

# CDIAC Data Management Support for Ocean Carbon Dioxide Measurements

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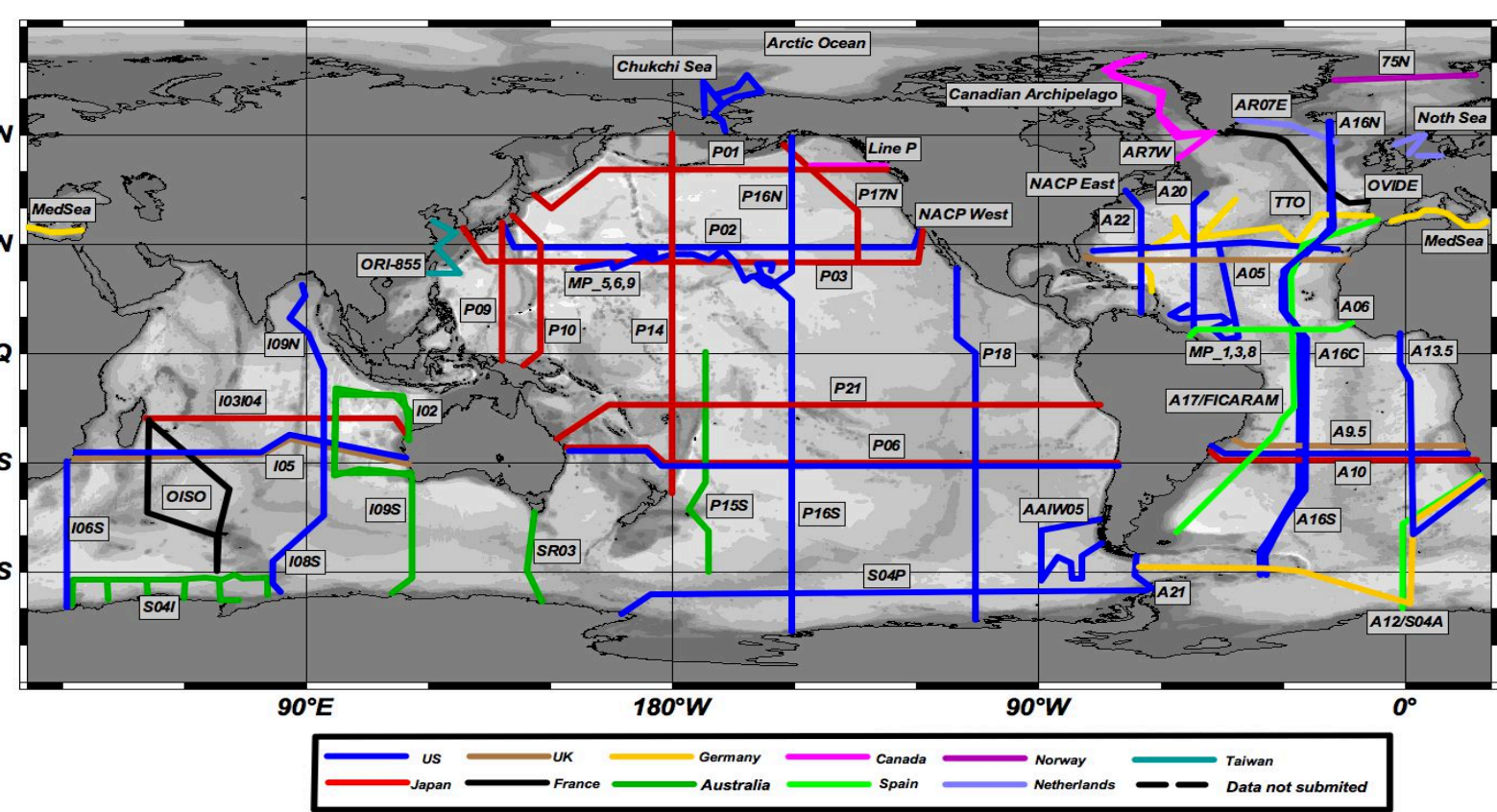
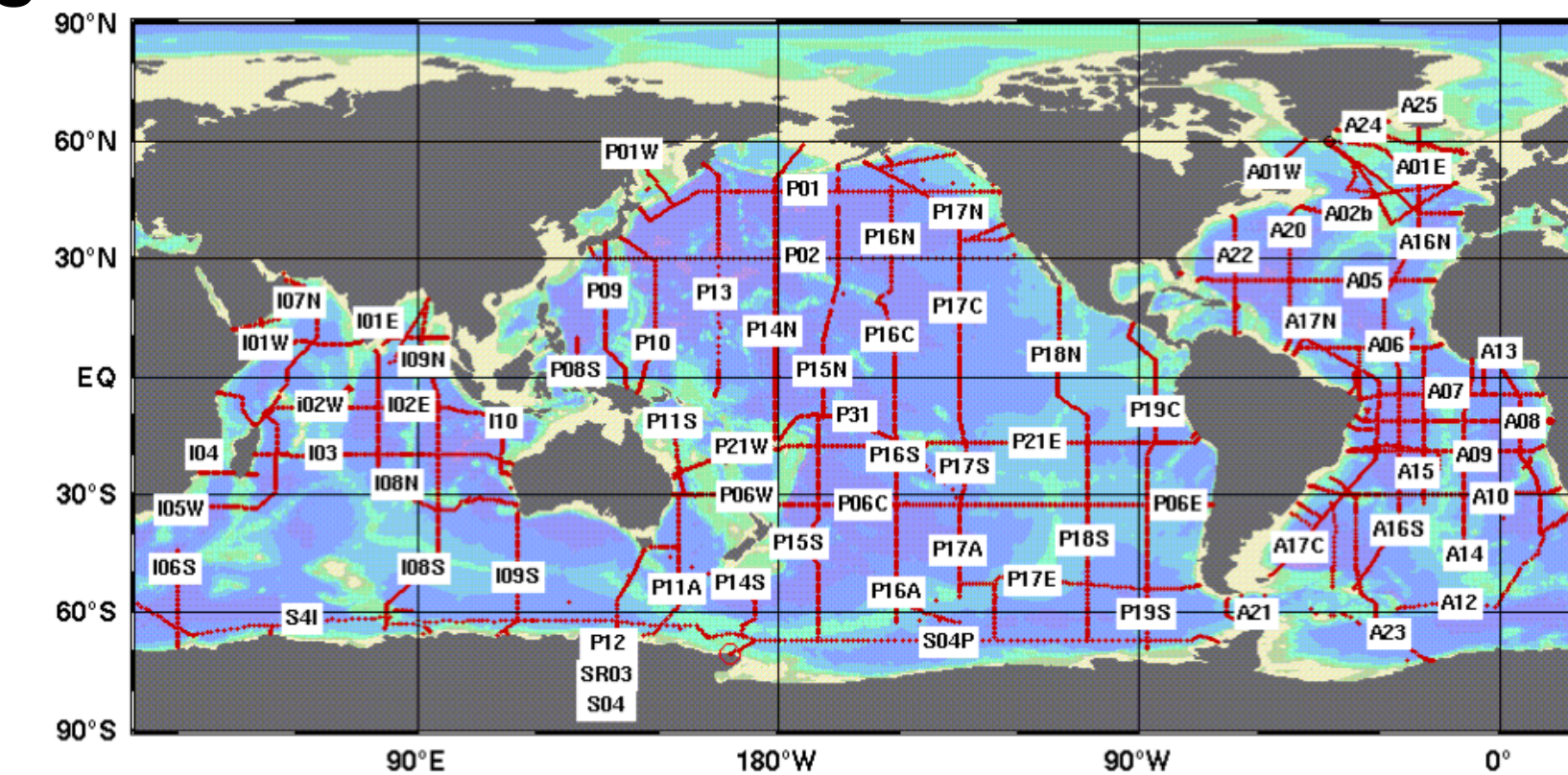
## 1. Introduction

