

Practical RDM

A Little More Earth Science, Case Studies

Steve Diggs

Scripps Institution of Oceanography

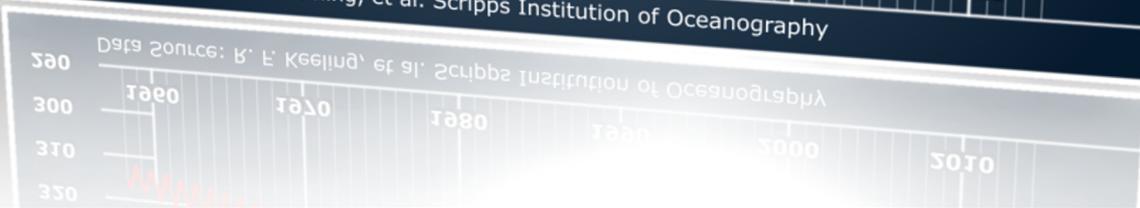
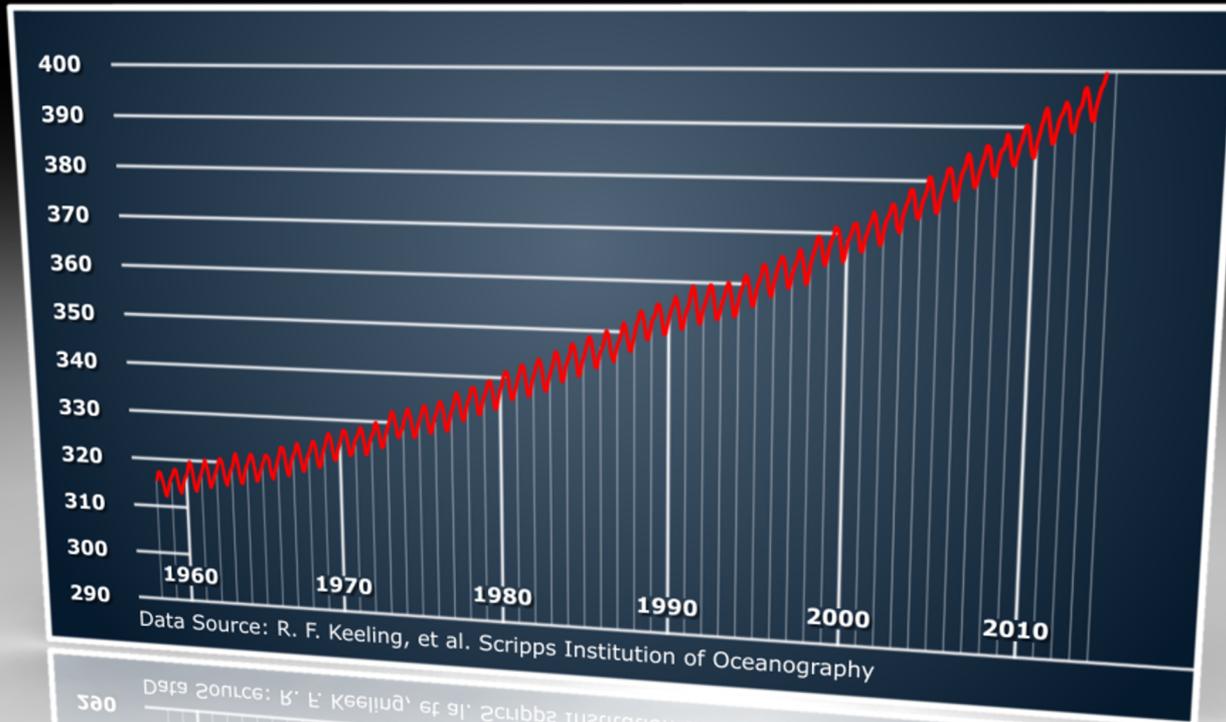
RDA/CODATA School
2021.10.21

