

Storing, Backing Up and Archiving Data



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Objectives for This Session

- Know options for storing, backing up, sharing and archiving your data.
- Understand best practices for protecting your data.

Data Storage Definition

- The media (optical or magnetic) to which you save your data files and software.
- All storage media are vulnerable to risk and obsolescence.
- Storage media should be evaluated and updated every 2-5 years.

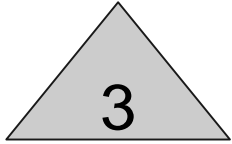
Data Storage Considerations

- Location (Internal/External HD, Network, Remote)
- Disk size or storage quota
- Computing performance
- Accessibility

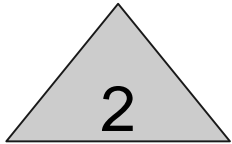
Data Backup Definition

- Allows you to *restore* your data if original data is lost or damaged due to:
 - Hardware or software malfunction
 - Environmental disaster (fire, flood)
 - Theft
 - Unauthorized access

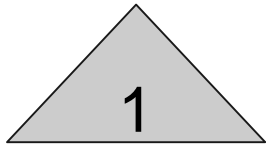
3-2-1 Backup Rule



Save 3 copies of your data.



Use 2 types of storage.



Keep 1 remote copy.

Data Backup Considerations

- Location (On-site, off-site)
- Procedure (Full, differential, incremental, mirror)
- Frequency (Hourly, daily, weekly, monthly)
- Retention (Months, years)
- Performance

TEST YOUR BACKUP PLAN!

Data Backup Summary

Backup type	Backed up	Backup time	Restore time	Storage space
Full/snapshot	All data	Slowest	Fast	High
Differential	All data since last full	Moderate	Moderate	Moderate
Incremental	Only new/modified files	Fast	Slowest	Lowest
Mirror	Only new/modified files	Fastest	Fastest	Highest

Overview of Data Storage, Backup and Sharing Options at Rice

Network Storage

- **storage.rice.edu** - U: drive, departmental shares
- **Research Data Facility (RDF)** - larger scale storage for research projects

Backup Options

- **storage.rice.edu** backups/snapshots
- **Crash Plan** for Rice workstations

Data Sharing/Collaboration Tools - Google Drive, Rice Box, Globus Connect


Options for faculty/ staff: <https://kb.rice.edu/page.php?id=70762>

Options for students: <https://kb.rice.edu/page.php?id=65636>


Storage: storage.rice.edu


- Location: Networked
- Storage quotas
 - Undergraduates: 2 GB
 - Graduates, Staff, Faculty: 5 GB
 - Colleges, Depts, Centers, Institutes: 40 GB
- Performance - Subject to network
- Accessibility
 - NetID folder: Private, not shared
 - Groups: Any Rice NetID holder by request


▲ Hard Disk Drives (1)

 Windows (C:)
818 GB free of 931 GB


▲ Devices with Removable Storage (3)


 DVD RW Drive (D:)

 Removable Disk (E:)

 Removable Disk (F:)

▲ Network Location (9)

 Departments
(\\storage.rice.edu\library) (T:)
[Progress bar]















 jn8 (\\storage.rice.edu\j-home) (U:)
207 GB free of 799 GB

Storage: Research Data Facility

- Location: On Site (Rice PDC) network data shares
- Storage quotas
 - 500GB per researcher
 - Additional storage available with cost recovery
 - Cost below \$100/TB/year, prorated monthly by use
- Performance - Subject to network
- Accessibility
 - Based on NetID and ADRICE security groups
 - Can be shared to multiple users in a research group

Backup: storage.rice.edu

- Location: On-site
- Procedure: Full replication
- Frequency: Daily
- Retention
 - Personal access: 2 weeks
 - Request IT restoration: 6 months

Name ^	Date modified	Type
 2015-03-23_1917-0500.UJ-p_daily	3/21/2015 12:04 AM	File folder
 2015-03-24_1917-0500.UJ-p_daily	3/21/2015 12:04 AM	File folder
 2015-03-25_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-26_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-27_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-28_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-29_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-30_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-03-31_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-04-01_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-04-02_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-04-03_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-04-04_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder
 2015-04-05_1917-0500.UJ-p_daily	3/25/2015 12:08 AM	File folder

Backup: CrashPlan

- Availability: Rice-owned computers
- Cost: \$82.56/year/person (up to 4 devices)
- Location: Off-site cloud storage
- Procedure: Incremental
- Frequency: Adjustable up to every minute
- Retention: Adjustable up to forever

Backup Frequency and Versioning Settings

Backup frequency:

New version  every 15 minutes

Additional versions to keep from:

Last week  every 15 minutes

Last 90 days  every day

Last year  every week

Previous years  every month

Remove deleted files  never

Defaults

Cancel

Ok

Sharing: Google Drive

- Unlimited storage for low risk data
- Can be used for collaboration within Rice
- Integrates nicely with G-suite productivity apps
- Files aren't local and performance is limited
- No provisions for retention of orphaned data
- Accessibility
 - Login to G-Suite apps with your Rice NetID

Sharing: Rice Box

- Web based file sharing tool similar to Dropbox
- Approved by Rice for sharing secure data
- Accessibility
 - Rice NetID
 - Share folders with Rice colleagues or external collaborators
 - Add emails of external collaborators to a folder and send invitations

Sharing: Globus Connect

- Widely used service for large data exchange between participating institutions
- Can be used in our HPC environment or from your desktop with Globus Connect Personal
- Accessibility
 - Contact CRC to be added to license
 - Arrange for access to peer institution end points

Product	Use	Location	Quota	Performance	Accessibility
Storage	S/B	Rice Data Center	2-5-40 GB	Network	NetID
Google Drive	S/C	Global Cloud	Unlimited	Internet	NetID & External
RDF	S/B	Rice Data Center	500GB free	Network	NetID
Rice Box	S/C	US Cloud	Unlimited	Internet	NetID & External
CrashPlan	B	Off-site cloud	Unlimited	Internet	Your NetID

Data Security

- Confidential (SSN, CC#, DL#)
 - Financial records
 - Health records
 - Education records
- Sensitive (Birth date, address, emergency contact, EID/SID)

Security Classification	Rice On-Site Most Secure	Rice Cloud Contract Semi-Secure
Low Risk (Public Data)	CampusPress, RDF	Google Drive
Moderate Risk (Sensitive Data)	RDF	Rice Box
High Risk (Confidential Data)	Storage Confluence	Rice Box CrashPlan
High Risk (Regulated Data)	Storage	CrashPlan

Data Archiving Definition

- Provides a final version of your data
- Stored for the long-term

Data Archiving Considerations

- Location
- File formats
- Responsibility
- Accessibility

Why Archive Your Data with a Data Repository?

- Conform to publisher or funder requirements
- Get cited
 - “studies that made data available in a public repository received 9% ... more citations than similar studies for which the data was not made available.” ([Piowowar & Vision](#), 2013)
- Promote future research

Data Archiving Options

Public Repositories:

- Discipline based repository
- General data repository (e.g. FigShare)
- Rice Digital Scholarship Archive

Private Approaches:

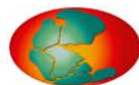
- Long-term storage (redundant)

Finding a repository

Consult lists and directories of data repositories:

- Nature, “Recommended Data Repositories”:
<https://www.nature.com/sdata/policies/repositories>
- PLOS Guide: <http://journals.plos.org/plosone/s/data-availability#loc-recommended-repositories>
- Re3data: <http://www.re3data.org/>

Share Your Data through A Disciplinary Repository: Pangea



PANGAEA.

Data Publisher for Earth & Environmental Science

Not logged in

SEARCH SUBMIT ABOUT CONTACT

Citation:

Yates, Kimberly Kaye; Halley, Roberet B (2006): Carbonate system data on the Molokai reef flat. PANGAEA, doi <https://doi.org/10.1594/PANGAEA.743388>,
Supplement to: Yates, KK; Halley, RB (2006): CO₃²⁻ concentration and pCO₂ thresholds for calcification and dissolution on the Molokai reef flat, Hawaii. *Biogeosciences*, **3**, 357-369, doi <https://doi.org/10.5194/bg-3-357-2006>

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Abstract:


The severity of the impact of elevated atmospheric pCO₂ to coral reef ecosystems depends, in part, on how seawater pCO₂ affects the balance between calcification and dissolution of carbonate sediments. Presently, there are insufficient published data that relate concentrations of pCO₂ and CO₃²⁻ to in situ rates of reef calcification in natural settings to accurately predict the impact of elevated atmospheric pCO₂ on calcification and dissolution processes. Rates of net calcification and dissolution, CO₃²⁻ concentrations, and pCO₂ were measured, in situ, on patch reefs, bare sand, and coral rubble on the Molokai reef flat in Hawaii. Rates of calcification ranged from 0.03 to 2.30 mmol CaCO₃/m²/h and dissolution ranged from -0.05 to -3.3 mmol CaCO₃/m²/h. Calcification and dissolution varied diurnally with net calcification primarily occurring during the day and net dissolution occurring at night. These data were used to calculate threshold values for pCO₂ and CO₃²⁻ at which rates of calcification and dissolution are equivalent. Results indicate that calcification and dissolution are linearly correlated with both CO₃²⁻ and pCO₂. Threshold pCO₂ and CO₃²⁻ values for



<https://doi.pangaea.de/10.1594/PANGAEA.743388>

Harvard Dataverse


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Replication Data for: Comparing Dynamic Pies: A Strategy for Modeling Compositional Variables in Time and Space