CDIAC's ocean carbon data collection includes discrete and underway measurements from a variety of platforms (e.g., research ships, commercial ships, buoys). The measurements come from deep and shallow waters from all oceans. Technological advances make it possible to deliver ocean carbon data real-time but questions about instrument reliability and data quality limit this practice at this moment. All ocean carbon data CDIAC receives come from individual investigators and groups following initial data review.

## 2. Ocean CO<sub>2</sub> data from Oceanographic Ships and Other Platforms

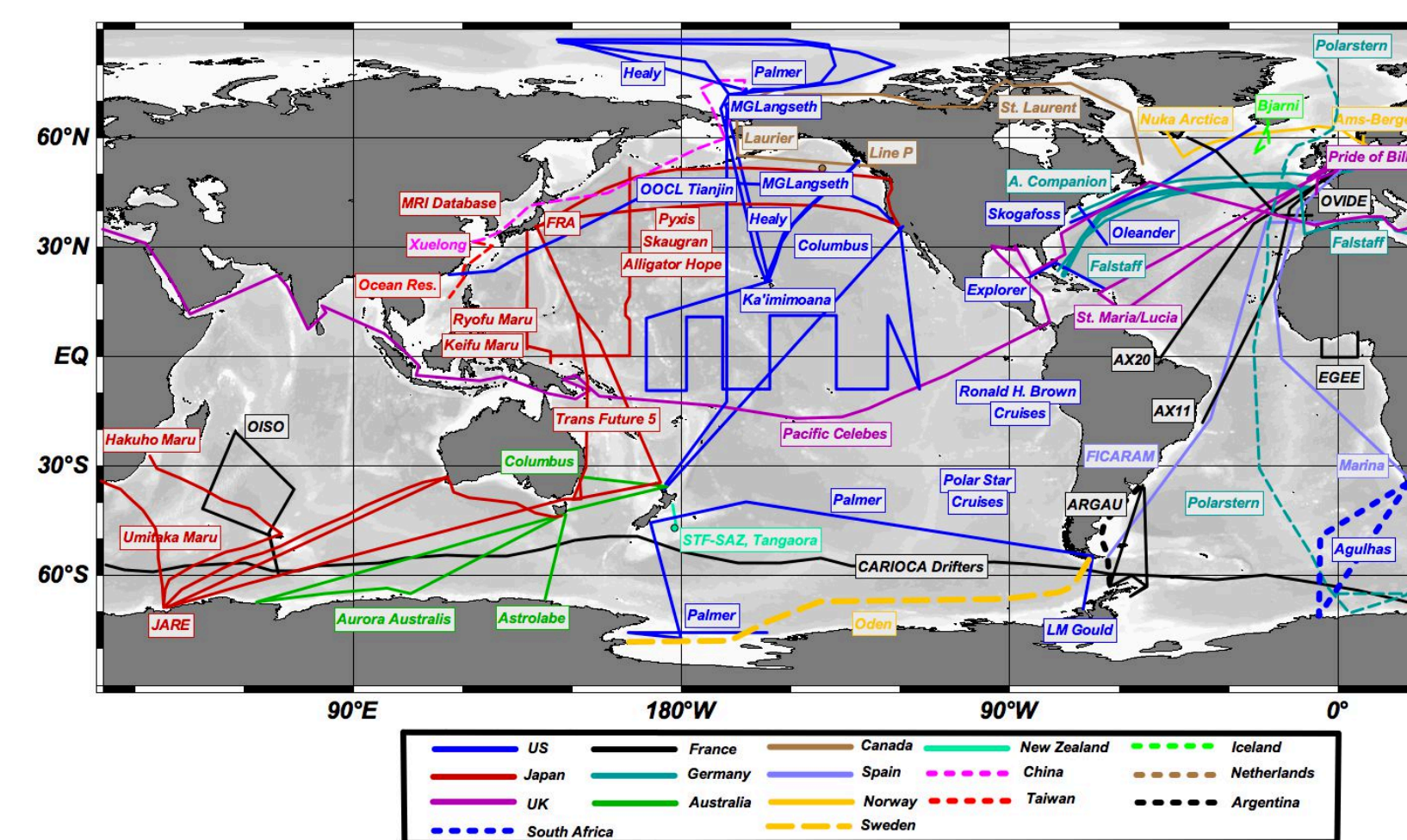
### World Ocean Circulation Experiment (WOCE)

