CADC and CANFAR: An Integrated VO-Enabled Framework

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Canadian Astronomy Data Centre

- National facility for open access
- Telescope collections:
  - Multiple missions, facilities and wavelengths
  - Pointed and survey observations
  - 12 telescopes
  - 6 advanced data collections
- Services
  - Archive services
  - Data curation
  - Community projects
- Many international collaborations
- Development and operations hub for CANFAR

The Canadian Astronomy Data Centre

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In the meanwhile, if you are unable to access the information you require, please contact us at cadc@nrc.gc.ca for assistance in the official language of your choice.

Thank you for your patience.

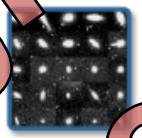

Advanced Query Service


Astronomy Meetings


CFHT Legacy Survey

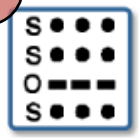

CFHT MegaCam Stacks

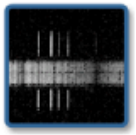

Canadian Virtual Observatory Services


Community Projects


WIRWolf CFHT WIRCam stacks


Programmatic Archive Access


Solar System Object Search


DAO Spectroscopic Plate Archive


BLAST


CFHT


CGPS


DAO


FUSE

Gemini

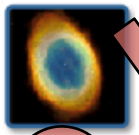

HST


JCMT


MACHO


MOST


AstroCat


Digitized Sky Survey


Guide Stars

U.S. Naval Observatory A2 Catalog

Vizier

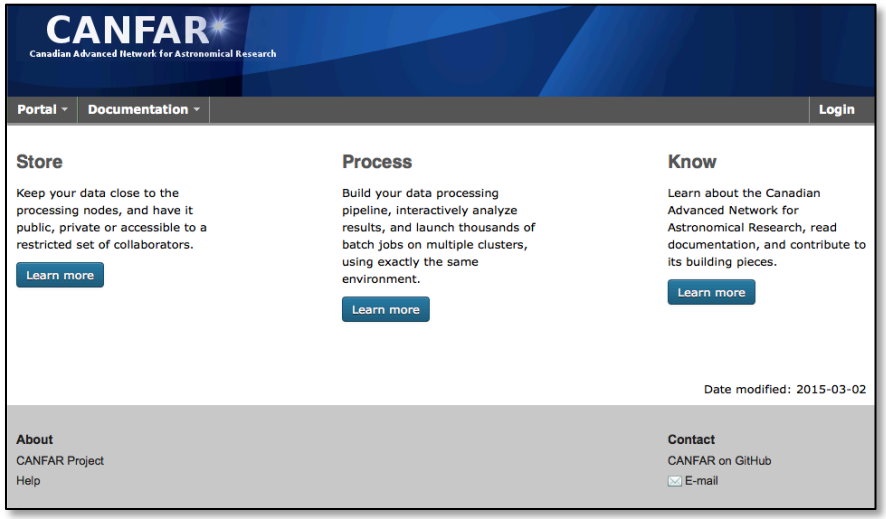
CANFAR

Advanced Search

- Enabled by CAOM (CADC's Common Archive Observation Model)
- Single query interface to "all" CADC collections
- With proprietary metadata and data access
- Support VO DAL/DM with views
- Many years in the making
- Released September 2013

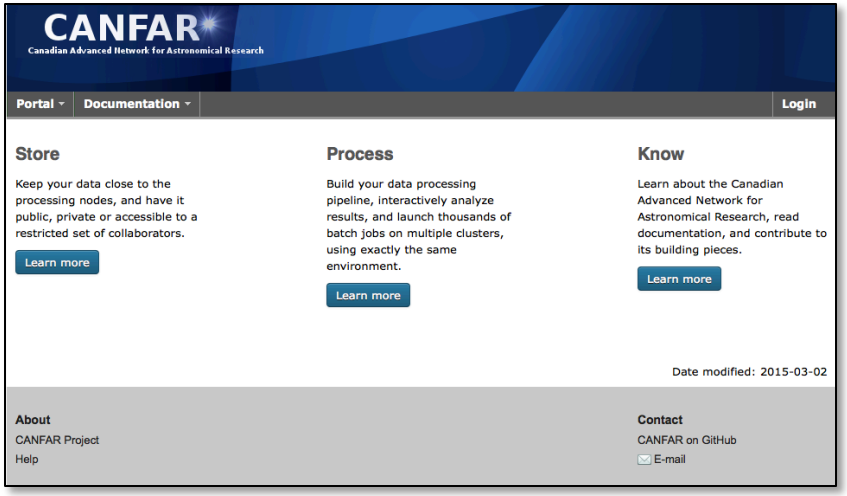
Canadian Advanced Network for Astronomical Research