Oct 8, 2017 - [Political Science Research and Methods \(PSRM\) Dataverse](#)

Lipsmeyer, Christine S.; Philips, Andrew Q.; Rutherford, Amanda; Whitten, Guy D., 2017, "Replication Data for: Comparing Dynamic Pies: A Strategy for Modeling Compositional Variables in Time and Space", doi:10.7910/DVN/XHW4CB, Harvard Dataverse, V1, UNF:6:3/OH09u/5FEZ4t2tfBSFEA==

<https://dataverse.harvard.edu/>

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Urban Road Network Data

19.01.2016, 12:21 by [Urban Road Networks](#)

Tool and data set of road networks for 80 of the most populated urban areas in the world. The data consist of a graph edge list for each city and two corresponding GIS shapefiles (i.e., links and nodes).

Make your own data with our ArcGIS, QGIS, and python tools available at:

<http://csun.uic.edu/codes/GISF2E.html>

Please cite: Karduni,A., Kermanshah, A., and Derrible, S., 2016, "A protocol to convert spatial polyline data to network formats and applications to world urban road networks", Scientific Data, 3:160046, Available at <http://www.nature.com/articles/sdata201646>

REFERENCES

- <http://csun.uic.edu/codes/GISF2E.html>

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- [Complex Physical Systems](#)

KEYWORD(S)

[Cities](#) [Graph](#) [GIS](#)

[network science](#) [Road Network](#)

Rice Data Sharing Option: Rice Digital Scholarship Archive



FA

[Rice Scholarship Home](#) / [Faculty & Staff Research](#) / [Rice Research Data](#) / [View Item](#)

The Acceptability of War and Support for Defense Spending: Evidence from Fourteen Democracies, 2004–2013 [Replication Data]



Name: esbuild.zip [View/Open](#)
Size: 3.011Mb
Format: application/zip
Description: Original data files



Name: esbuildNonproprietary.zip [View/Open](#)
Size: 2.651Mb
Format: application/zip
Description: Nonproprietary data files

<https://scholarship.rice.edu/>

How to Set Yourself Up to Archive Your Data

- Before sharing, ensure that confidentiality is protected and that there are no copyright concerns.
- Document your data so that others understand it.
- Organize your data
- Provide the metadata required by the repository
- Get your data into the appropriate format (ideally a non-proprietary format like csv or txt)
- Provide metadata
- Aim for networked storage rather than device-dependent

Example of submission requirements:

Pangea

Documentation

- explain abbreviations
- provide units for parameters

Metadata:

- position (geographic)
- citation of journal article

Format:

- excel or tab-delimited text files for tables

Questions to Ask in Evaluating a Data Repository

1. How well will the data be preserved? How stable is the repository?
2. What kind of reputation does the archive have in the community?
3. Does the repository facilitate citation of the data?
4. Does the repository allow you to describe the data fully and make it discoverable?
5. Are there curators who can help to deposit the data?
6. What are the costs of deposit, if any?

Data Archiving Caveats

- Do not share confidential data (unless it has been de-identified and approved through IRB).
- Consult with your collaborators before publishing data.
- It may be possible to embargo data so that it is not available until the related publication is released.

Offer Your Input: Texas Data Repository

Metrics

0 Downloads

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World Development Indicators Draft Unpublished

World Bank, 2017, "World Development Indicators", doi:10.5072/FK2/1UW4XX, Texas Data Repository ***TRAINING***
Dataverse, DRAFT VERSION

Cite Dataset

Learn about Data Citation Standards.

Description

World Development Indicators includes data spanning up to 56 years—from 1960 to 2016. World view frames global trends with indicators on population, population density, urbanization, GNI, and GDP. As in previous years, the World view online tables present indicators measuring the world's economy and progress toward improving lives, achieving sustainable development, providing support for vulnerable populations, and reducing gender disparities. Data on poverty and shared prosperity are now in a separate section, while highlights of progress toward the Sustainable Development Goals are now presented in the companion publication, Atlas of Sustainable Development Goals 2017.

Subject

Earth and Environmental Sciences; Social Sciences

Keyword

sustainability, global development

Related Publication

<http://wdi.worldbank.org/table/WV.3>

Files

Metadata

Terms

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Resources

- DataOne Primer on Data Management, https://www.dataone.org/sites/all/documents/DataONE_BP_Primer_020212.pdf
- Dataverse, *Data Management Plans*, <http://best-practices.dataverse.org/data-management/>
- ICPSR *Guide to Social Science Data Preparation and Archiving*, <http://www.icpsr.umich.edu/icpsrweb/content/deposit/guide/>
- Svend Juul et al, “Take good care of your data,” <http://www.epidata.dk/downloads/takecare.pdf>
- UK Data Archive, *Managing and Sharing Data: Best Practices for Researchers*, <http://www.data-archive.ac.uk/media/2894/managingsharing.pdf>

Thanks!

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