Accessing Multi-TB-sized Datasets: Research Data Archive at NCAR

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http://rda.ucar.edu

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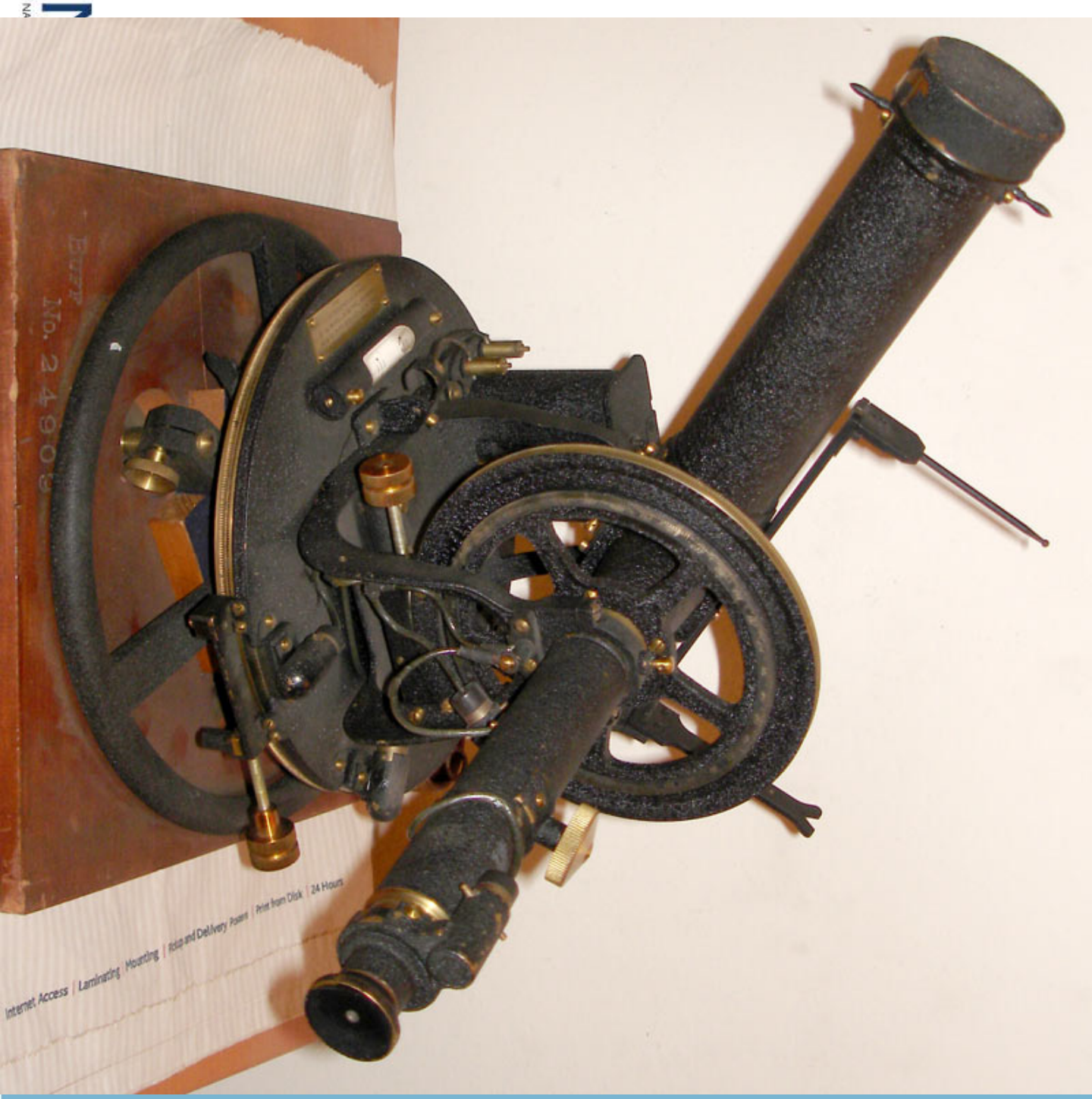

Highlights

- What is the RDA?
- Evolution of RDA Services
- User Identity Management
- Usage Metrics
- User Outreach and User Support
- Lessons Learned and Conclusions

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What is the RDA?

- NCAR/CISL Research Data Archive
- Purposes
  - Support climate & weather research at NCAR and UCAR Universities with reference datasets
- Collections
  - Ocean & atmosphere observations, analyses, reanalyses, operational NWP outputs
- Basic Metrics
  - Established in 1960s
  - 600+ datasets, 8M files, 1.8 PB
  - 70+ datasets growing daily – monthly

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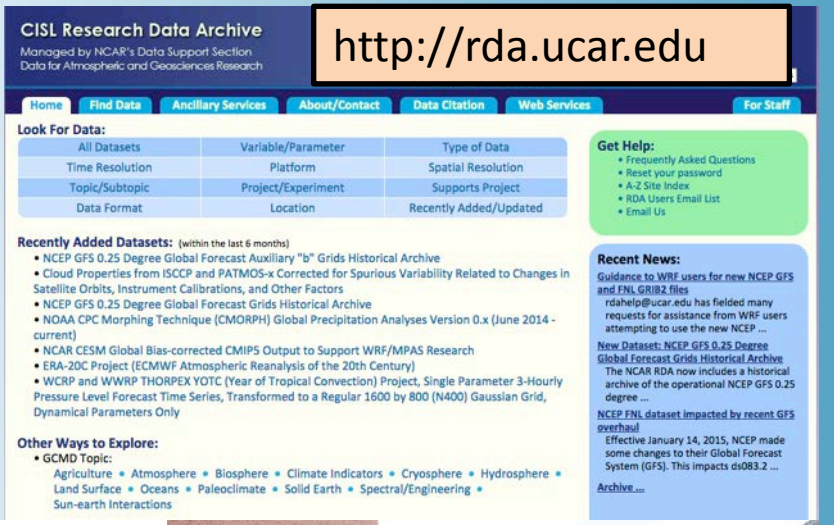
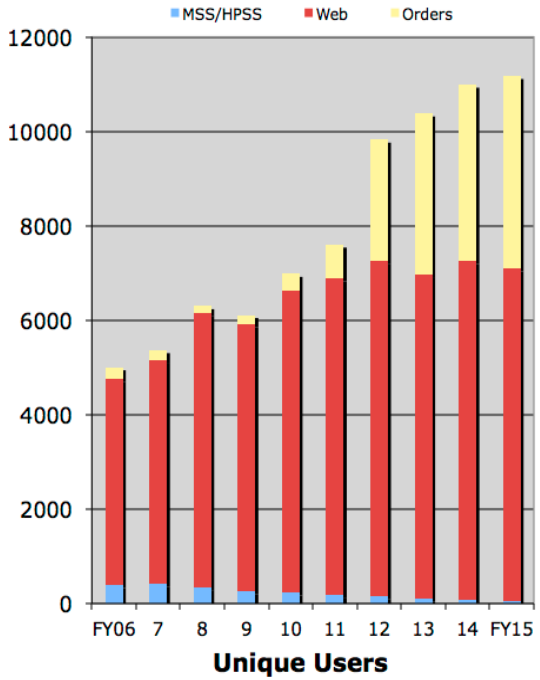
What is the RDA?