UC San Diego



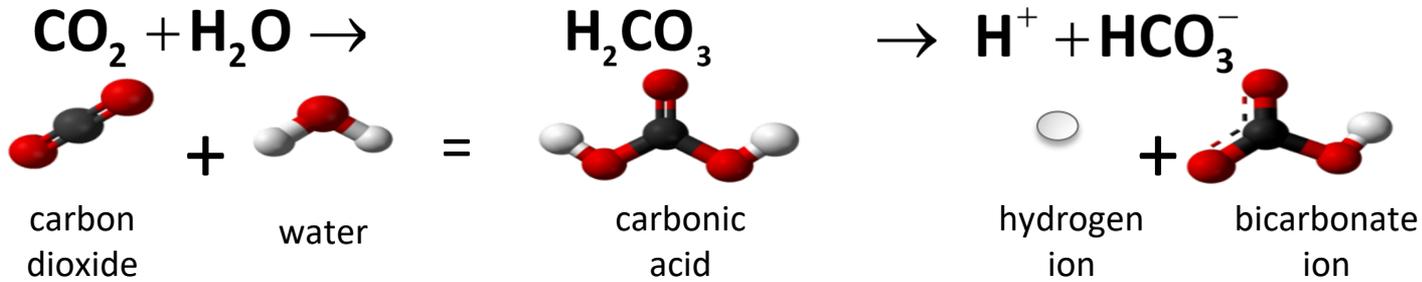
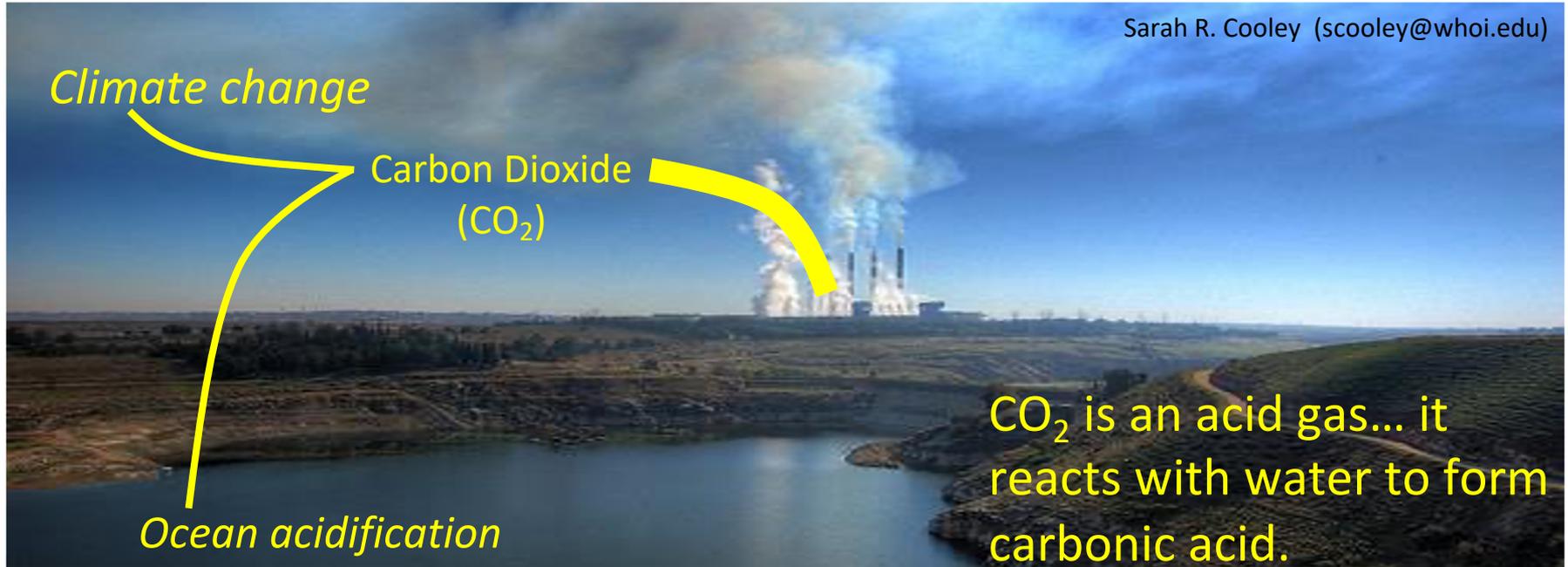
SCRIPPS INSTITUTION OF
OCEANOGRAPHY

Atmospheric CO₂ (ppm)



Ocean Acidification: the other CO₂ problem

Sarah R. Cooley (scooley@whoi.edu)



Ocean Acidification is Occurring Rapidly

- Approximately 28% of the CO₂ generated by human activities since the mid-1700s has been absorbed by the oceans.
- Ocean acidity has increased 30% since the start of the industrial age.
- Ocean acidity is projected to increase 100-150% percent by 2100.
- Current rate of acidification is nearly 10x faster than any period over the past 50 million years.



