NOAA/NESDIS/NCEI

Ocean Acidification Data Stewardship (OADS) Project

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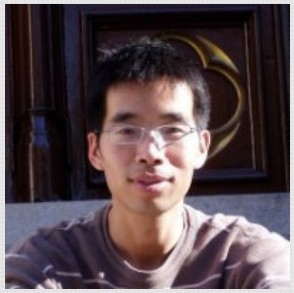
2 National Centers for Environmental Information, Silver Spring, Maryland.

OADS introduction

- Funded by NOAA's Ocean Acidification Program, OADS is a data management project within NOAA/NESDIS/National Centers for Environmental Information (NCEI).

NOAA Headquarters, SSMC-3
1315 East-West Hwy, Silver Spring, MD



Li-Qing Jiang, PhD.

A. Rost Parsons, PhD.

Krisa M. Arzayus, PhD.

OADS goals

❑ Short-term Goal:

- To ensure all data sets collected from OAP funded research projects are properly archived and made accessible towards improved OA analyses, forecasting capabilities, and better assessments of marine resource vulnerability.

❑ Long-term Vision:

- To serve the broader OA community by providing dedicated long-term archiving, online data discovery, access, and scientific stewardship for a diverse range of ocean acidification and other chemical, physical, and biological oceanographic data.

- OADS project is envisioned as a building block towards a U.S. national OA data management and integration service required by the Federal Ocean Acidification Research and Monitoring Act of 2009 (FOARAM Act).

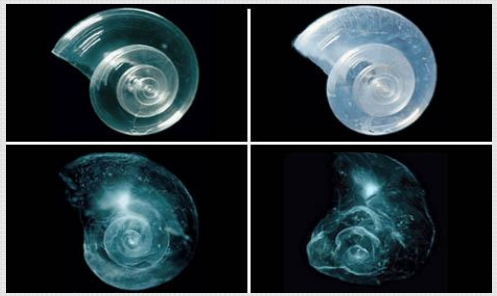
OADS archives a full spectrum of OA data

