE and CLIVAR 14C ANALYSES](#)

Climate Variability and Predictability (CLIVAR)

In future years, the program on Climate Variability and Predictability will continue surveys of the distribution of radiocarbon in oceanic DIC. Dr. Ann McNichol, the NOSAMS staff chemist and one of the co-PIs on this proposal, has submitted a proposal to manage collection of samples and provision of radiocarbon analyses to CLIVAR. This proposal was funded to provide approximately 3960 samples over a six-year period beginning in 2003.

Environmental Studies

Spills of oil and other industrial products derived from fossil fuels can be studied using ^{14}C . The carbon in these products has been stored in crustal reservoirs for millions of years. All of the ^{14}C has decayed. When soils and other natural media are analyzed, the presence of petroleum derivatives is signaled by levels of ^{14}C lower than those encountered in unpolluted settings. A salt marsh on Buzzard's Bay, in West Falmouth, was fouled by an oil spill in 1969. Since then, it has provided a laboratory for the long-term study of such spills. Two recent reports linked below describe these investigations and the role of radiocarbon studies.

In general, ^{14}C serves as a "negative label" for products derived from fossil sources. Tracing experiments using conventional, positive labels can provide spectacular sensitivity, but they require injection of isotopically labeled materials in natural environments. Moreover, the time clock for such experiments starts with the injection. If slow, natural processes are to be studied, the experiment must also be very long. Exploitation of the absence of ^{14}C as an inherent, natural tracer does not suffer from those disadvantages. And, when analyses are tightly focused – on single compounds, or classes of compounds, for example – its sensitivity is more than adequate for the exploration of important questions. At WHOI, Timothy Eglinton, Chris Reddy, and John Hayes are developing these techniques in a project entitled "[Molecular-Isotopic Tools for Environmental Research](#)," funded by the National Science Foundation's Division of Chemistry.

Related Links

[#0187 Oil Spill Effects Can Persist for Decades from the 2002 Annual Report](#)
[#0187 Oil from Spill Lingers in West Falmouth Marsh from Woods Hole Currents](#)

Marine and Geochronologies

Paleoclimatic studies require accurate and precise time scales. Ages less than 40,000 years are usually based on radiocarbon. NOSAMS provides hundreds of AMS analyses of biologically precipitated calcium carbonate as well as acid-insoluble organic carbon (usually where calcareous fossils are unavailable) for paleo studies each year.

Global Change Studies

With each report of AMS results, we ask that investigators send us a list of publications in which they've utilized radiocarbon results produced by our facility. The PDF-formatted document linked below lists citations we have accumulated since the inception of the facility and while not exhaustive, represents the body of work from over 500 individual investigators who have asked us to analyze more than 22,000 samples for a wide variety of global change studies. In addition to these, more than 15,000 seawater DIC samples have been analyzed as part of the WOCE and CLIVAR programs.

Last updated: May 23, 2013

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