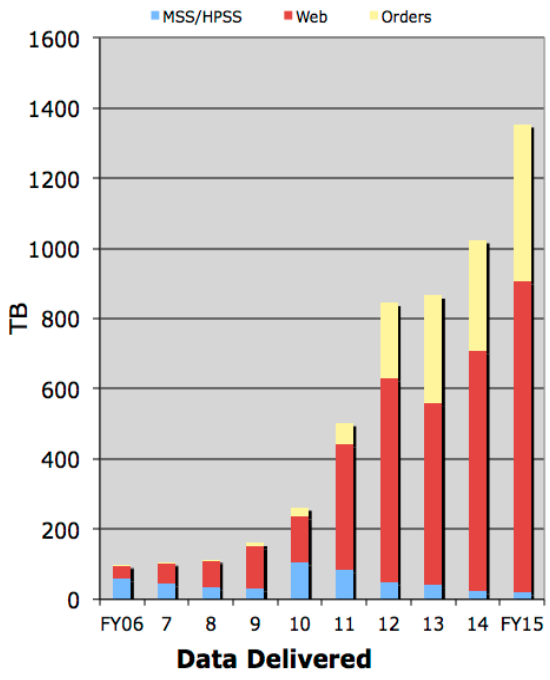
Science educated staff

Expert consultants and data engineers

Free and open access







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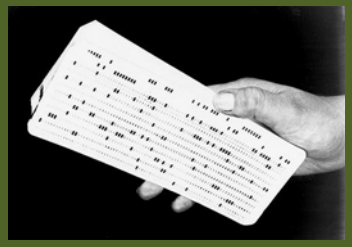
Evolution of RDA services

- Systematically maintain a large diverse community archive
- Make data discovery “easy”
- Improve access to serve many more users
- Support reproducible research
- Reduce the time researchers spend dealing with data