Surface underway

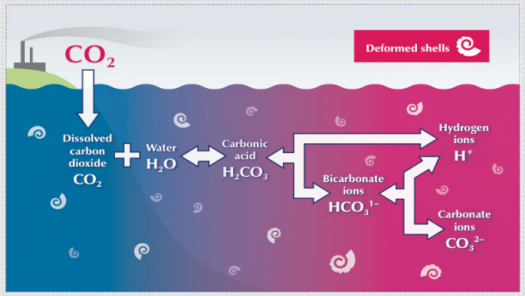
CTD/Niskin

Time series

Biological monitoring

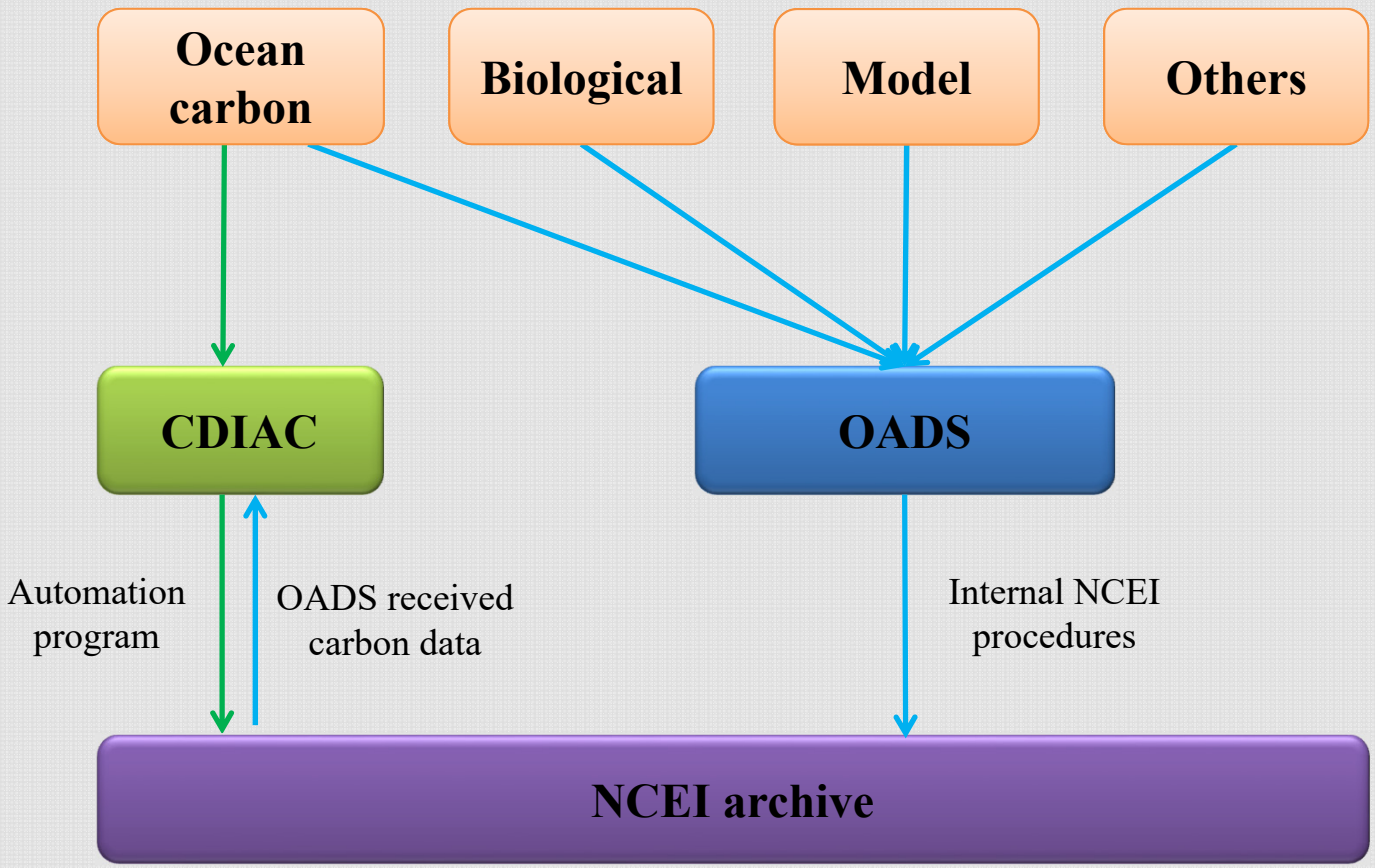


Experimental

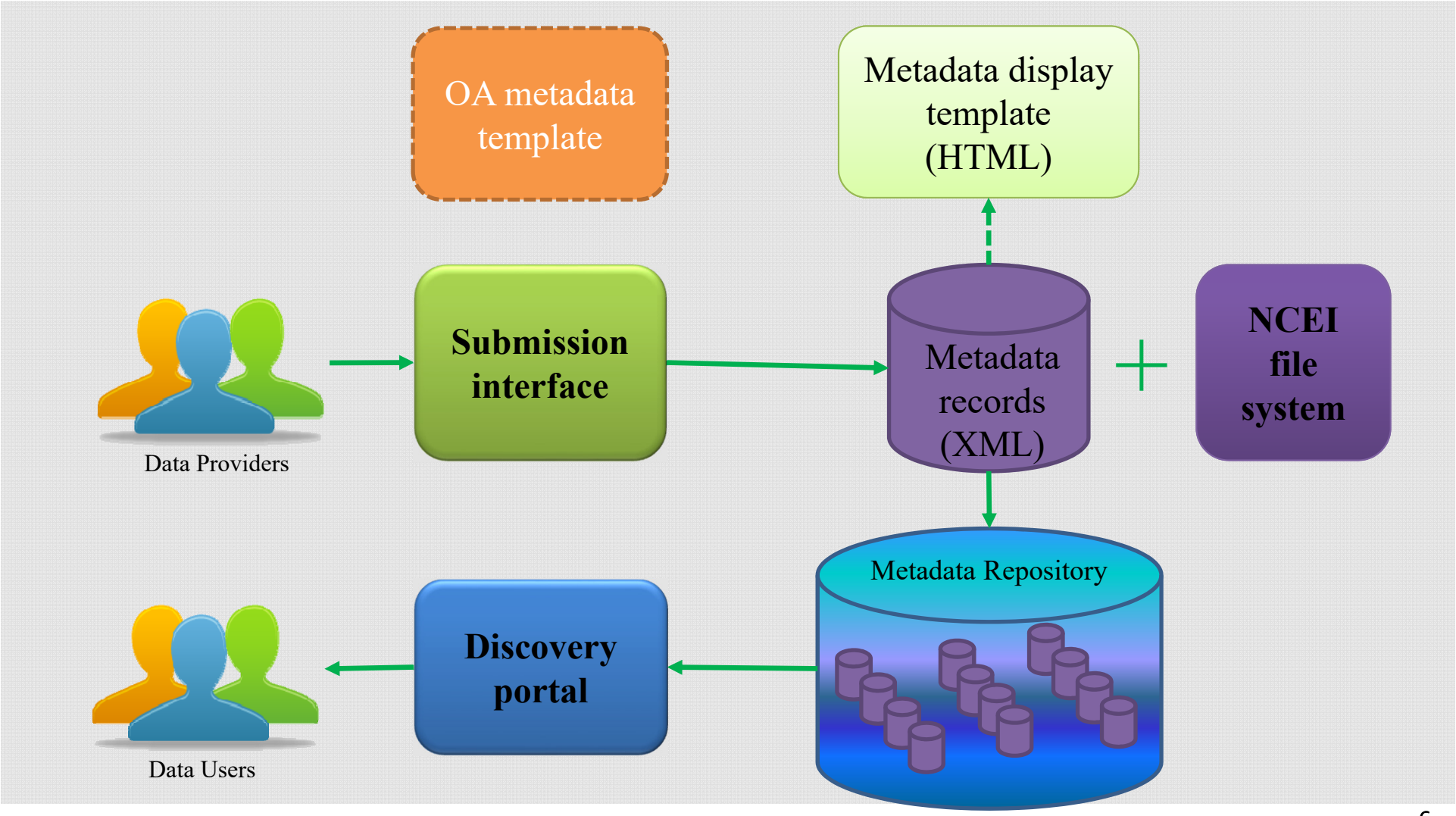


Model

OADS data flow



OADS data management components



OA metadata template

- Investigators
- Title
- Abstract
- Temporal coverage
- Spatial coverage
- Geographic names
- **Location of organism collection**
- Platforms (e.g., research vessels)
- **Variable metadata cluster**
- Publications describing the data set
- Supplementary information

http://docs.lib.noaa.gov/noaa_documents/NESDIS/NODC/OA_metadata/

Variable metadata cluster

Variable/parameter	Variable abbreviation
	Full variable name
	Unit
	Observation type
	In-situ / manipulation / response variable
	Manipulation method
	Measured or calculated
	Calculation method and parameters
	Sampling instrument
	Analyzing instrument
	Detailed sampling and analyzing information
	Uncertainty
	Method reference (citation)
	Biological subject
	Life stage of the biological subject
	Researcher name
	Researcher institution

http://docs.lib.noaa.gov/noaa_documents/NESDIS/NODC/OA_metadata/

Data submission interface

- **Submission form (currently in use)**
  - http://www.nodc.noaa.gov/oceanacidification/support/SubmissionForm_OADS_v6.xlsx

- **Scientific Data Integration System (SDIS, proposed)**
  - The system will allow data providers to submit OA metadata and data to OADS in a user-friendly fashion leveraging the OADS metadata template.
  - To provide automated connectivity to the NCEI's archive system and create a first version of the data package.
  - Future: to read the data values out of the files and store the data in a standardized format
    - do an initial quality control (automated QC check with predefined criteria) on the submitted observations.
    - to allow quick property-property plots.