WOCE was a major component of the World Climate Research Program with the overall goal of better understanding the oceans role in climate and climatic changes resulting from both natural and anthropogenic causes. The CO<sub>2</sub> survey took advantage of the sampling opportunities provided by the WHP cruises during this period between 1990 and 1998. The final data set covers approximately 23,000 stations from 94 WOCE cruises. <http://cdiac.ornl.gov/oceans/CDIACmap.html>



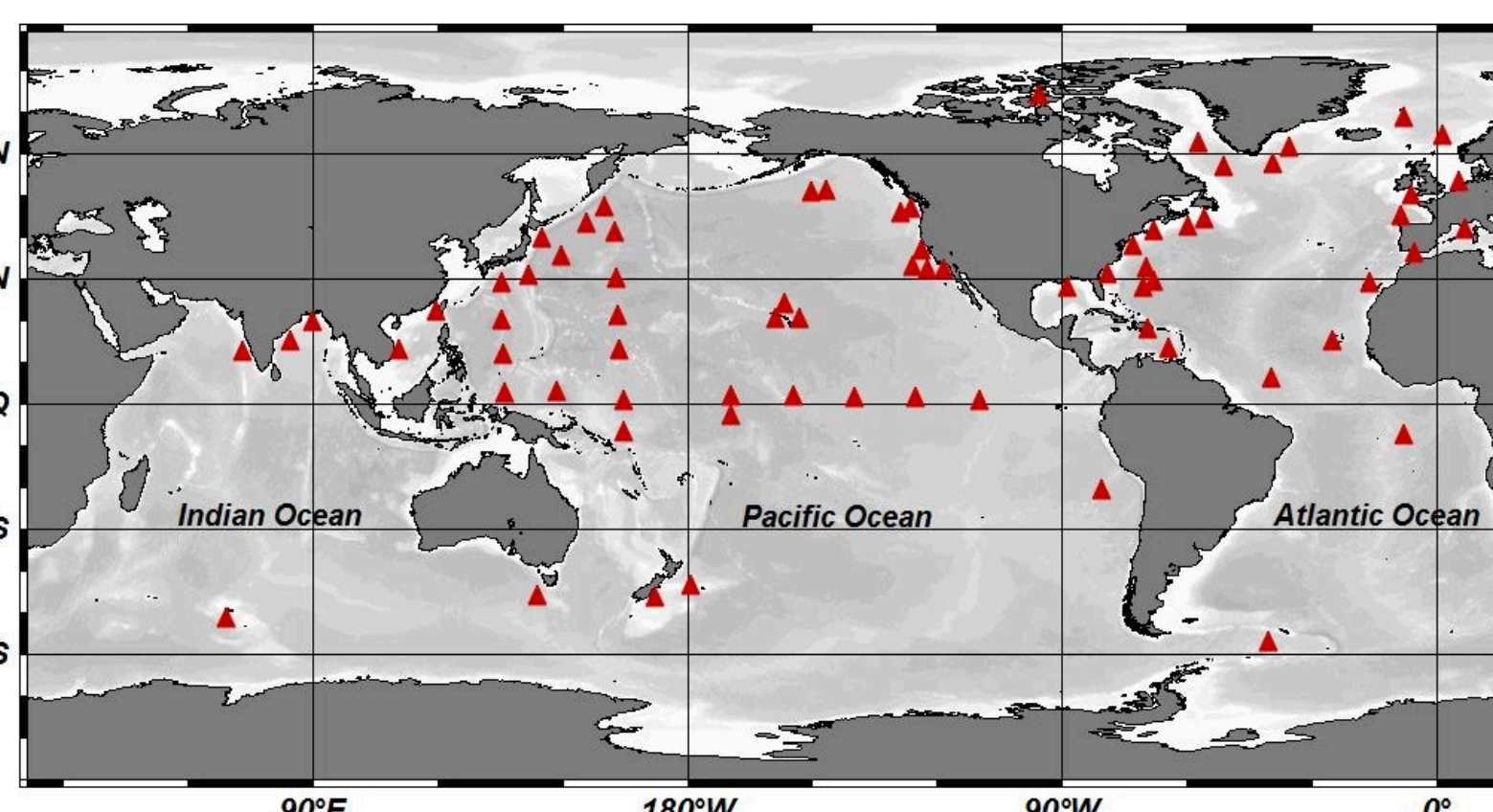
### Global Ocean Carbon and Repeat Hydrography Sections

The Global Ocean Carbon and Repeat Hydrography Program carries out a systematic and global re-occupation of select WOCE/JGOFS hydrographic sections to quantify changes in storage and transport of heat, fresh water, carbon dioxide (CO<sub>2</sub>), and related parameters. The high-quality discrete measurements of carbon-related parameters are available via CDIAC Repeat Hydrography web site (<http://cdiac.ornl.gov/oceans/RepeatSections/>)