Reproducibility and Replicability in Science



If the data can't be found, the science cannot be reproduced

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News & Comment > News > 2018 > September > Article

NATURE | NEWS
Scientists losing data at a rapid rate
Decline can mean 80% of data are unavailable after 20 years.
Elizabeth Gibney & Richard Van Noorden
19 December 2013
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MISSING DATA
As research articles age, the odds of their raw data being extant drop dramatically.

The graph plots 'Data extant (assuming author responded)' on the y-axis (0 to 1.00) against 'Age of paper (years)' on the x-axis (0 to 20). Red dots represent individual data points, and a green line with a shaded confidence interval shows a steady decline from approximately 0.95 at year 0 to 0.35 at year 20.

Age of paper (years)	Data extant (assuming author responded)
0	0.95
2	0.78
4	0.80
6	0.82
8	0.85
10	0.80
12	0.65
14	0.85
16	0.75
18	0.55
20	0.15
22	0.35

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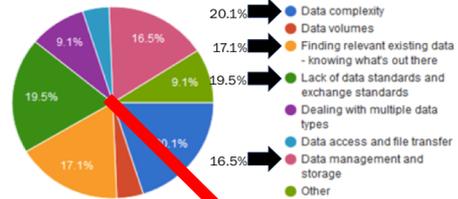
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NATURE | NEWS FEATURE
1,500 scientists lift the lid on reproducibility
Survey sheds light on the 'crisis' rocking research.
Monya Baker
25 May 2016 | Corrected: 28 July 2016
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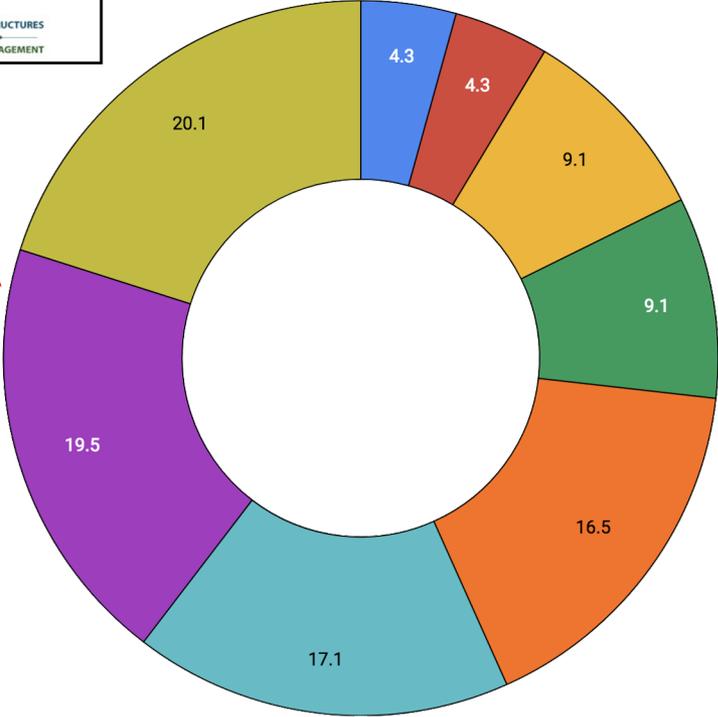


Researcher Challenges with Data Use

The top four issues accounted for 73% of respondents



Data Management Skills Gap Analysis, April 7-2017
<http://hfe-inf.org/document/skills-gap-analysis>



- Data Volumes
- Data Access and file transfer
- Dealing with multiple data types
- Other
- Data Management and Storage
- Finding relevant existing data - knowing what's out there
- Lack of data standards and exchange standards
- Data Complexity