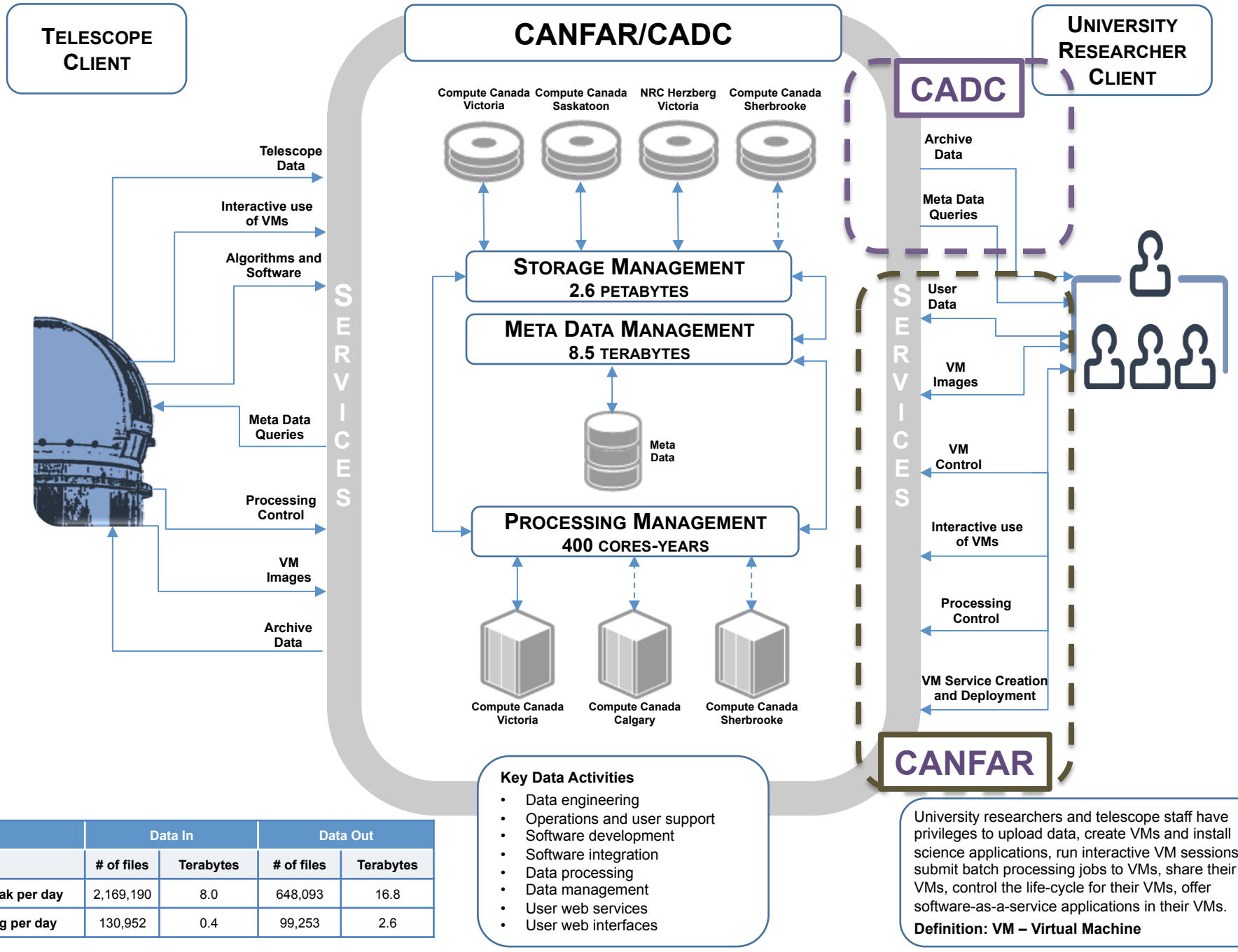
- A cloud ecosystem for data intensive astronomy
- A platform supporting many virtual organisations
- User services
  - Store and share data
  - Create and share VMs
  - Run VMs close to data
    - Interactive for data exploration
    - Persistent for SaaS
    - Batch processing in Virtual Clusters
- Federated research cloud resources
  - Compute Canada
- Integrated:
  - Authentication and authorization
  - Access to telescope data
  - Access to user storage
- In operation since 2011



CANFAR/CADC 2014

- Size:
  - 233M files (932M files)
  - 597 TiB (2.3 PiB)
- Users
  - Authenticated access: 762
  - Anonymous access: 7,544
  - Registered: 7,018
- Data handled in the last year
  - TiB: 1,106
  - Files: 91M
- Batch processing
  - 488 Core-years
  - 2.7M jobs