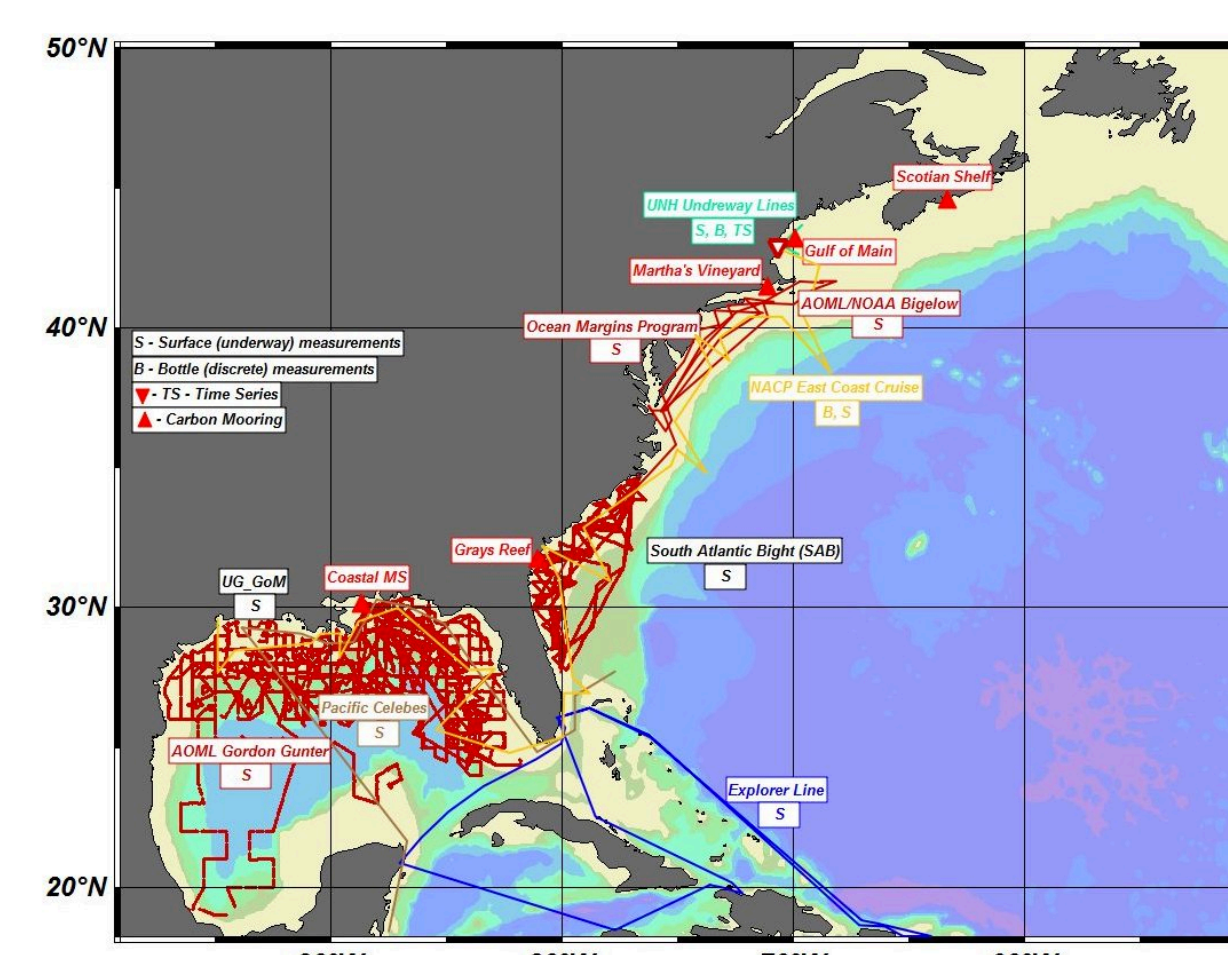
### Global Volunteer Observing Ships (VOS) Project

The VOS project is coordinated by the International Ocean Carbon Coordination Project (IOCCP). The international groups from 14 countries have been outfitting research ships and commercial vessels with automated CO<sub>2</sub> sampling equipment to analyze the carbon exchange between the ocean and atmosphere. The high-quality surface (underway) measurements of carbon-related parameters are available via CDIAC VOS web site [http://cdiac.ornl.gov/oceans/VOS\\_Program/](http://cdiac.ornl.gov/oceans/VOS_Program/)



### Global CO<sub>2</sub> Time-series and Mooring Project

The international groups from 18 countries have mounted sensors on moored buoys to provide high-resolution time-series measurements of atmospheric boundary layer and surface ocean CO<sub>2</sub> partial pressure (pCO<sub>2</sub>). The CO<sub>2</sub> Time-series and Mooring Project is also coordinated by IOCCP. The high-quality measurements of carbon-related parameters from the Moorings are available via CDIAC Time-series and Mooring Project Web site <http://cdiac.ornl.gov/oceans/Moorings/>