Evolution of RDA services

- 1960s to early 1990s – **Data Consultant Driven**
  - One to one service model

Data/Metadata Storage



Data Discovery

Data Delivery

Evolution of RDA services

- Mid 1990s to Early 2000s – **Data Consultant Driven**

Data/Metadata Storage

Data Discovery

Data Delivery

Evolution of RDA services

- Mid 2000s to Present –**Metadata Driven**
  - One to many service model

Data/Metadata Storage

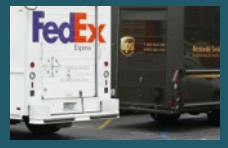
Data Discovery

Data Delivery

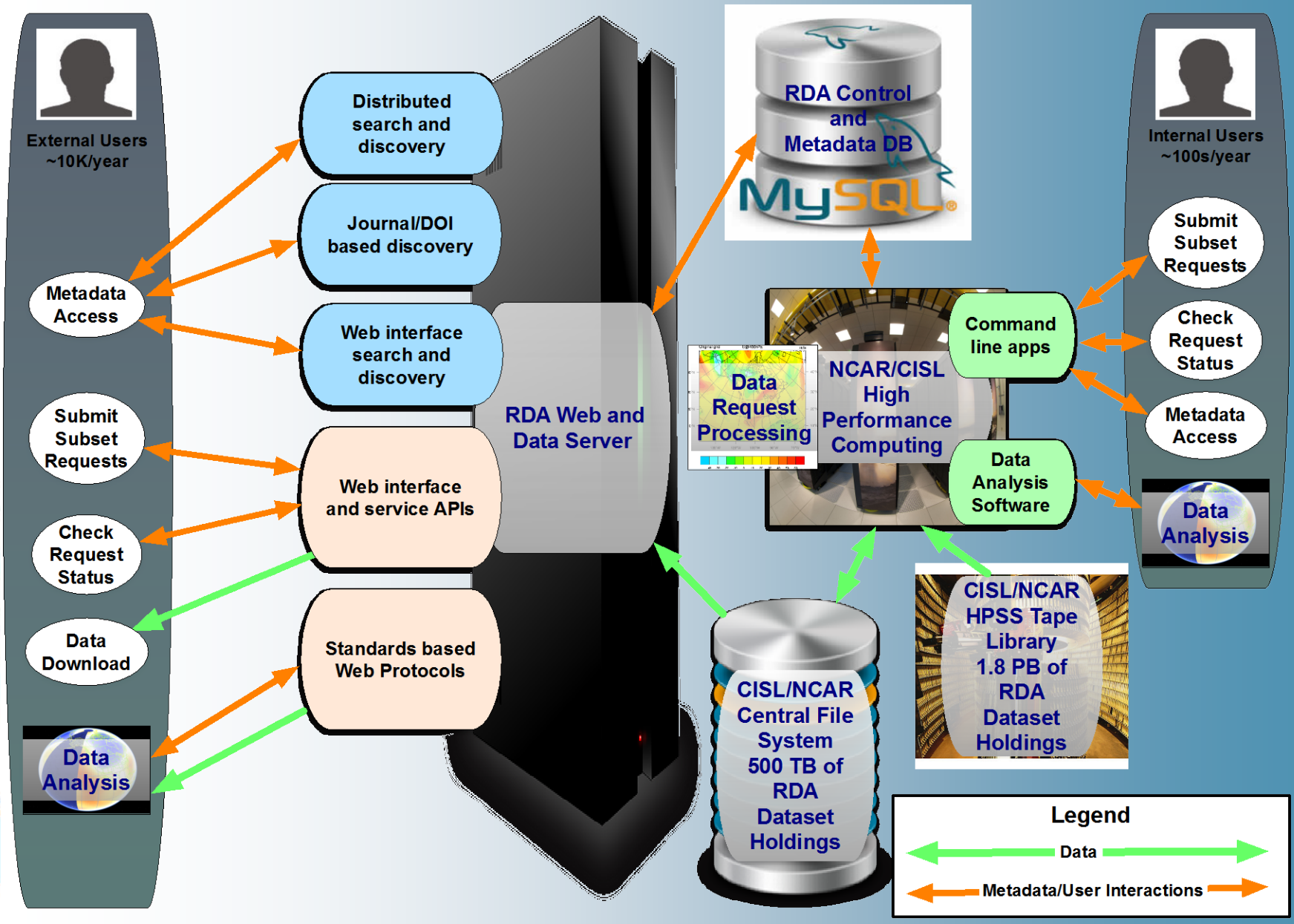
http://

globus online

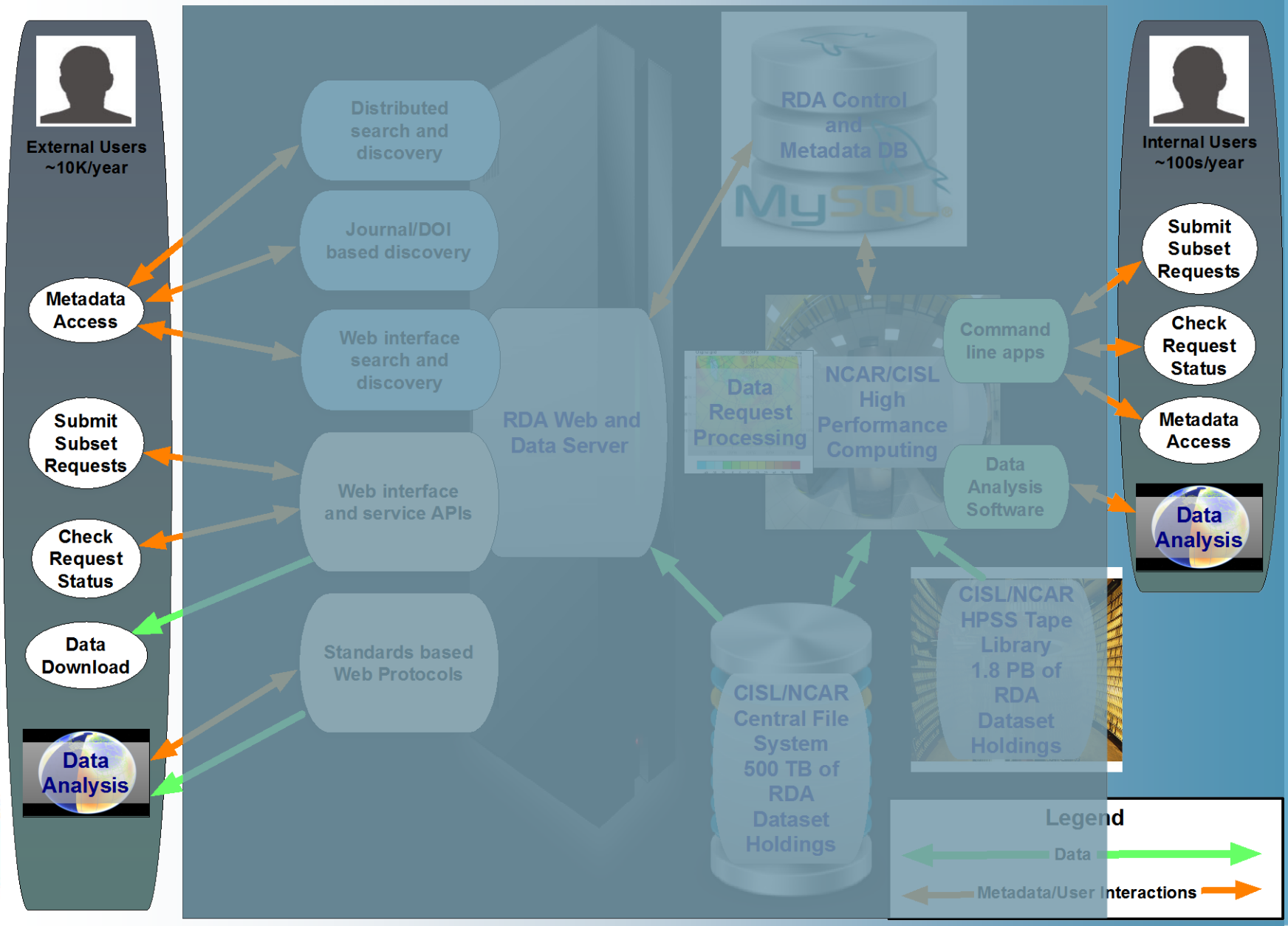
OPeNDAP



Current RDA Services

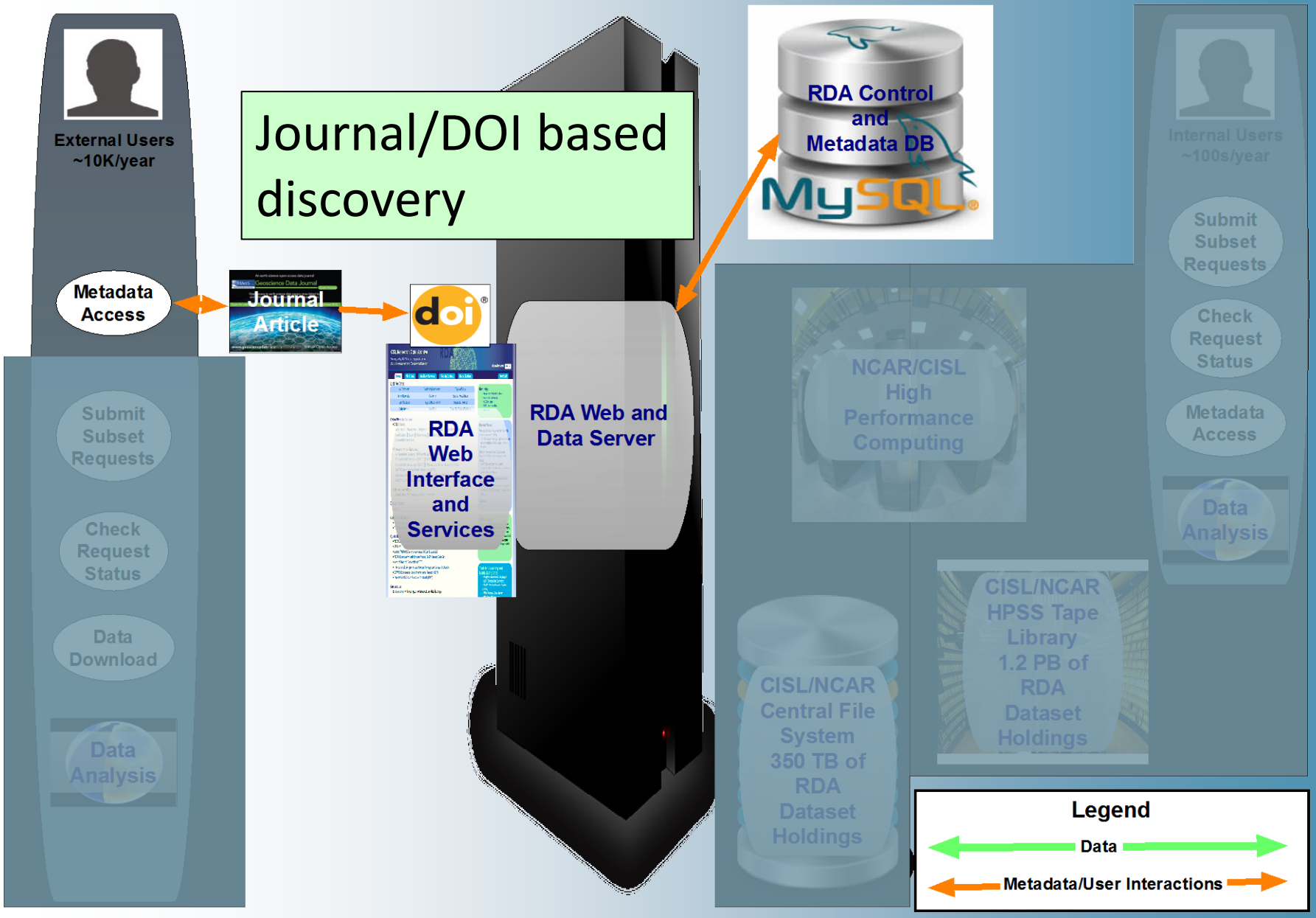


Current RDA Services



RDA Data Discovery Pathways

RDA Data Discovery Pathways



RDA Data Discovery Pathways

-Server Generated Data Citation

How to Cite This Dataset:

RIS

BibTeX

Compo, G. P., and Coauthors, 2009: NOAA CIRES Twentieth Century Global Reanalysis Version 2. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory, Boulder, CO. [Available online at http://dx.doi.org/10.5065/D6QR4V37.] Accessed† dd mmm yyyy.

†Please fill in the "Accessed" date with the day, month, and year (e.g. - 5 Aug 2011) you last accessed the data from the RDA.

Bibliographic citation shown in American Meteorological Society (AMS) style

Get a customized data citation

Dataset:

NOAA CIRES Twentieth Century Global Reanalysis Version 2 (ds131.1)

Your Access History for July 2013:

Choose a day to get a citation for this dataset. You will also see more details about your downloads on that day, which will help you verify that this is the citation you want.

July 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
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Maintain user access history, citation recall at any time

For Data Accessed on 2013-07-03:

Dataset Citation: RIS

Compo, G. P., et al. 2009. *NOAA CIRES Twentieth Century Global Reanalysis Version 2*. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory. http://dx.doi.org/10.5065/D6QR4V37. Accessed 3 Jul 2013.

Bibliographic citation shown in Federation of Earth Science Information Partners (ESIP) style

Data Access Detail:

1 subset request:

- 18 files, 3.44 MB

```
Date Limits          :  1975-06-15 00:00 to 1975-06-30 12:00
Parameter            :  TMP
Level Type           :  UGTL
```

RDA Data Discovery Pathways

s Laboratory

RDA Data Discovery Pathways

-Advise User of Best Dataset Collection(s) for purpose

NCAR UCAR | ClimateDataGuide

inform • compare • discover

CLIMATE DATA | ANALYSIS TOOLS | MODEL EVALUATION | EXPERT CONTRIBUTORS | ABOUT | Site-wide Search >>

Data Discovery Guided by Experts > >

Search and access 174 data sets covering the Atmosphere, Ocean, Land and more. Explore climate indices, reanalyses and satellite data and understand their application to climate model metrics. This is the only data portal that combines data discovery, metadata, figures and world-class expertise on the strengths, limitations and applications of climate data. Discover it now.

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Ricciardulli, Lucrezia | Meiyappan, Prasanth | Vicente-Serrano, Sergio M. | Huang, Boyin | Kay, Jennifer | von Schuckmann, Karina

Dai, Aiguo | Keyantash, John | Meier, Walter | Kent, Elizabeth | Hassler, Birgit | Tian, Baijun

Data Set Overviews > >

Compare the attributes, strengths and limitations of multiple data sets.