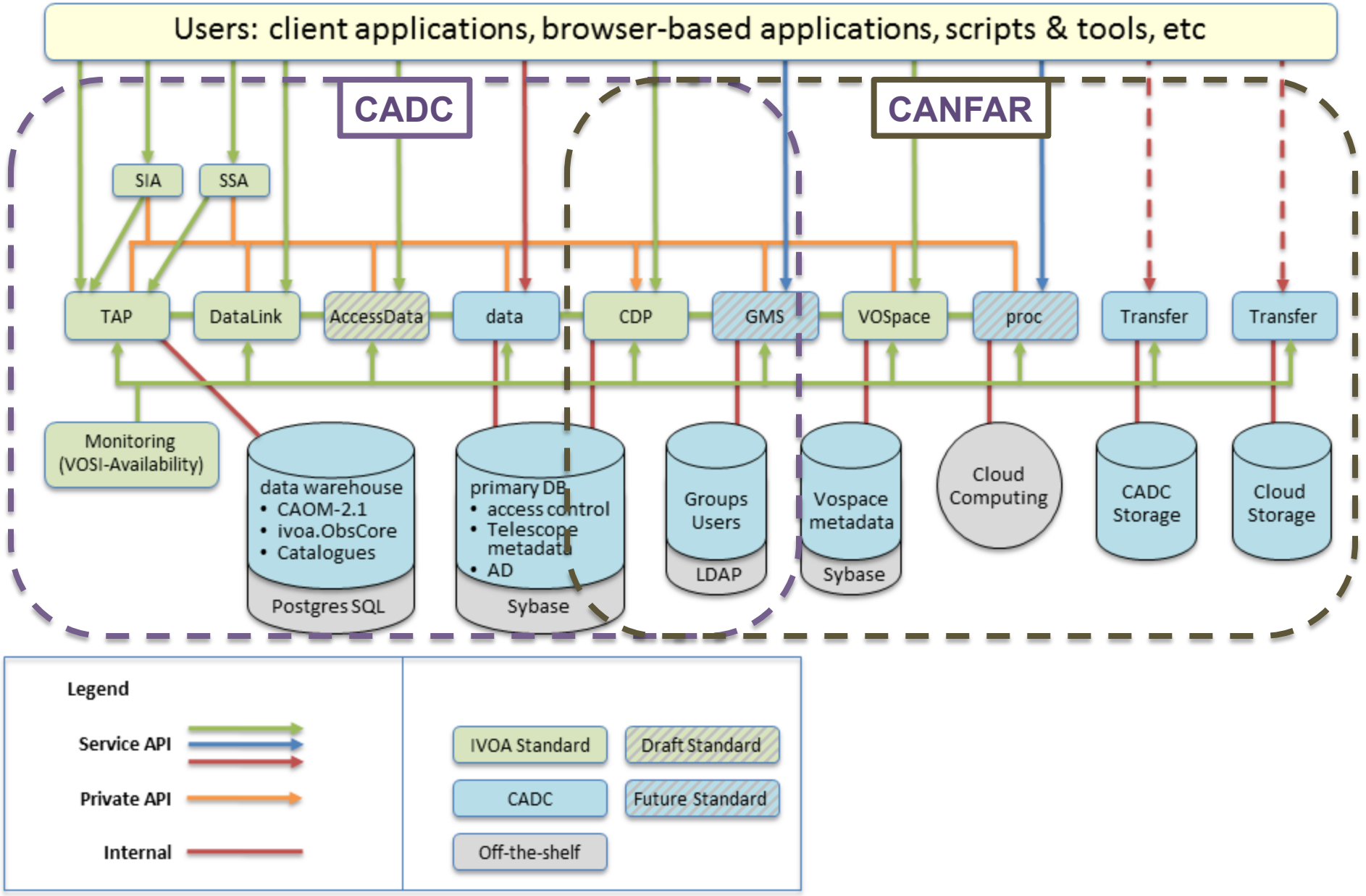
	Data In		Data Out	
	# of files	Terabytes	# of files	Terabytes
Peak per day	2,169,190	8.0	648,093	16.8
Avg per day	130,952	0.4	99,253	2.6