Metadata storage format


```
   <variable>
      <abbrev>nitrit</abbrev>
      <fullname>Nitrite</fullname>
      <observationType>Profile and surface underway</observationType>
      <insitu>In-situ observation</insitu>
      <unit>micro-mol/kg</unit>
      <measured>Measured</measured>
      <calcMethod></calcMethod>
      <samplingInstrument>Niskin bottle and flow through pump</samplingInstrument>
      <analyzingInstrument>Continuous flow analyzer (CFA) using the standard and analysis
the manual by L.I. Gordon, et al. (1993).</analyzingInstrument>
      <duration></duration>
      <detailedInfo>Nutrient samples were collected from Niskin bottles, after at least th
within a few hours of sample collection after the samples had warmed to room temperature.
refrigerated for later analysis. Samples were analyzed for phosphate (PO4- 3), nitrate (NC
was determined by diazotizing the sample with sulfanilamide and coupling with N-1 naphthyl
color produced is measured at 540 nm. </detailedInfo>
      <replicate></replicate>
      <uncertainty>A mixed stock standard consisting of silicic acid, phosphate and nitrat
(KNO3, KH2PO4 and Na2SiF6) in deionized water using a two step dilution for phosphate and
nitrite stock standard was prepared dissolving NaNO2 in distilled water, and this standard
standards were prepared fresh daily by diluting the stock solutions in low nutrient seawat
standards, and in-lab standards. </uncertainty>
      <flag>WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4
measurements, 9 = sample not drawn.</flag>
      <methodReference>Armstrong, F.A.J., Stearns, C.R. and Strickland, J.D.H. (1967). The
processes by means of the Technicon AutoAnalyzer and associated equipment.  Deep-Sea Res.
Gordon, L.I., Jennings Jr., J.C., Ross, A.A. and Krest, J.M. (1993). A suggested protocol
(phosphate, nitrate, nitrite and silicic acid) in the WOCE Hydrographic program and the Jc
3: The Observational Programme, Section 3.2: WOCE Hydrographic Programme, Part 3.1.3: WHP
Report No. 68/91.  November 1994, Revision 1, Woods Hole, MA., USA, 52 loose-leaf pages. <
      <biologicalSubject></biologicalSubject>
      <speciesID></speciesID>
      <lifeStage></lifeStage>
      <researcherName>Jia-Zhong Zhang</researcherName>
      <researcherInstitution>Atlantic Oceanographic and Meteorological Laboratory, Nationa
Administration</researcherInstitution>
   </variable>
```


http://www.nodc.noaa.gov/oceanacidification/support/Submission_xml_v6.txt

Metadata display format

Partial pressure (or fugacity) of carbon dioxide, temperature, salinity and other variables collected from surface underway observations using carbon dioxide gas analyzer, shower head equilibrator and other instruments from R/V Wecoma in the U.S. West Coast California Current System during the 2011 West Coast Ocean Acidification Cruise (WCOA2011) from 2011-08-12 to 2011-08-30 (NODC Accession 0123607)

Simone R. Alin {NOAA Pacific Marine Environmental Laboratory, 7600 Sand Point Way NE, Seattle, WA, 98115, USA}
Richard A. Feely {NOAA Pacific Marine Environr
Lauren W. Juranek {Oregon State University, Col
Corvallis, OR, 97331, USA}

ABSTRACT: This archival package contains the surfa
(WCOA2011). The cruise took place August 12-30, 20
southern California along thirteen transect lines. At all
bottles. Underway measurements of pCO2 were collect
key carbon, physical, and biogeochemical parameters a
same transect lines were occupied as during the 2007 V
support of the coastal monitoring and research objectiv

CITE AS: Alin, Simone R.; Feely, Richard A.; Juranek
temperature, salinity and other variables collected from
and other instruments from R/V Wecoma in the U.S. W
(WCOA2011) from 2011-08-12 to 2011-08-30 (NODC
doi:10.7289/V51R6NGD [access date].

Sea surface temperature

Abbreviation:	SST(TSG)_C
Observation type:	Surface underway
In-situ / Manipulation / Response variable:	In-situ observation
Unit:	degrees Celsius
Measured or calculated:	Measured
Sampling instrument:	Seawater pump
Analyzing instrument:	Thermosalinograhs onboard the research vessel
Researcher name:	Catherine E. Cosca
Researcher institution:	Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration

Additional metadata (NODC)

Download data

IDENTIFICATION INFO OF THIS DATA PACKAGE:
NODC ACCESSION: 0123607
NODC DOI: 10.7289/V51R6NGD
EXPOCODE: 32WC20110812
CRUISE ID: WCOA2011
SECTION/LEG: West Coast Ocean Acidification Cruise (WCOA)

http://www.nodc.noaa.gov/oceanacidification/data/0123607.xml

OA data search portal

Ocean Acidification Data Portal

This data access portal allows you to search for individual collection-level data sets.

- ○ Search all of the data holdings in the Ocean Archive System, or
- ◉ Search the OADS managed data sets (a project-only subset of the above).