Atmospheric Reanalysis: Overview & Comparison Tables

Global Temperature Data Sets: Overview & Comparison Table

Precipitation Data Sets: Overview & Comparison table

Sea Ice Concentration data: Overview, Comparison table and graphs

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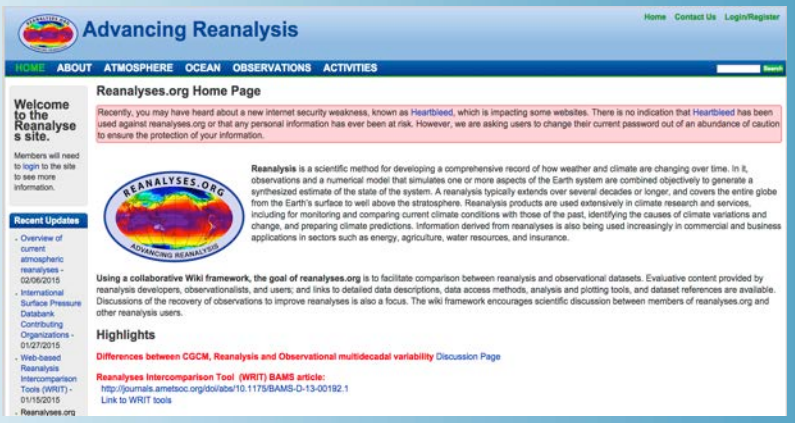
AGU's Eos @AGU_Eos 12 Dec

How well do climate models simulate present-day climate? A new diagnostic tool may give insight: ow.ly/FNdlG



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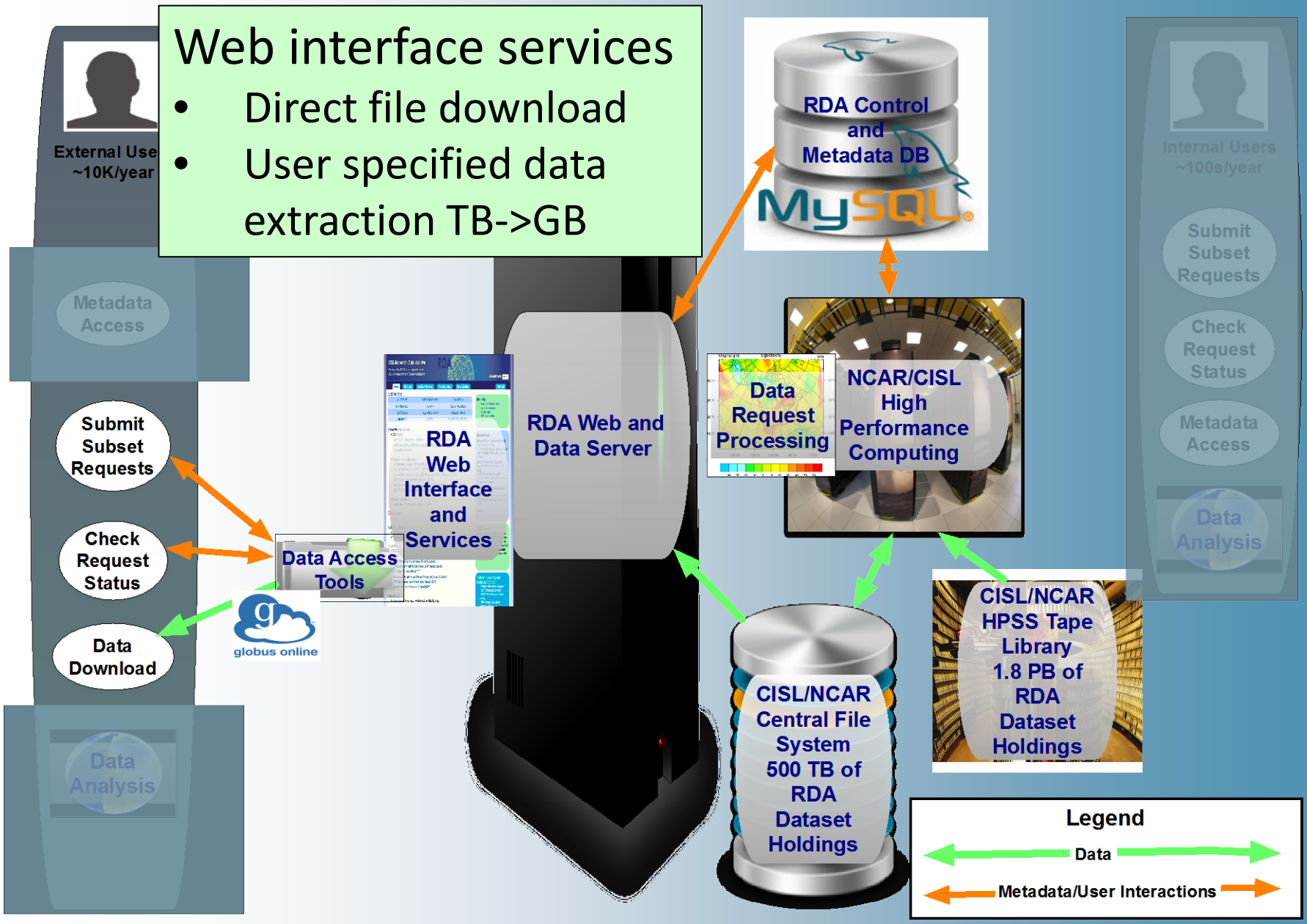
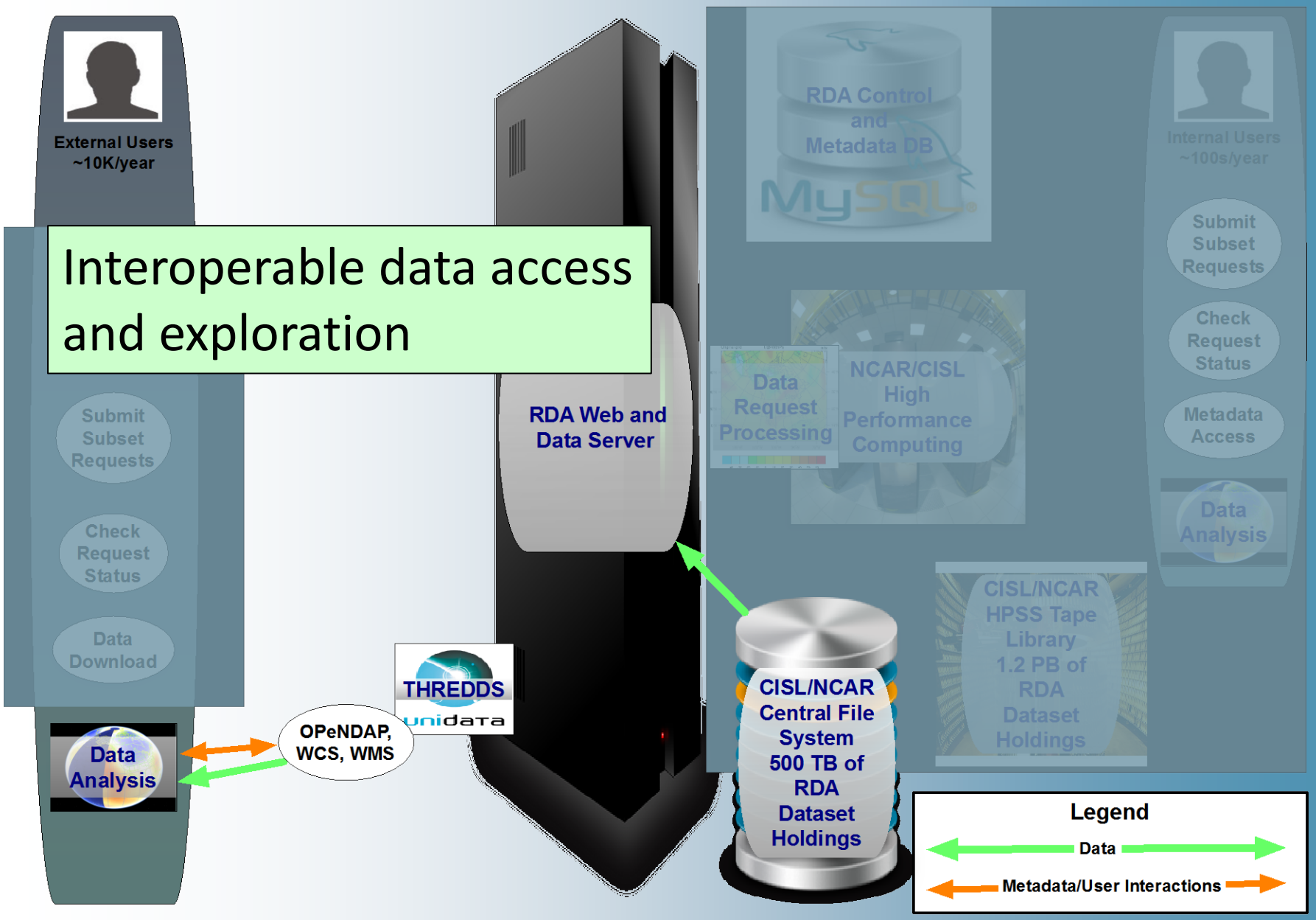
RDA Data Access Pathways

