Linking Data and Information: Viewing Oceanographic Research Holistically

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Biological & Chemical Oceanography Data Management Office



Ocean Research Data Overview

- Fate of data & information within oceanographic research
- Challenges associated with sharing and discovering oceanographic data
- Strategies used by repositories to reconnect curated data to related content
- Share an example working with oceanographic *omics community









Ocean Research Data Challenges

- Hypothesis-driven research questions are often complex
- Many data types are collected
- Data are highly heterogeneous in file type, scale, and format
- A single collaborative research projects may involve several investigators each responsible for each data type









Ocean Research Data Challenges

Good News:

- Researchers are increasingly depositing data for sharing
- Disciplinary repositories exist to help manage and publish output
- Technology and strategies exist to help curate data and related information in a structured way



Not-so-Good News:

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- Researchers often times must organize, submit and work with multiple repositories
- Data and Information go off in different directions once research is completed
- Discovery of full project output is difficult due to distributed, soloed organizations

Ocean Research Workflow







Physical and Chemical Water Properties Sediment Cores



Ocean Research Workflow c 🕹 🙃 Cruise Catalog: KN195-03 Ship Location, speed, NIH National Library of Medicine 2291725 Course underway data Organism Gene Home SRAHome Morphology ssel (retired): Kni **Omics** @NIH Cruise @R2R Physiology Omics Geochemistry @ECL BCO-DMO 💮 IEDA 🚳 Physical and Sediment **Chemical Water** Cores Properties Water @BCO-DMO

Ocean Research Workflow

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upported by: NSF | NDAA | ONR |

Cruise DOI: 10.7284/900490

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Home About R2R - Cruise Catalog QA Dashboard News Contact Us Internal -

Cruise Catalog: KN195-03

Operator: Woods Hole Oceanographic Institution

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Dataset DOI doi:10.1594/IEDA/100562

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EarthChem Library Record



Role of Repositories: Creating Linkages

- Repositories leverage:
 - Best practices for publishing data on the web (Linked Open Data)
 - Formats and standards to represent structured data on the web



- Persistent Identifiers (PIDs)
 - DOI, ORCiD, Accession
 Numbers
- Partner to access and share related content

Provide discovery and access to content related to the datasets we curate



Creating Linkages: Omics Example

DNA/RNA Sequence Data

Yellowfin Cruise 2013

BCQ-DMQ

NCBI

National

Center for

Information

Biotechnology

Biological & Chemical Oceanography Data Management Office

Water Chemistry Data

DNA Image by brgfx on Freepik

Creating Linkages: Genomics Example

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Funding	114	Principal Investigator: David Caron (University of Southern California, USC)	
Awards	2,998	Co-Principal Investigator: Sarah K. Hu (University of Southern California, USC)
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NCBI accession metadata for 18S rRNA gene tag sequences from DNA and RNA from samples collected in coastal California in 2013 and 2014

Abstract:

Raw DNA and RNA V4 tag sequences include spatially and temporally distinct samples from costal California. Samples were collected in Niakin bottles with a CTD rosette at the San Pedro Ocean Time-series (SPOT) between April of 2013 and January of 2014. This dataset contains sequence data accession numbers and metadata for the National Center for Biotechnology Information (NCBI) Sequence Read Archive (SRA) database (SRA Study ID: SRP070577, Biotry)ecit: PNIAN311248).

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		Nucel	trient concentrations and I/virus-like particles counts	Nutrient concentrations and cell/virus-like particles counts
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SSU rRNA Gene Sequencing A characterization of microbes at the San Pedro Ocean Time-series (SPOT)

Creating Linkages: Genomics Example

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Creating Linkages: Final Thoughts

Aerobic Microbial Respiration 86-Million-Year-Old Deep-Sea

Repositories play a crucial role in linking data to content

- RDA Working Group "Repo2Pub" streamlining connections between published data and paper.
- Maximizing potential in PIDs: e.g., prepopulating information from a researcher's ORCiD



RESEARCH DATA ALLIANCE

RDA Repo2Pub Working Group