Variables / Parameters

Match ◉ any ○ all of the following:

- [x] Alkalinity
- [x] Dissolved inorganic carbon
- [x] pCO2/fCO2-water
- [x] pH
- [ ] Ammonia/Ammonium
- [ ] Apparent oxygen utilization
- [ ] Aragonite saturation state
- [ ] Chloroflourocarbons (CFC-11, 12, 113)
- [ ] Chlorophyll
- [ ] Chromophoric Dissolved Organic Matter (CDOM)
- [ ] Delta C13
- [ ] Delta C14
- [ ] Delta He3
- [ ] Delta N15
- [ ] Delta O18
- [ ] Dissolved organic carbon
- [ ] Fluorescence
- [ ] Methane
- [ ] Nitrate
- [ ] Nitrate+Nitrite
- [ ] Nitrite
- [ ] Nitrous oxide
- [ ] Oxygen
- [ ] Particulate organic carbon
- [ ] Phosphate
- [ ] Salinity
- [ ] Silicate
- [ ] Sulfur Hexafluoride
- [ ] Temperature
- [ ] Tritium
- [ ] xCO2-Atmosphere

Other variables:

Observation Category

Choose one: Any

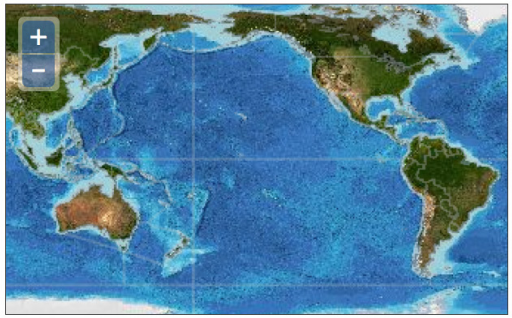
Observation Dates

Start date: ... (YYYYMMDD)

End date: ... (YYYYMMDD)

Geographic Coverage

Hold the "shift" key and drag to select an area.



North: 90

West: -180 Global East: 180

South: -90

Additional Terms

Search for:

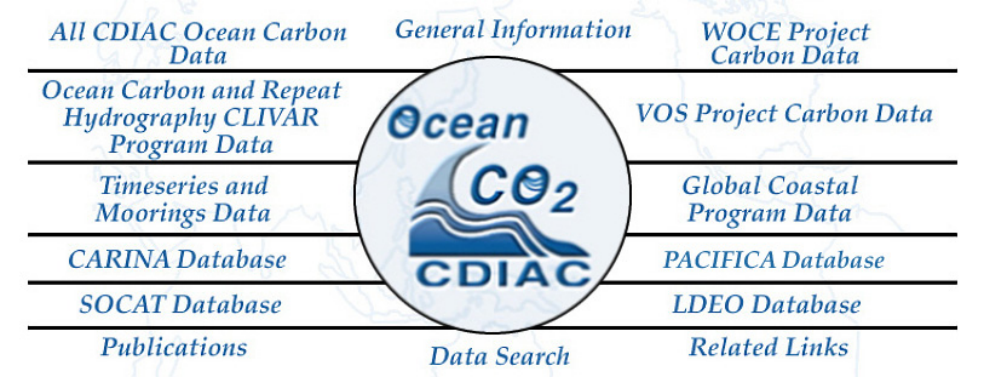
Search Reset

http://www.nodc.noaa.gov/oceanacidification/stewardship/data_portal.html

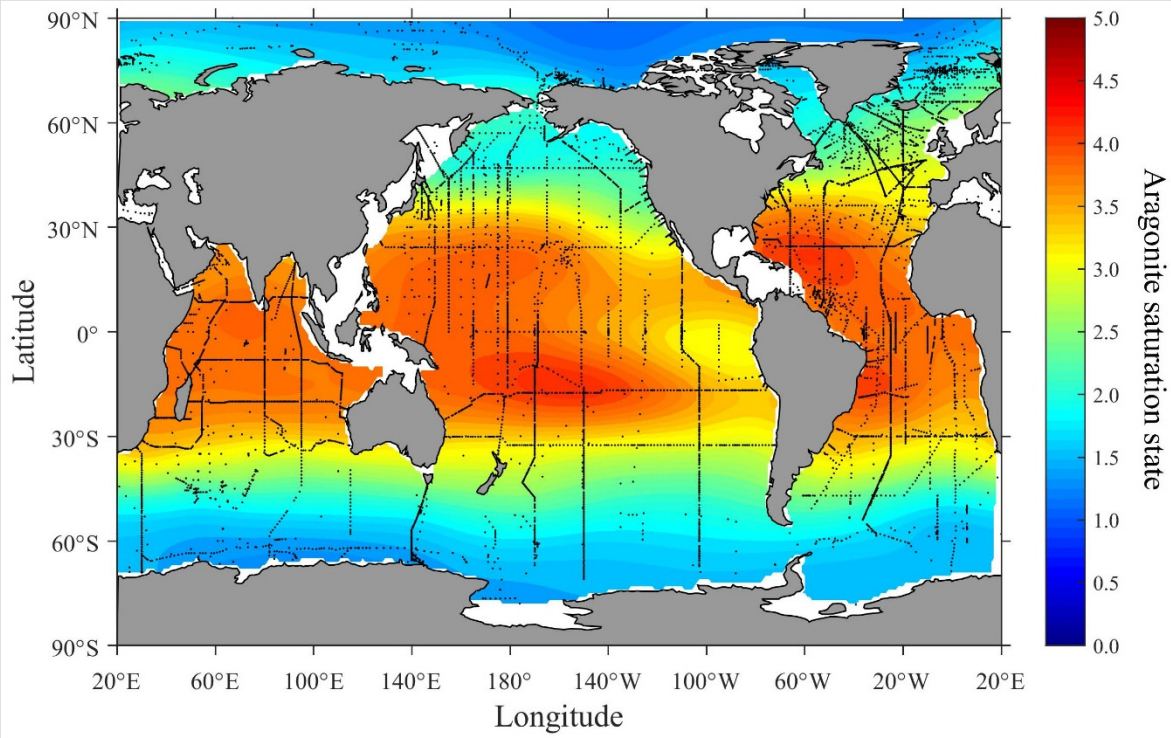
CDIAC data transfer

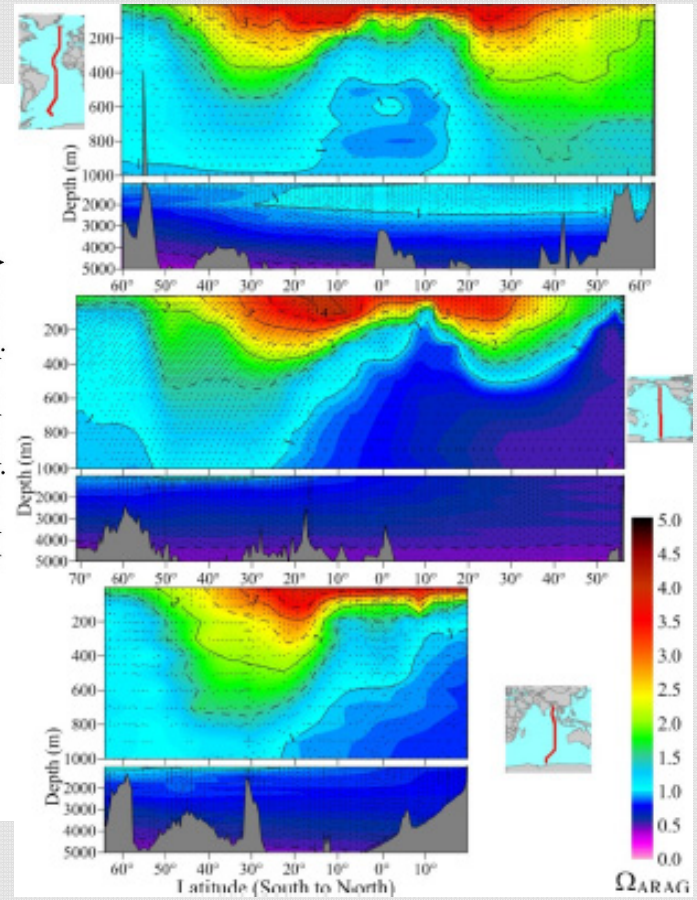
A total of 806 Accessions have been archived at NCEI.