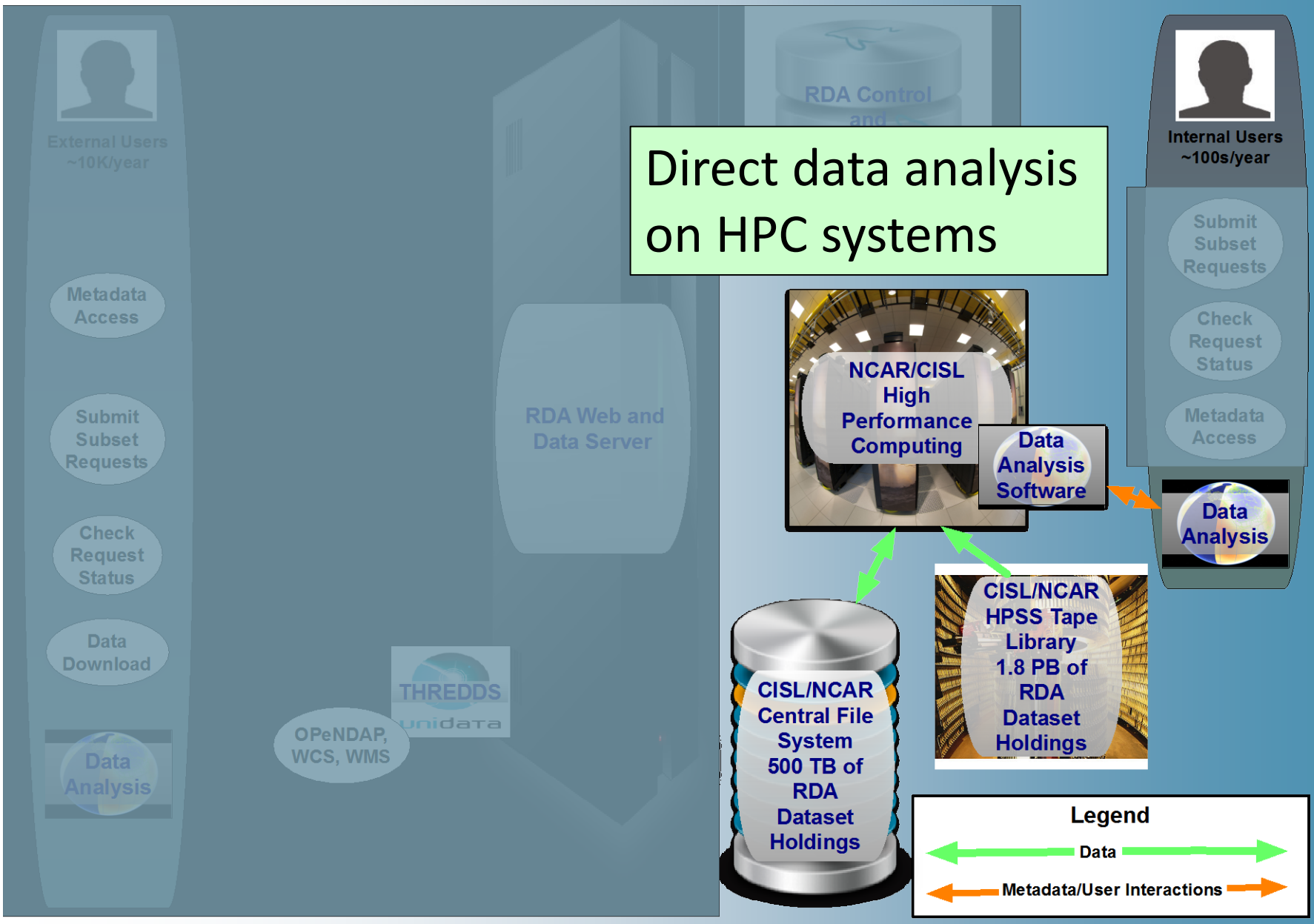


RDA Data Access Pathways

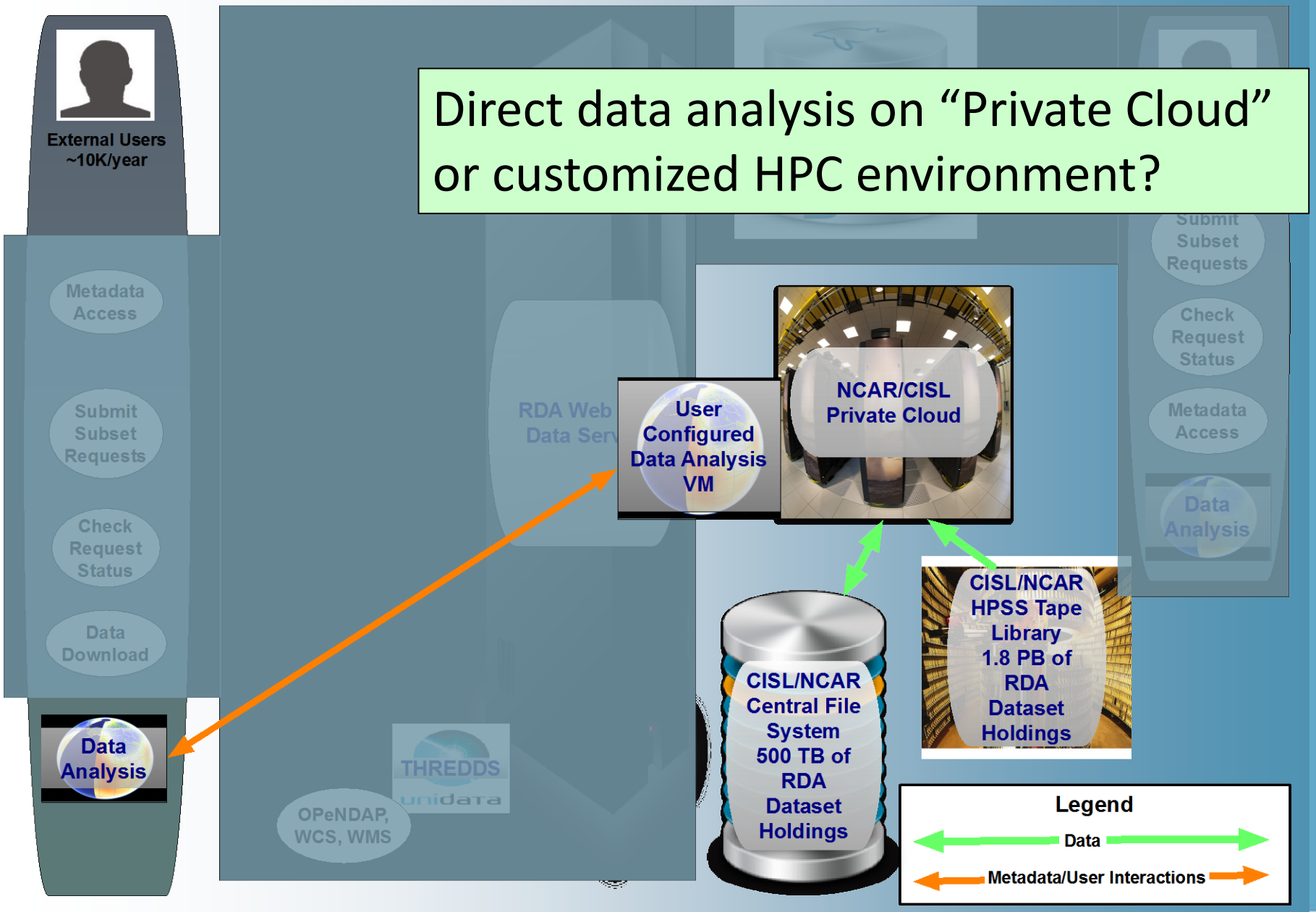


OPeNDAP Access Example Product

RDA Data Access Pathways



Future RDA Data Access Pathways



Highlights

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- User Identity Management
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- User Outreach and User Support
- Lessons Learned and Conclusions

User Identity Management

- Currently many identity management solutions across NCAR
  - RDA (home grown)
- Need a “single-sign-on” and alt-ID solution
  - Ease of use
  - Improve security
  - Reduced costs –eliminate duplication of effort
  - Integrated app development
- User identity as a service?
  - Globus Auth and Nexus?