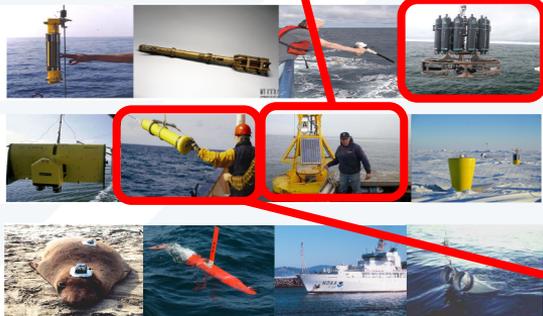


Your Assignment



We will focus on four (4) data streams

Deep Ocean Moorings



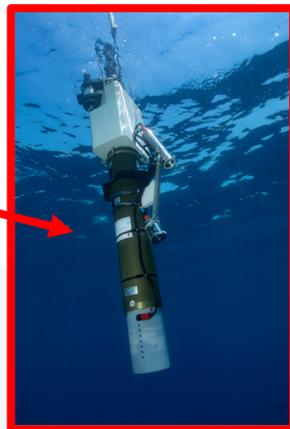
Rosette Casts
(Bottle & CTD data)



Air Samples from
glass flasks



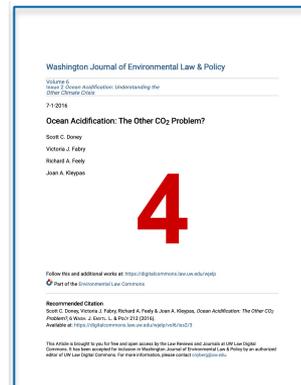
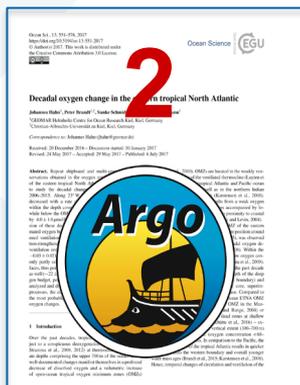
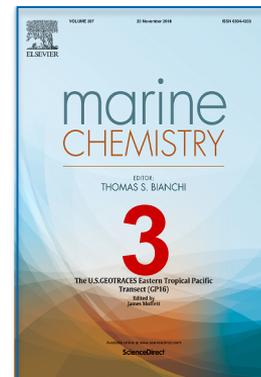
Argo Floats
(autonomous T/S, BGC)



Assignment Materials

There are four papers. Please skim all of them, and then choose ONE (and only one) as your subject.

Read this paper completely.



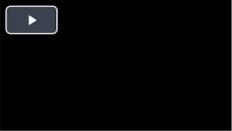
On Moodle Course Page

Teaching RDM 303.2KB PDF document

Now that you are equipped with the knowledge to practice good RDM, you may want to teach this or pass your knowledge on.



Introduction to Practical RDM 25.9MB PDF document



More about the Oceans

Due 26 October 2021

2 of 80 submitted, 2 ungraded

Video: Oceanography (General Circulation) 77.3MB Video file (MP4)

The Rosette: Classic Ocean Measurement 15.4MB Video file (MP4)

Robots in the Ocean - Argo Floats 20.8MB Video file (MP4)

Practical RDM: A Little More Earth Science, Case Studies 24.2MB PDF document



* Research Papers

Here are the four (4) research papers that were discussed in the lecture.
Take a look at all of them, but only choose one.

Practical RDM: A Little More Earth Science, Case Studies 24.2MB PDF document



* Research Papers

Here are the four (4) research papers that were discussed in the lecture.
Take a look at all of them, but only choose one.

The CODATA RDA Resea ...

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* Research Papers

Here are the four (4) research papers that were discussed in the lecture.
Take a look at all of them, but only choose one.

- ARGO_os-13-551-2017.pdf
- Atmospheric_Chemistry_O2_and_CO2_Resplandy_s41586-018-0651-8.pdf
- GO_SHIP_e1601426-full.pdf
- Ocean Acidification_The_Other CO2_Problem_.pdf

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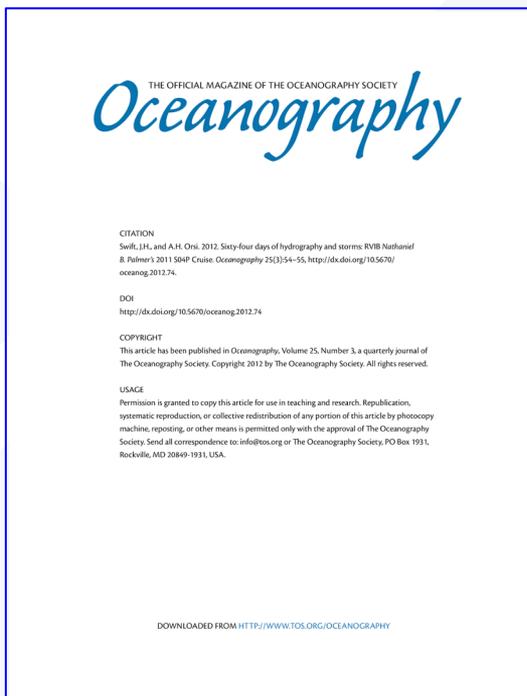
Problem Description