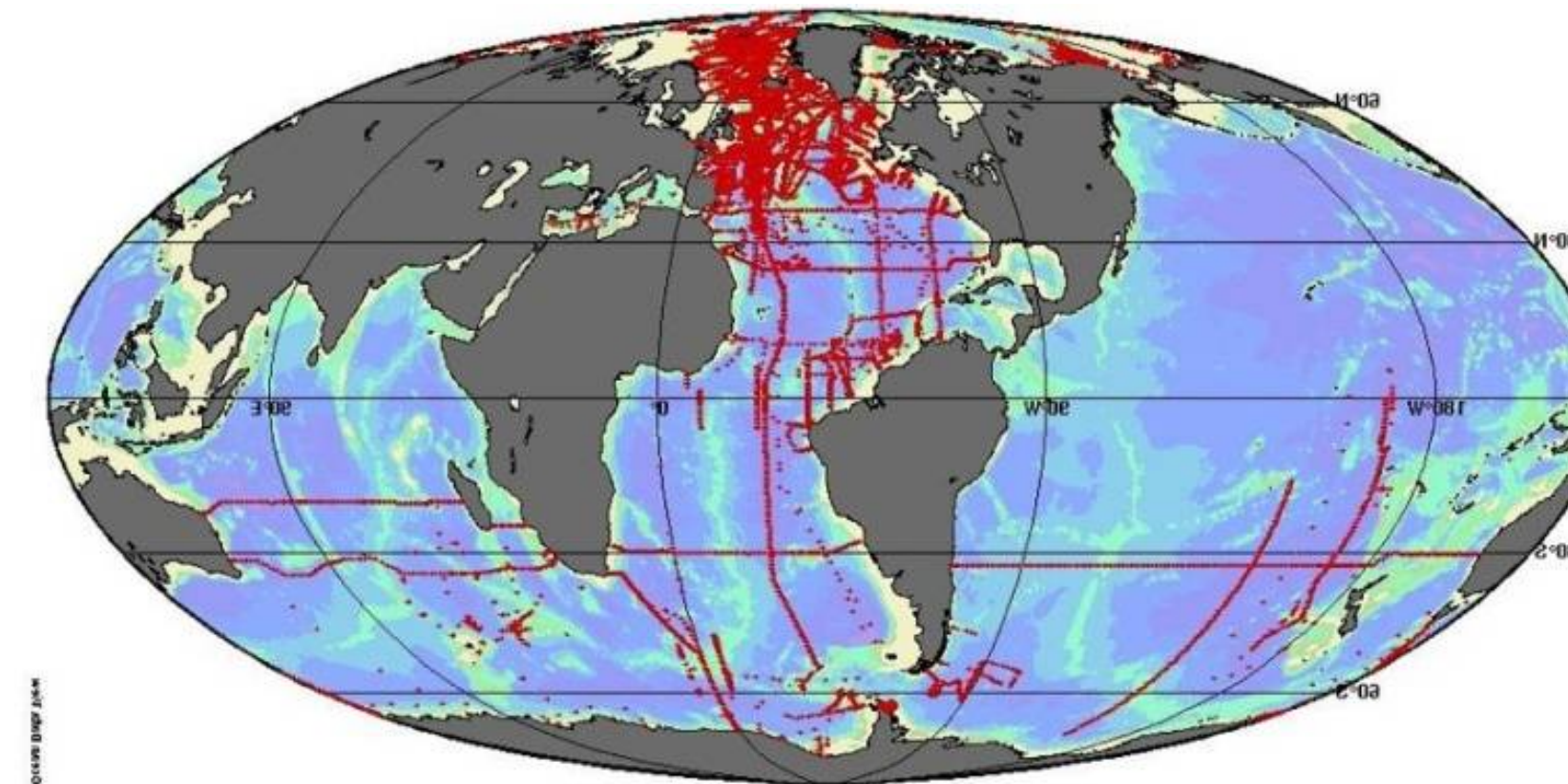
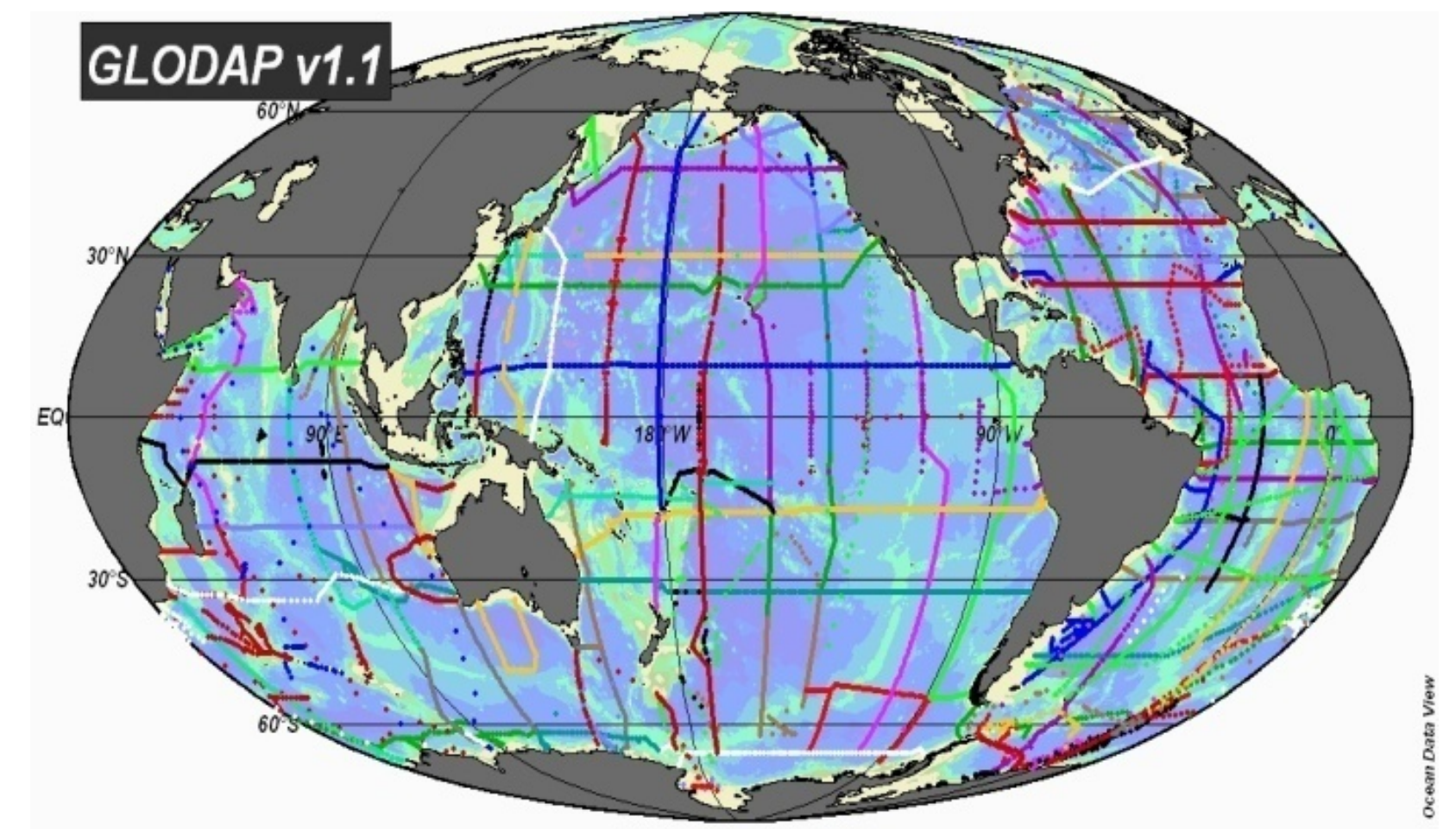
### Global Coastal Carbon Data Project

The coastal regions data are very important for the understanding of carbon cycle on the continental margins. The Coastal Project data include the bottle (discrete) and surface (underway) carbon-related measurements from coastal research cruises, the data from time series cruises and coastal moorings. The data from US East Coast, US West Coast, and European Coastal area are available from CDIAC Global Coastal Carbon Data Project Web site <http://cdiac.ornl.gov/oceans/Coastal/>.