User Identity Management

- Globus Auth
  - Remove the Need for an RDA Identity
  - Support login with Globus Auth federated identity providers
    - University login
    - Social accounts (google, facebook)
  - Globus Auth sends a standard OpenID connect token that identifies the user
- Globus Nexus
  - Manage RDA Identities?

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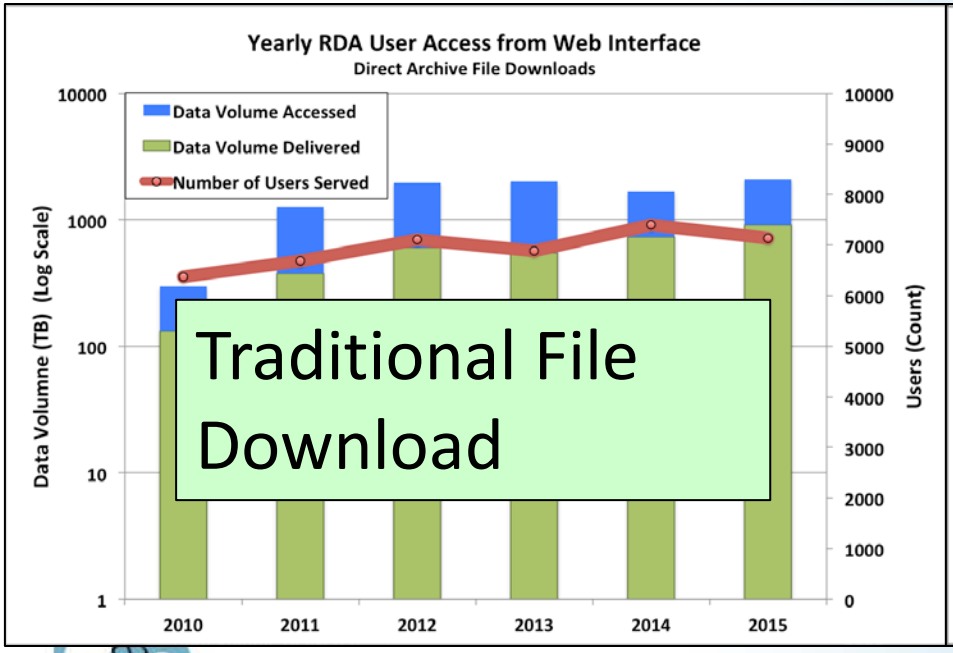
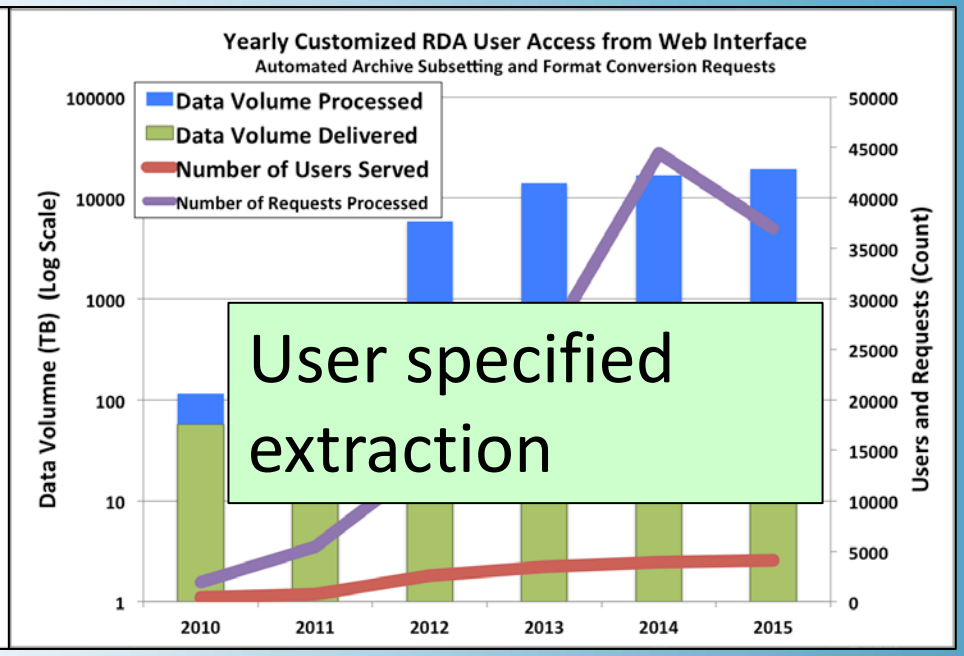
Current Services Overview – Usage metrics





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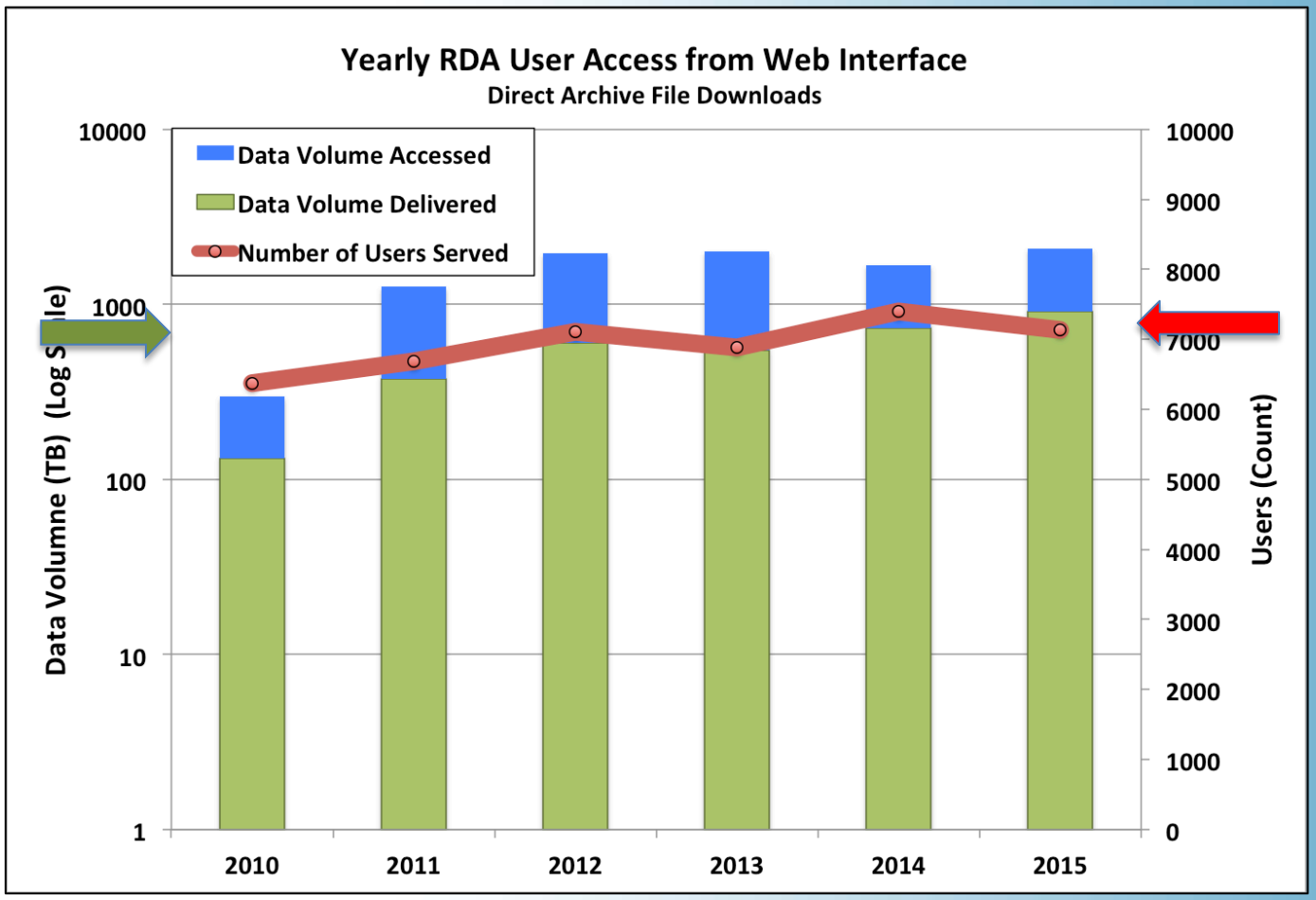
Traditional File Download – Usage metrics