IVOA Standards

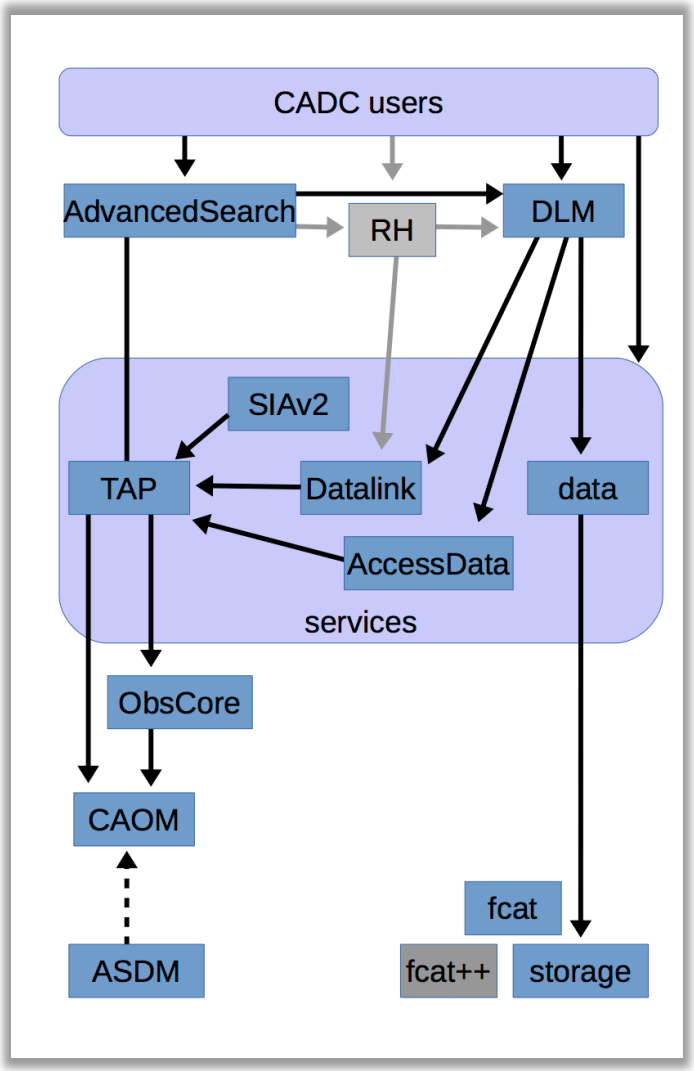
- ADQL 2.0
- CDP 1.0
- DALI 1.0
- DataLink 1.0
- ObsCore 1.0
- SIA 1.0
- SimpleDALRegExt 1.0
- SSO 1.01
- TAP 1.0
- TAPRegExt 1.0
- UWS 1.0
- VODataService 1.1
- VOResource 1.03
- VOSI 1.0
- VOSpace 2.0
- VOTable 1.1, 1.2, 1.3
- RegistryInterfaces 1.0

PR and WD implementations

Reference Implementations of Proposed Recommentations	Prototype implementations of Working Drafts
• *DataLink 1.0* • SIA 2.0	• ObsCore 1.1 • UWS 1.1 • SSO 2.0 • VOSpace 2.1 • TAP 1.1 • AccessData 1.0 • VOSI-tables 1.1


Users: client applications, browser-based applications, scripts & tools, etc
CADC
CANFAR
SIA
SSA
TAP
DataLink
AccessData
data
CDP
GMS
VOSpace
proc
Transfer
Transfer
Monitoring
(VOSI-Availability)
data warehouse
• CAOM-2.1
• ivoa.ObsCore
• Catalogues
Postgres SQL
primary DB
• access control
• Telescope metadata
• AD
Sybase
Groups
Users
LDAP
Vospace
metadata
Sybase
Cloud
Computing
CADC
Storage
Cloud
Storage
Legend
Service API
Private API
Internal
IVOA Standard
Draft Standard
CADC
Future Standard
Off-the-shelf

AdvancedSearch and VO standards



VO Discovery and Access

- The VO models are views on CAOM:
  - **ObsCore**: observation.intent = "science" and plane.calibrationLevel is not null
  - **SIAv2**: ObsCore and plane.dataProductType in ("image", "cube")
  - **SIAv1**: observation.intent="science" and plane.calibrationLevel > 1 and plane.dataProductType = "image" and artifact.productType = "science"
  - ***SSA***:* observation.intent="science" and plane.calibrationLevel > 1 and *and plane.dataProductType = "spectrum"*