## 3. Ocean Carbon Data Synthesis Projects

### Global Ocean Data Analysis Project (GLODAP)

Published at CDIAC in 2004. GLODAP is a cooperative effort of investigators funded for synthesis and modeling projects through the National Oceanic and Atmospheric Administration (NOAA), DOE, and the National Science Foundation (NSF). Cruises conducted as part of the WOCE, JGOFS, and the NOAA Ocean-Atmosphere Carbon Exchange Study (OACES) over the decade of the 90s have generated oceanographic data of unparalleled quality and quantity. As of today, the GLODAP database consists of data from 94 WOCE, JGOFS, and other International and Historical Cruises. <http://cdiac.ornl.gov/oceans/glodap/>

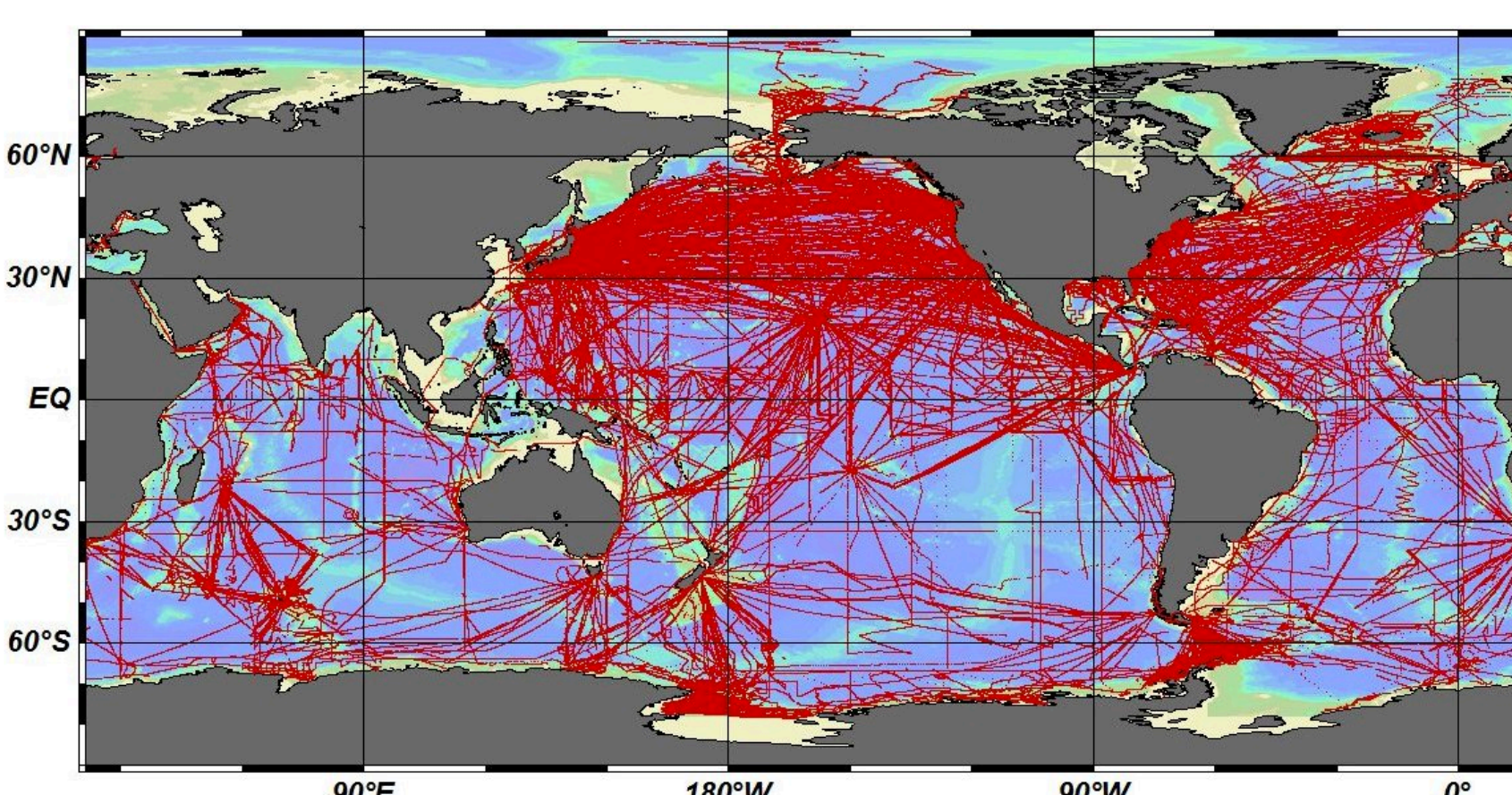
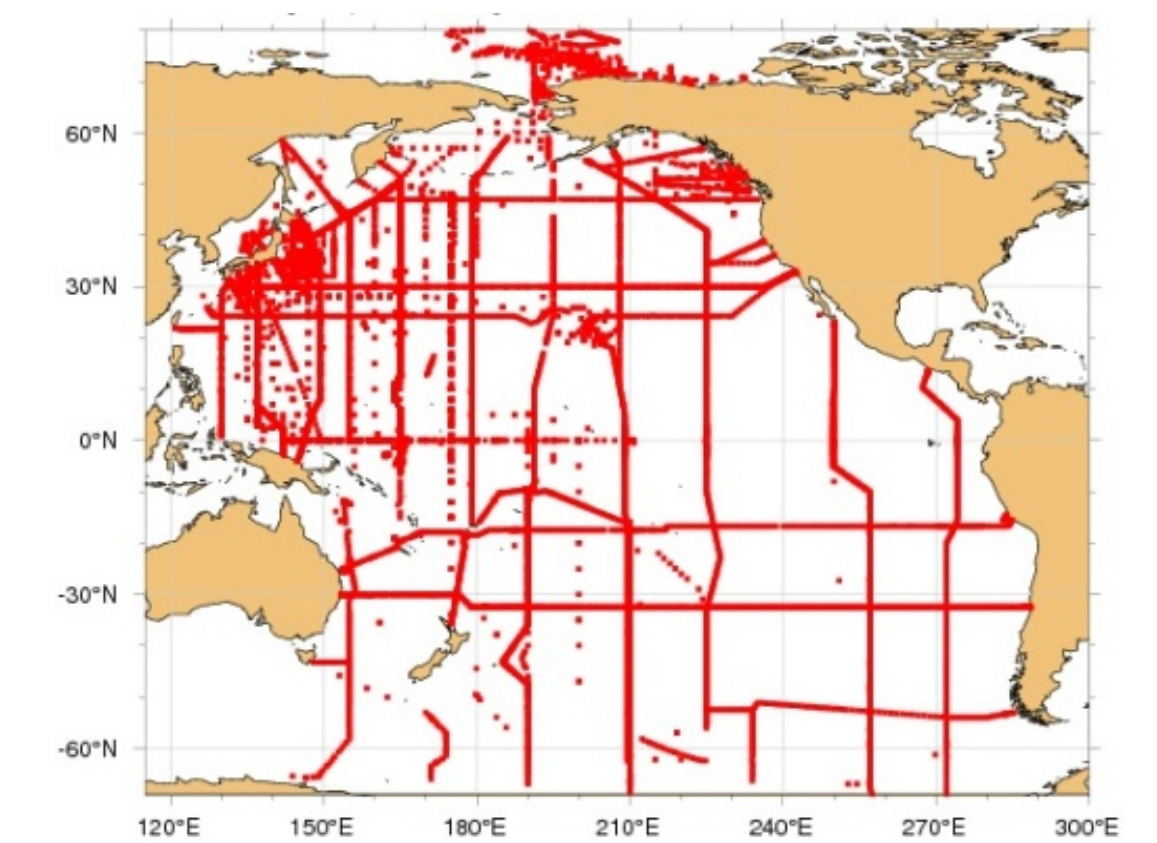