In FY 2015 (through Sep 1)

- 7100 users
- 900TB of data delivered

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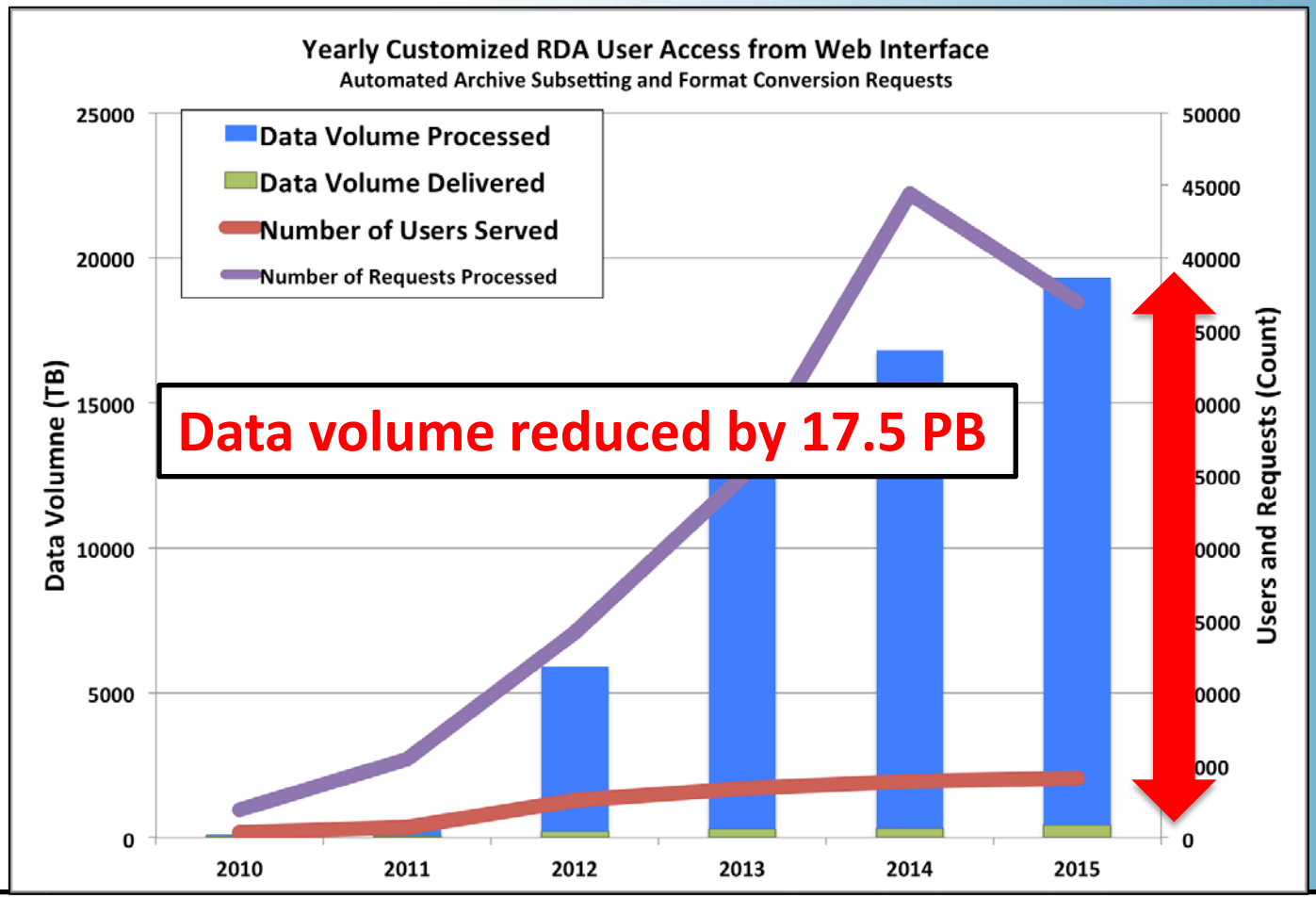
User Specified Extraction –Usage Metrics



In FY 2015 (through Sep 1)

- 37K user requests
- 4000+ users submitted data extraction requests
- 18+ PB data processed **("Parallel" processing on HPC)**
- 380 TB of data delivered

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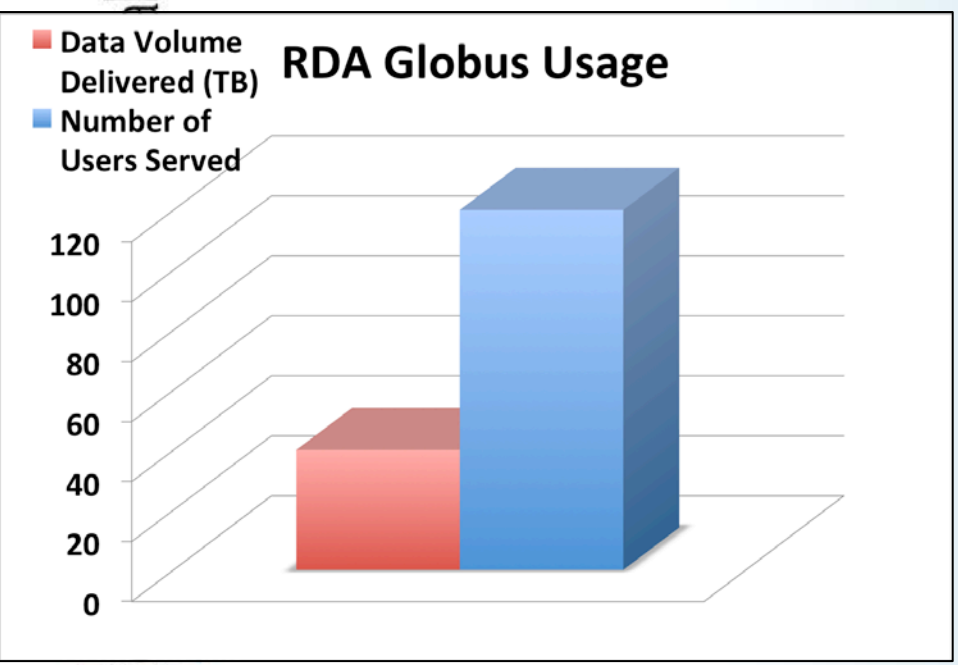
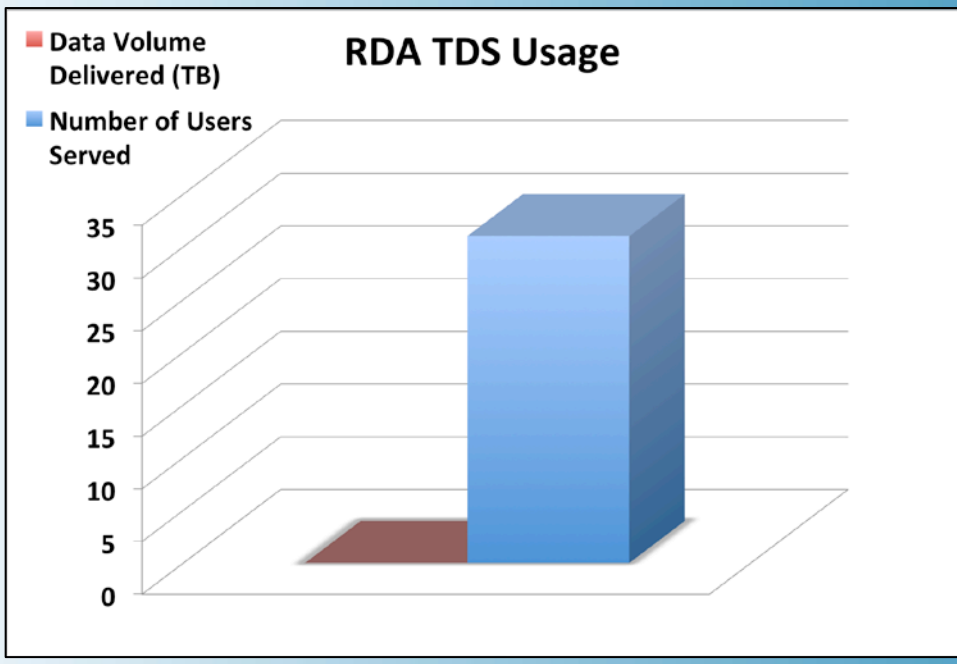
New Services Overview –Usage metrics