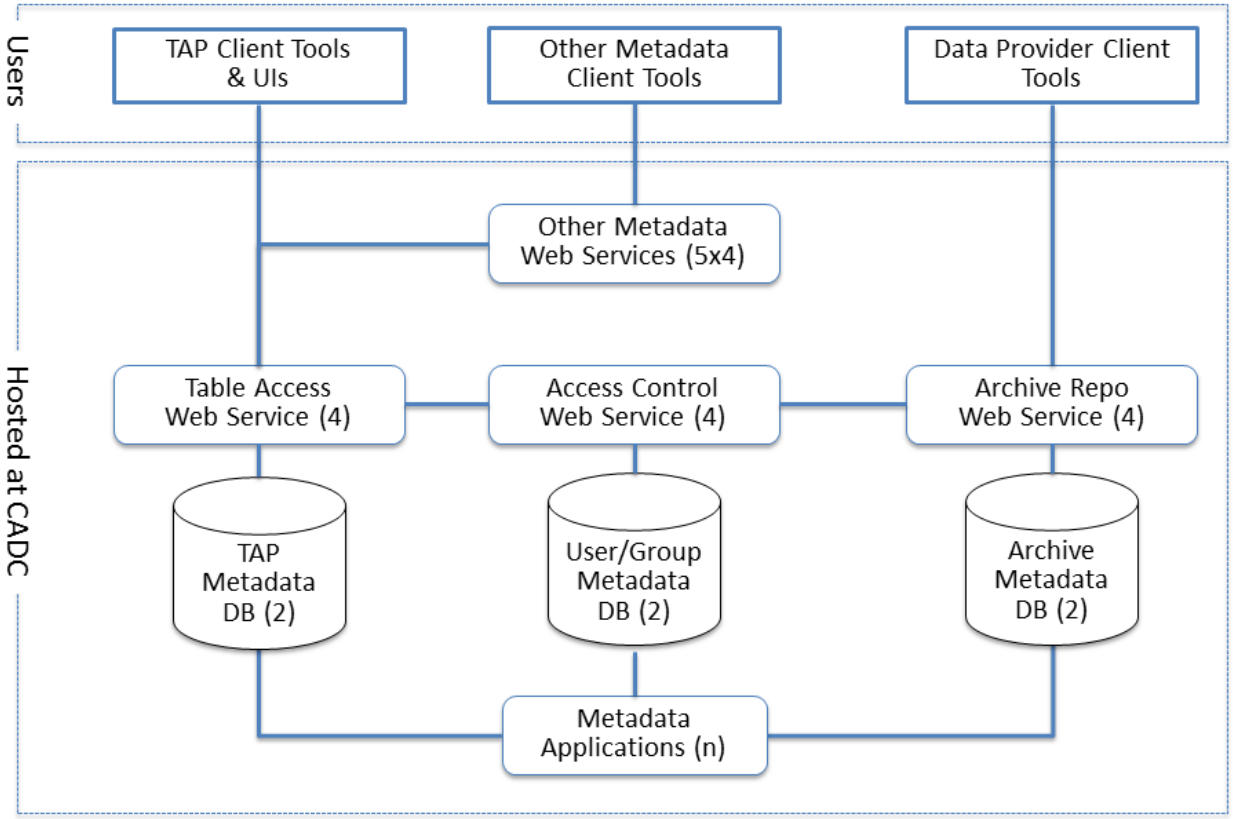
Data Model	All Collections	CFHT	Gemini	HST	JCMT	UKIRT
CAOM with VO Table Access Protocol (TAP)	9,156,115	2,326,217	1,040,051	2,506,648	1,329,312	1,288,458
VO ObsCore with Table Access Protocol (TAP)	6,166,103	1,595,230	313,580	1,694,645	1,095,414	975,765
VO Simple Image Access (SIA)	3,970,840	1,357,035	313,580	1,675,171	217,076	-
VO Simple Image Access Version 2 (SIAv2)	4,141,400	1,414,808	313,580	1,671,236	333,734	-
VO Simple Spectral Access (SSA)	*513,508*	180,475	-	23,409	226,392	-

**Not yet implemented*

Publishing Data with CAOM

- Supported by:
  - python and java libraries
  - java application
- Web service for persistence and retrieval
- Google Code repository