- **Voluntary Observing Ships**
  (187 Accessions)
- **Time Series and Mooring**
  (38 Accessions)
- **CLIVAR**
  (140 Accessions)
- **PACIFICA**
  (202 Accessions)
- **WOCE**
  (250 Accessions)
- **LDEO Database**
  (Accession 0059946)
- **SOCAT Database**
  (Accession 0101726)
- **PACIFICA Database**
  (Accession 0110865)



Data synthesis





OADS worked with PMEL and OAP scientists on the climatological distribution of aragonite saturation state in surface and subsurface waters of the global oceans.

OADS publications

- Jiang, L.-Q., S. A. O'Connor, K. M. Arzayus, A. Kozyr, and A. R. Parsons (2015), An ocean acidification metadata template, *Earth System Science Data*, **7,** 117-125.

- Jiang, L.-Q., R. A. Feely, B. Carter, D. J. Greeley, D. Gledhill, and K. M. Arzayus (2015), Climatological distribution of aragonite saturation state in the global oceans, *Global Biogeochemical Cycles,* under review.

- Jiang, L.-Q., K. M. Arzayus, H. E. Garcia, J.-P. Gattuso, A. Kozyr, C. Chandler, Y. Yang, R. Thomas, B. Beck, T. Spears (2015), How to document ocean acidification data, *Limnology & Oceanography e-Lecture,* submitted.

Next step in data management (1 of 2)

- **Base level data archiving and access**
  - To create an XSLT program to generate rich metadata records for all of the previously archived CDIAC data sets.
  - To work with PMEL on the newly proposed data submission system – Scientific Data Integration System (SDIS).
  - We are proposing to update the OA data access portal so that it will:
    - Adopt a better open-layer map,
    - have a better spatial constraints,
    - Enable search results manipulations.

Next step in data management (2 of 2)

- **Databases for standardized data sets**
  - SOCAT style databases for profile and time series data
  - Database for physiological response data sets:
    - Develop a data standard for this type of data.

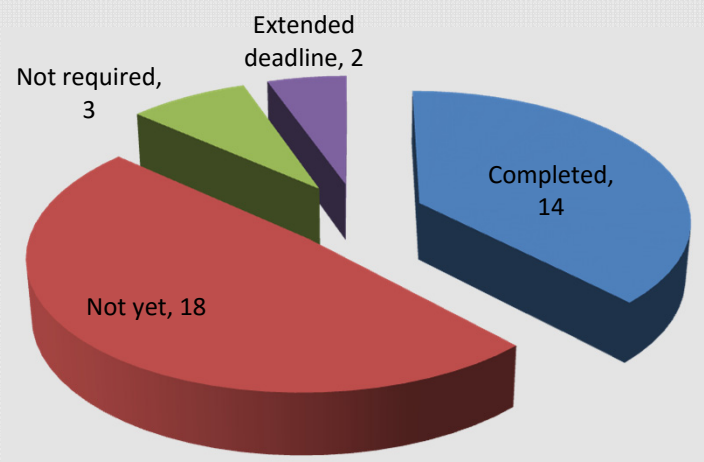
- **Data synthesis efforts**
  - Continue to develop aragonite, calcite and pH climatology with new data sets.
  - Extend climatology into coastal regions.
  - Further develop seasonal trends.
  - Incorporate biogeochemical float and mooring data into the global synthesis.

Data submission

OAP data management requirements:

- Data from OAP funded projects FY12-FY14 need to be archive published before the end of FY15.
- In order to encourage PIs to submit their data in time, OAP will hold off funding transfer to your institution until the data management requirements are met.

Current data submission status:



To submit your data

- **There are no excuses:**
  - We are capable of documenting all types of OA data, including biological experiment data and model data.
- **Data submission instructions:**
  - http://www.nodc.noaa.gov/oceanacidification/stewardship/submission.html
- Table showing data submission progress:
  - http://www.nodc.noaa.gov/oceanacidification/stewardship/oap_data.html

OADS website

http://www.nodc.noaa.gov/oceanacidification/

Need help?

- **OADS email list server:**
  - nodc.ocean.acidification@noaa.gov
- **Liqing Jiang contact info:**
  - Email: Liqing.Jiang@noaa.gov
  - Phone: (301) 713-4858.

Acknowledgements

- Funding support from NOAA/Ocean Acidification Program.
- IT support from John Relph of NCEI, ISO support from Sarah O'Connor of NCEI. XSLT support from Jeff Ogata and Jacqueline Mize of NCEI.
- Comments/Suggestions from many of you.
- Many thanks to PIs who submitted their data early.