In FY 2015 (TDS and Globus usage)

- 120 users transferred 40 TB of data using Globus
- 31 users downloaded 1 TB of data using TDS services (OPeNDAP, Aug 2015)

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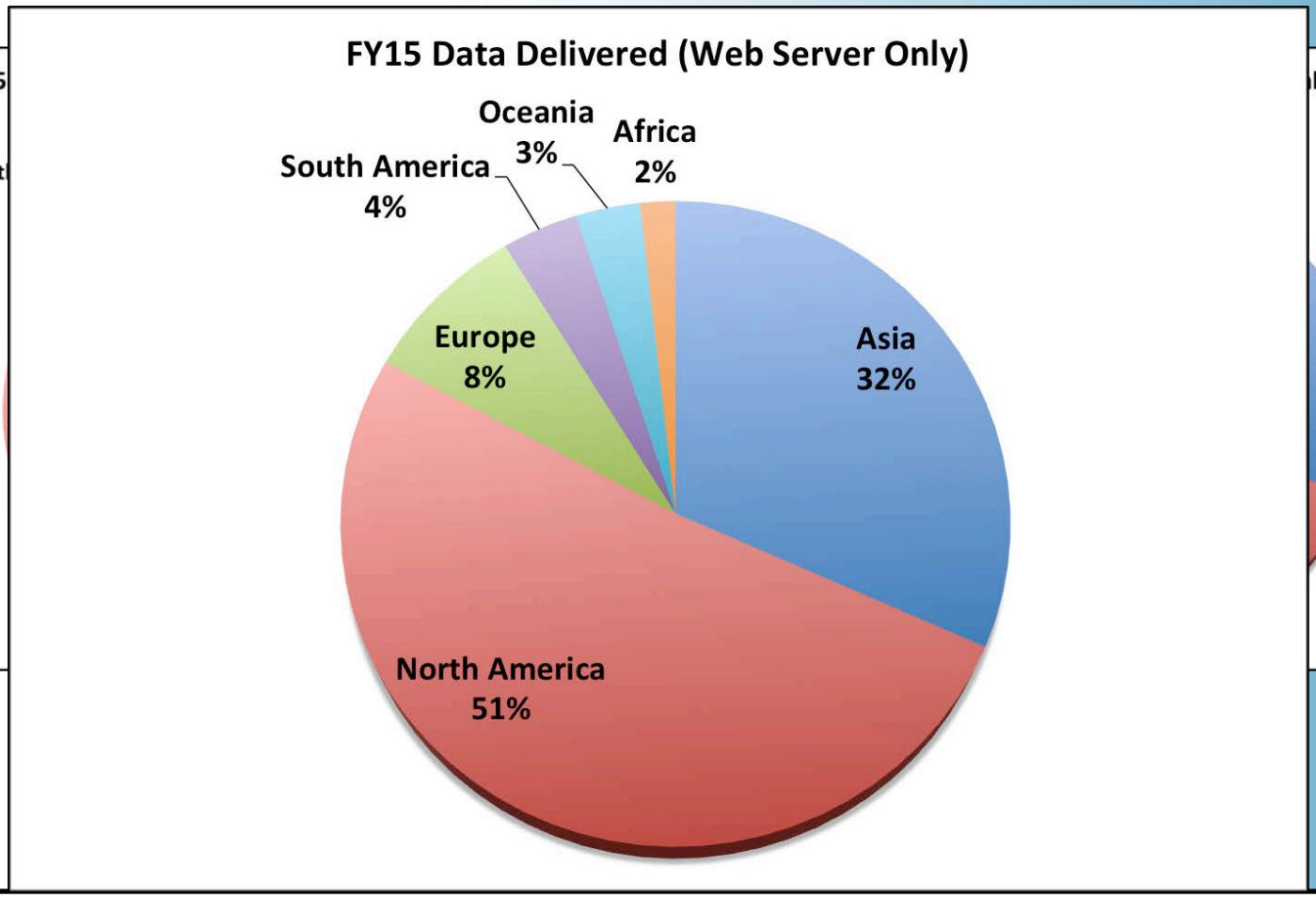
Metrics: Users and Data Delivery by Region

Excluding HPC Usage at NCAR, Web services only



In FY 2015

- 51 % of unique users originate from Asia
- 51 % of data volume downloaded to North American users

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User Outreach and Support

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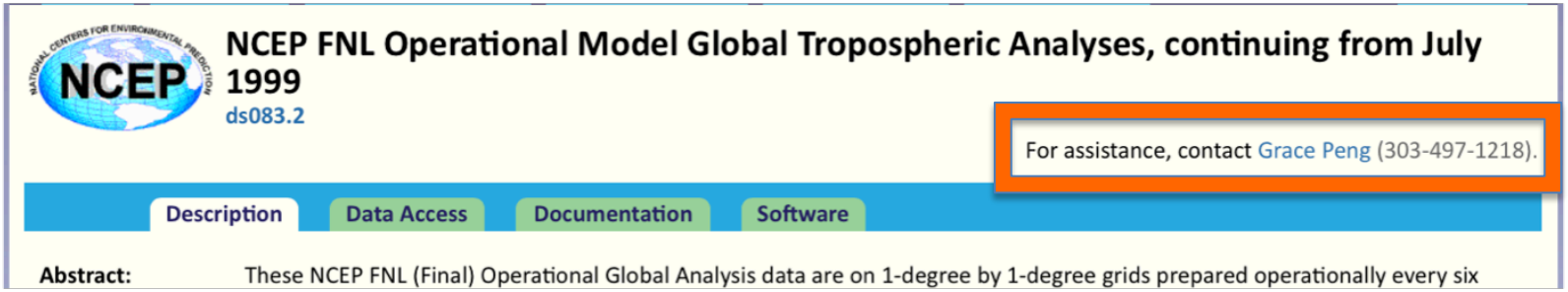
User Outreach and Support

- Dataset consultant listed on each dataset homepage



- General help email rdahelp@ucar.edu
- Future: User tutorial video series

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Lessons Learned

- Archive structure impacts efficiency of data access services
  - Use cases: climate vs weather research
  - Use of tar packages/compression
- Programmatic metadata harvesting critical to support value added services
- Faceted search tends to be overly complicated and not regularly used
- Interoperable tools lack authentication support
- Usage metrics for HPC users tough to capture

Conclusions

- The RDA is a large, growing, heterogeneous archive
- Evolution of RDA Services
  - Consultant Driven -> One-to-one
  - Metadata Driven -> One-to-many
- User Identity Management
  - Need single-sign-on and alt-id provider support
- User Outreach and User Support
  - Traditional methods and social media

Questions?

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