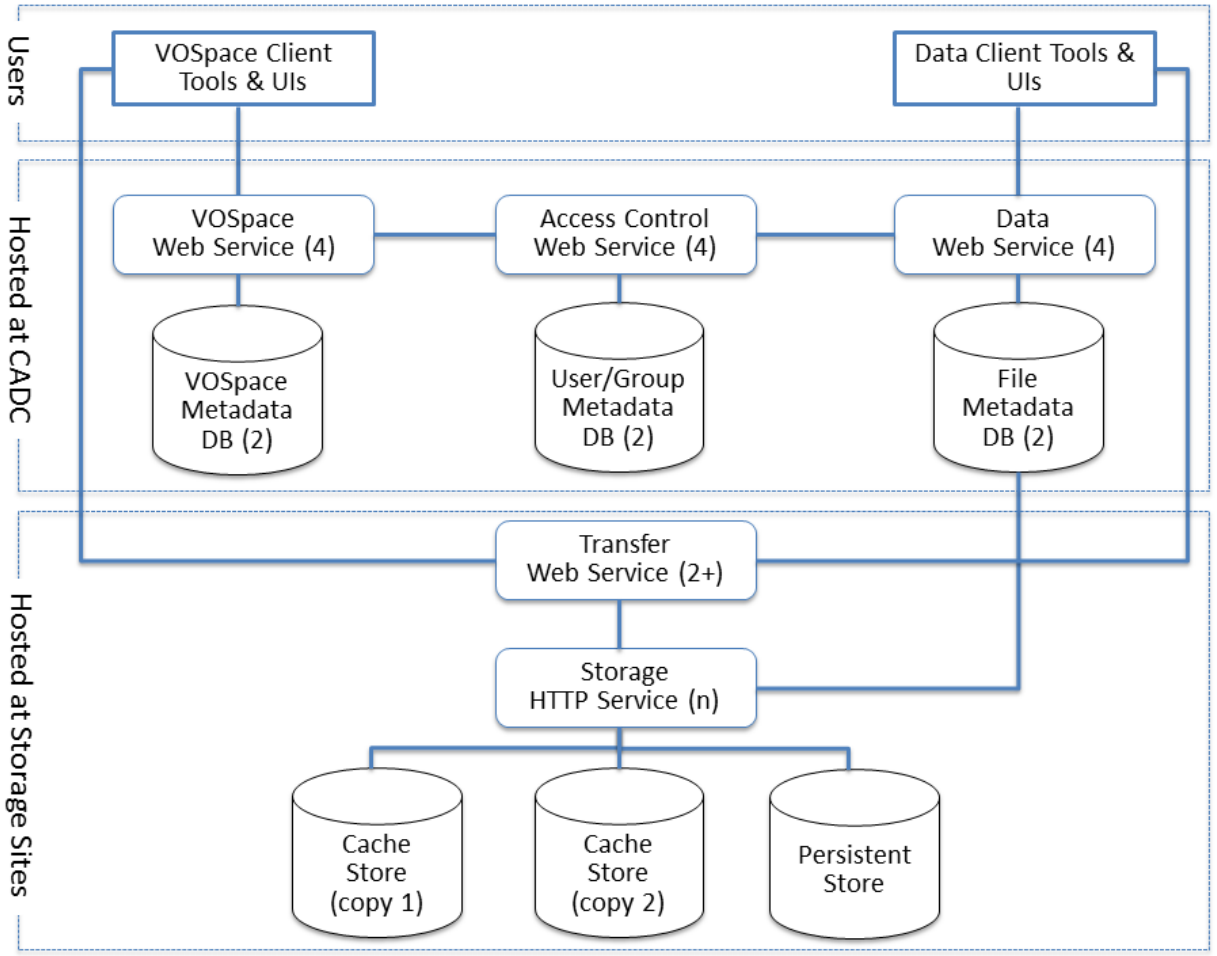
- Tools for user contributed publishing



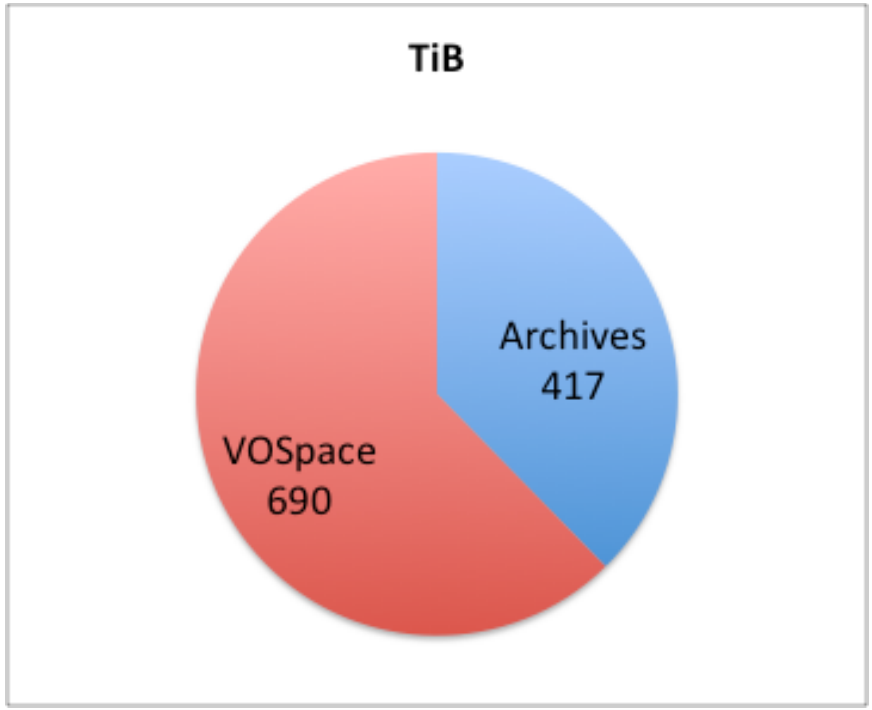

CANFAR
Canadian Advanced Network for Astronomical Research
Welcome Severin Gaudet
Register | Log Out | About
gaudet
10 items, 49.95 GB available
Name
Size
Last Modified (UTC)
..
--
ESAC_talks
16.93 MB
2012-09-19 - 23:55:11
Euclid_Bologna
12.50 MB
2012-09-21 - 10:18:35
HST_previews
1.97 MB
2012-09-19 - 23:54:52
rsstest
2.41 MB
2012-09-19 - 23:53:25
rsstestpub
1.85 MB
2012-09-19 - 23:53:25
Sao_Paolo
11.92 MB
2012-11-15 - 00:36:11
Talks
2.19 MB
2012-10-01 - 06:21:09
TAP
98.75 kB
2013-02-21 - 16:39:14
TAP_queries
100.58 kB
2012-09-19 - 23:54:52
vm
0 bytes
2011-05-09 - 22:59:45
Actions
Add files
Add folder
Upload folder
Add link
Add bookmark link
Download
Delete
Move
Edit permissions
Manage Groups
Powered by
UBC
CADC/CCDA
canarie
compute • calcul
CANADA
CSA ASC