- You have decided to try to replicate the results from the research described in the paper
- Your assignment is as follows:
 1. Scan the paper, look for clues as to where the data used in this research might reside
 2. Try to **FIND** and download those data
 3. **RDM** -> **Be mindful throughout of what makes the data easy/hard to:**
 - Locate
 - Download
 - READ/UNDERSTAND (possibly with other data)
 - Use in a subsequent/related study

Very Optional: Try to use the program of your choice to read in and map the data, examine the properties of these data



Example



ANTARCTIC OCEANOGRAPHY IN A CHANGING WORLD >> SIDEBAR

Sixty-Four Days of Hydrography and Storms: RVIB Nathaniel B. Palmer's 2011 S04P Cruise

BY JAMES H. SWIFT AND ALEJANDRO H. ORSI

Beginning 2003, the United States has systematically reoccupied select hydrographic sections from the 1990s World Ocean Circulation Experiment (WOCE) as part of this country's contribution to the Climate Variability and Predictability (CLIVAR) and Global Ocean Carbon programs of the World Climate Research Programme and International Ocean Carbon Coordination Project. The overarching goal of these efforts is to quantify changes in storage and transport of heat, freshwater, carbon dioxide, and other related parameters. In brilliant Antarctic weather and rarely seen open waters in McMurdo Sound, we set out on the icebreaking research vessel *Nathaniel B. Palmer* from the ice pier at the US Antarctic

In addition, we aimed to close off key CLIVAR meridional transects to the Antarctic shelf break, including completion of transects along 150°W and 170°W. With nominal spacing of 30 nm, each station consisted of a full-depth deployment of a 36-place rosette/CTD equipped with dual temperature/conductivity channels, pressure and dissolved oxygen instruments, a reference thermometer, a transmissometer, a fluorometer, an altimeter, and an acoustic Doppler current profiler (ADCP). Water samples were collected for measurements of salinity, dissolved oxygen, nutrients, chlorofluorocarbon, dissolved inorganic and organic carbon, total alkalinity, pH, colored dissolved organic matter

ADCP, surface temperature/salinity/pCO₂, and other seawater properties, meteorology, solar radiation, and aerosols/precipitation.

US data and accompanying documentation are publicly available at the CLIVAR and Carbon Hydrographic Data Office (via <http://ushydro.ucsd.edu>) and the Carbon Dioxide Information Analysis Center (<http://cdiac.ornl.gov>).

As we neared the ice edge to start the first station, winds rose well past 30 knots and continued to roughen the seas during the day. This weather was a taste of the future, because storms frequently interrupted our work (e.g., 105 hours were lost in the first two weeks of the cruise alone), but the new data were fascinating from the start.

US data and accompanying documentation are publicly available at the CLIVAR and Carbon Hydrographic Data Office (via <http://ushydro.ucsd.edu>) and the Carbon Dioxide Information Analysis Center (<http://cdiac.ornl.gov>).



Watch Out for Updates and Revisions



The ocean stores much of the warming caused by the buildup of greenhouse gases. DANIEL RAMIREZ/FICKR

High-profile ocean warming paper to get a correction

By [Christa Marshall, E&E News](#) | Nov. 14, 2018 , 2:55 PM

Originally published by E&E News

Scientists behind a major study on ocean warming this month are acknowledging errors in their calculations and say conclusions are not as certain as first reported.



Your Research Data Assessment Report

<https://forms.gle/tYm59fTUqSA9TXgM7>



Let's Go Outside!
Putting RDM into Practice

Practical RDM: Your Only Assignment

In today's module, you were asked to select one of four papers to read, locate the data and Now that you have selected and evaluated your research paper of choice, it is time to provide your assessments.

Name *
Short answer text

Name *
Short answer text

Title of research paper *
Short answer text

What was the premise of the paper, or was the experiment done simply to collect data? *
Short answer text

In your own detailed words, what was the most important conclusion of this research paper? *



Good Luck!