### PACIFICA Database

Published at CDIAC in 2013. The work on the Pacific Ocean Carbon data assembly, data analysis and data synthesis started in 2007 as a part of North Pacific marine Science Organization (PICES) Carbon & Climate Group (C&CG) project. We planed to work on the PACIFICA database for at least 3 years, as this is completely volunteer work for all members of PICES C&CG. The final database will include all cruises in the Pacific Ocean that were not included in the GLODAP database. The data and metadata from the PACIFICA individual cruise data and database are now available from the CDIAC PACIFICA web site (<http://cdiac.ornl.gov/oceans/PACIFICA/>) and from the WAVES search system.

### Carbon in the Atlantic Ocean (CARINA)

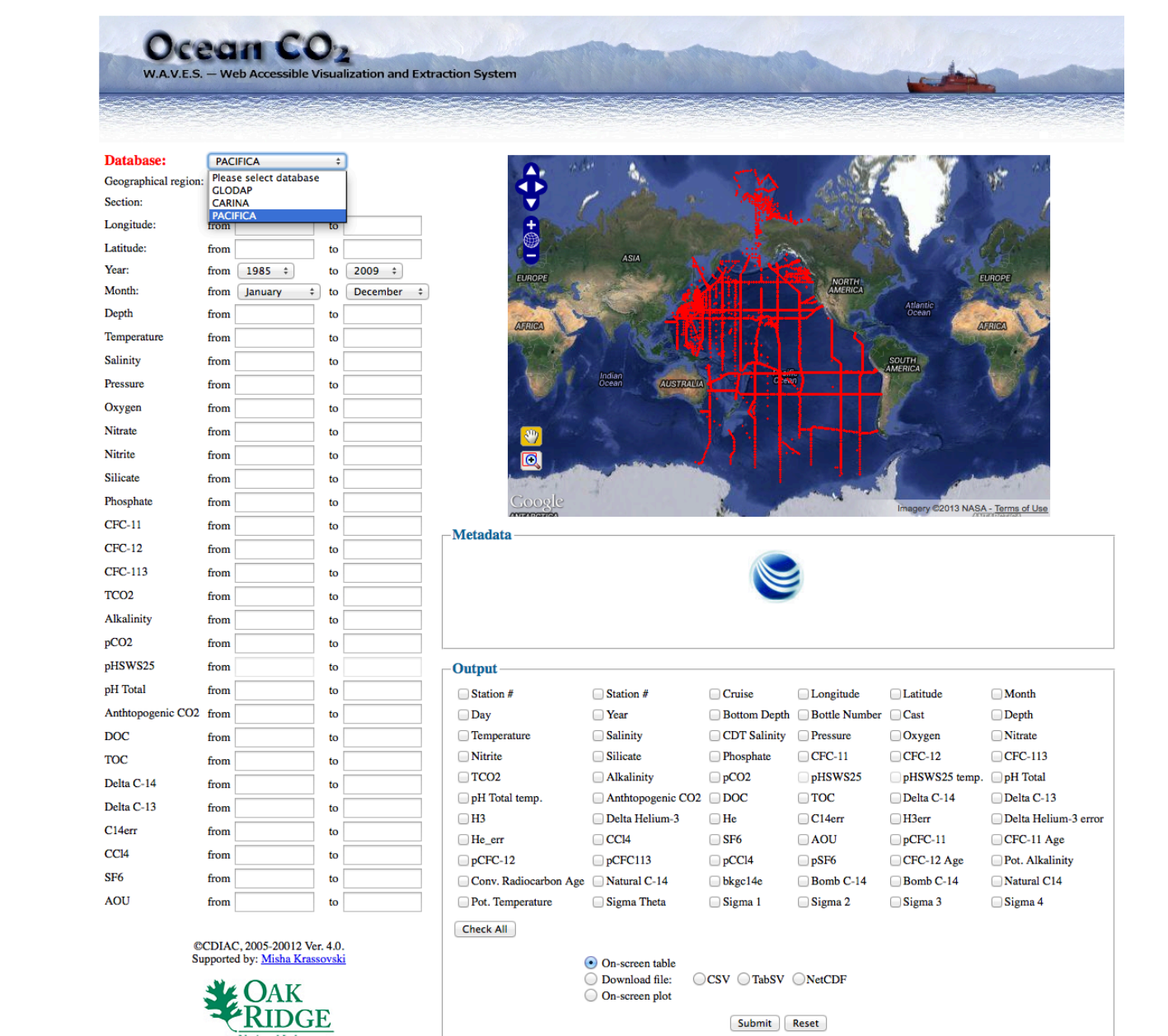
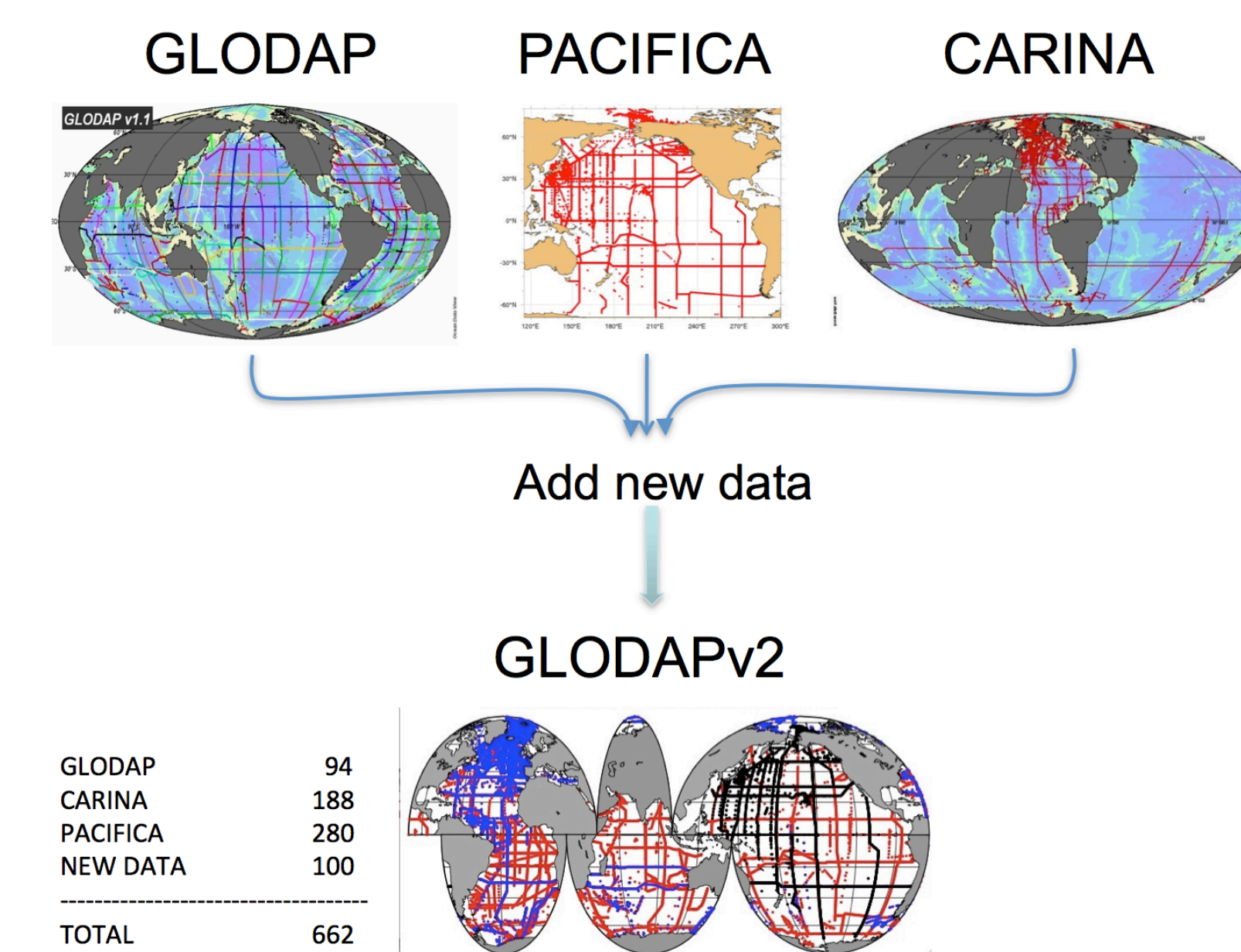
CARINA database was published at CDIAC in 2009 and consists of data from 188 cruises. CARINA started as the International Project, which emerged from a workshop on "CO<sub>2</sub> in the North Atlantic Ocean," held in June 1999 in Delmenhorst, Germany and continued throughout of the EU CARBOOCEAN Project. The data and metadata from the CARINA individual cruise data and database are now available from the CDIAC CARINA web site (<http://cdiac.ornl.gov/oceans/CARINA/>) and from the WAVES search system.



### LDEOv2012 Database

Approximately 6.4 million measurements of surface water partial pressure of CO<sub>2</sub> obtained over the global oceans during 1957-2012 are listed in the Lamont-Doherty Earth Observatory (LDEO) database, which includes open ocean and coastal water measurements. The data presented in this database include the analyses of partial pressure of CO<sub>2</sub> (pCO<sub>2</sub>), sea surface temperature (SST), sea surface salinity (SSS), pressure of the equilibration, and barometric pressure in the outside air from the ship's observation system. The data and metadata from the LDEO Database are now available from the Global Surface pCO<sub>2</sub> (LDEO) Database web page ([http://cdiac.ornl.gov/oceans/LDEO\\_Underway\\_Database/](http://cdiac.ornl.gov/oceans/LDEO_Underway_Database/)) and from the WAVES search system

The new database GLODAPv2 will be published at CDIAC in 2014



WAVES - Web Accessible Visualization and Extraction System

### Acknowledgment

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