VOSpace

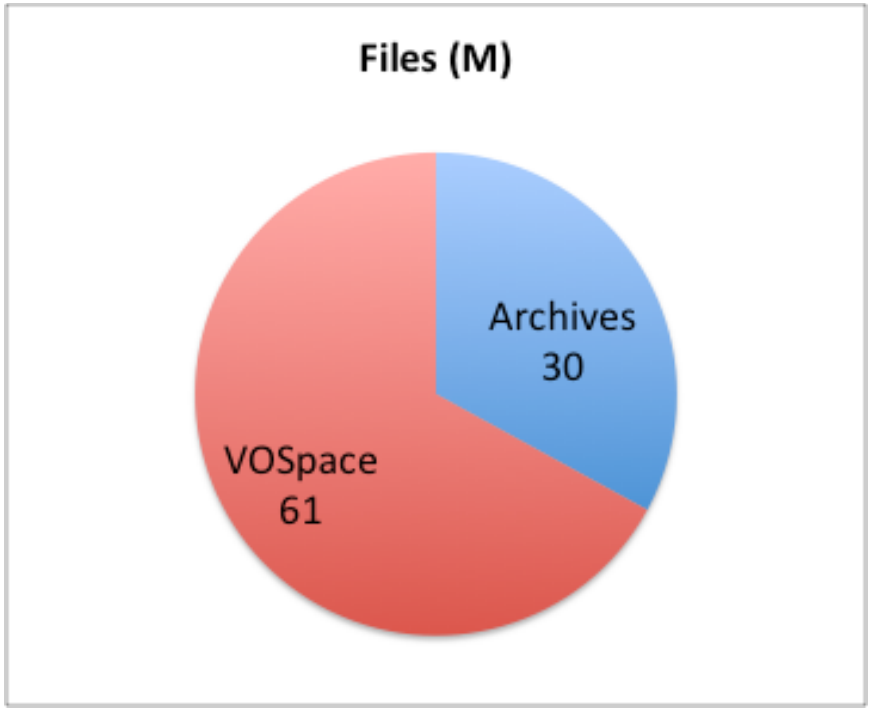
- Storage web services using several distributed storage resources
- Optimization and QoS strategies not user nor provider dependent
- Same system for both archive and users
- File in/File out



VOSpace usage in 2014

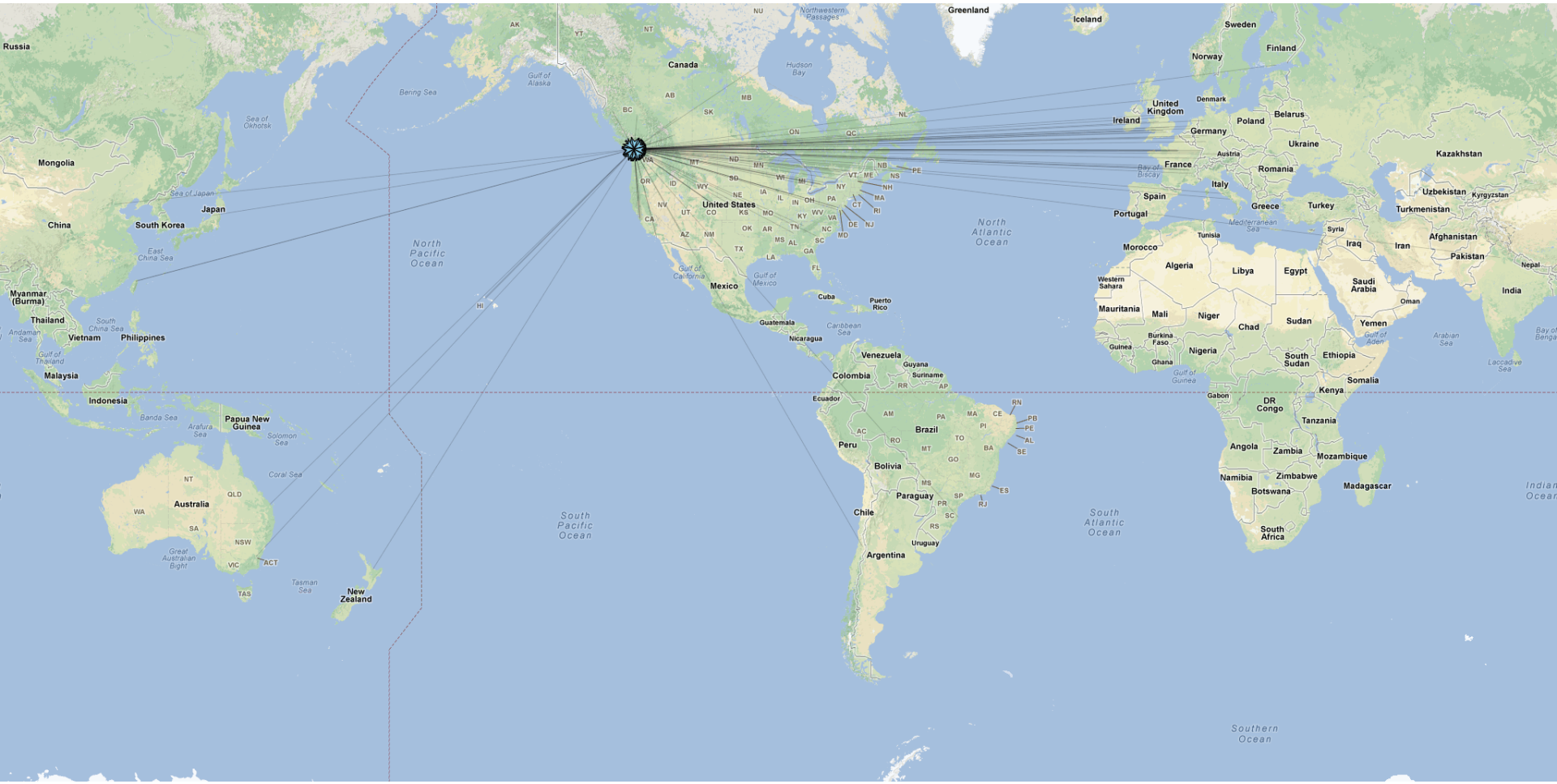


62% VOSpace
Average per week: 13.3
Peak week: 39.0

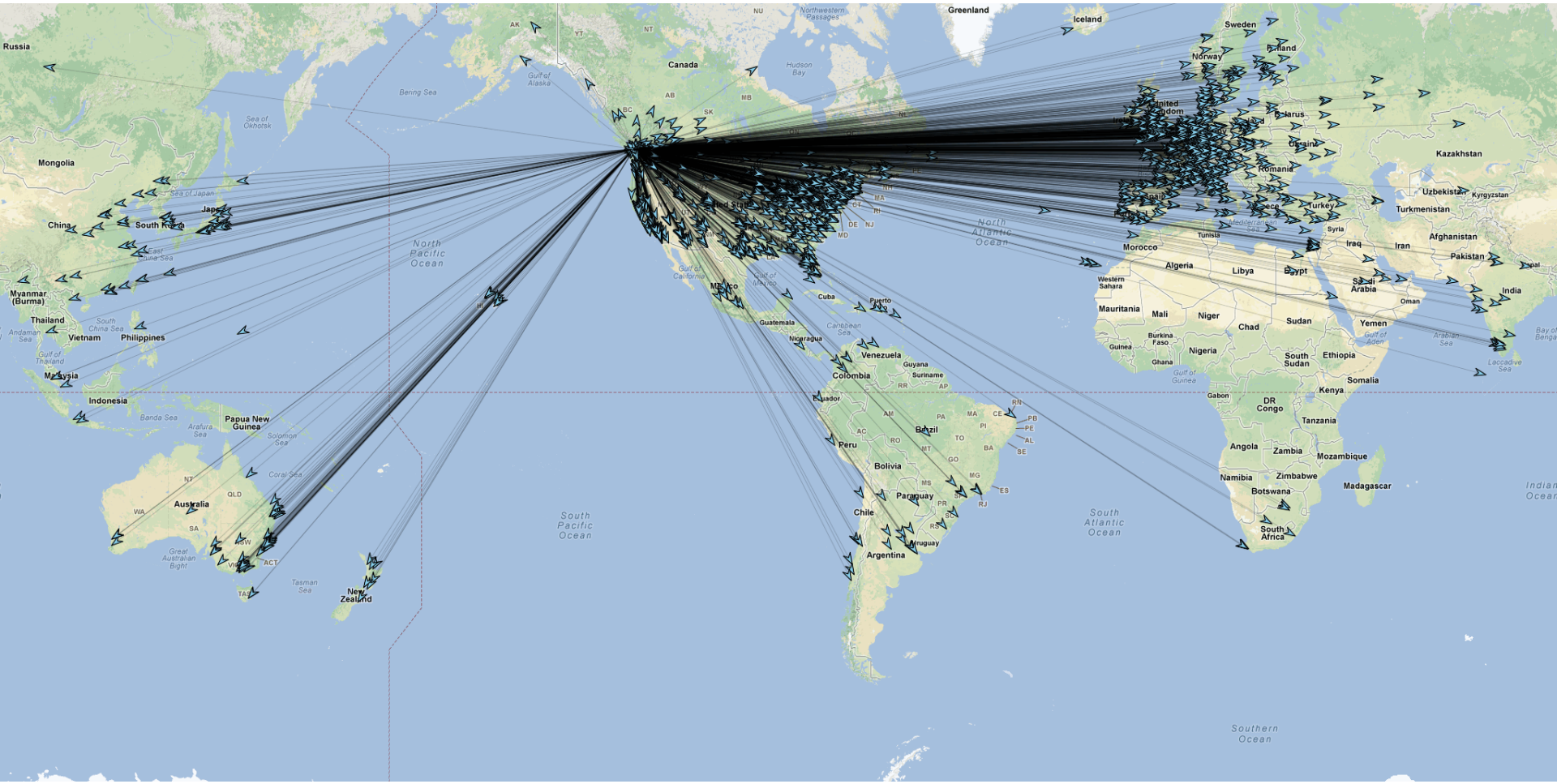


67% VOSpace
Average per week: 1.2M
Peak week: 11.7M

Geography of VOSpace PUTs



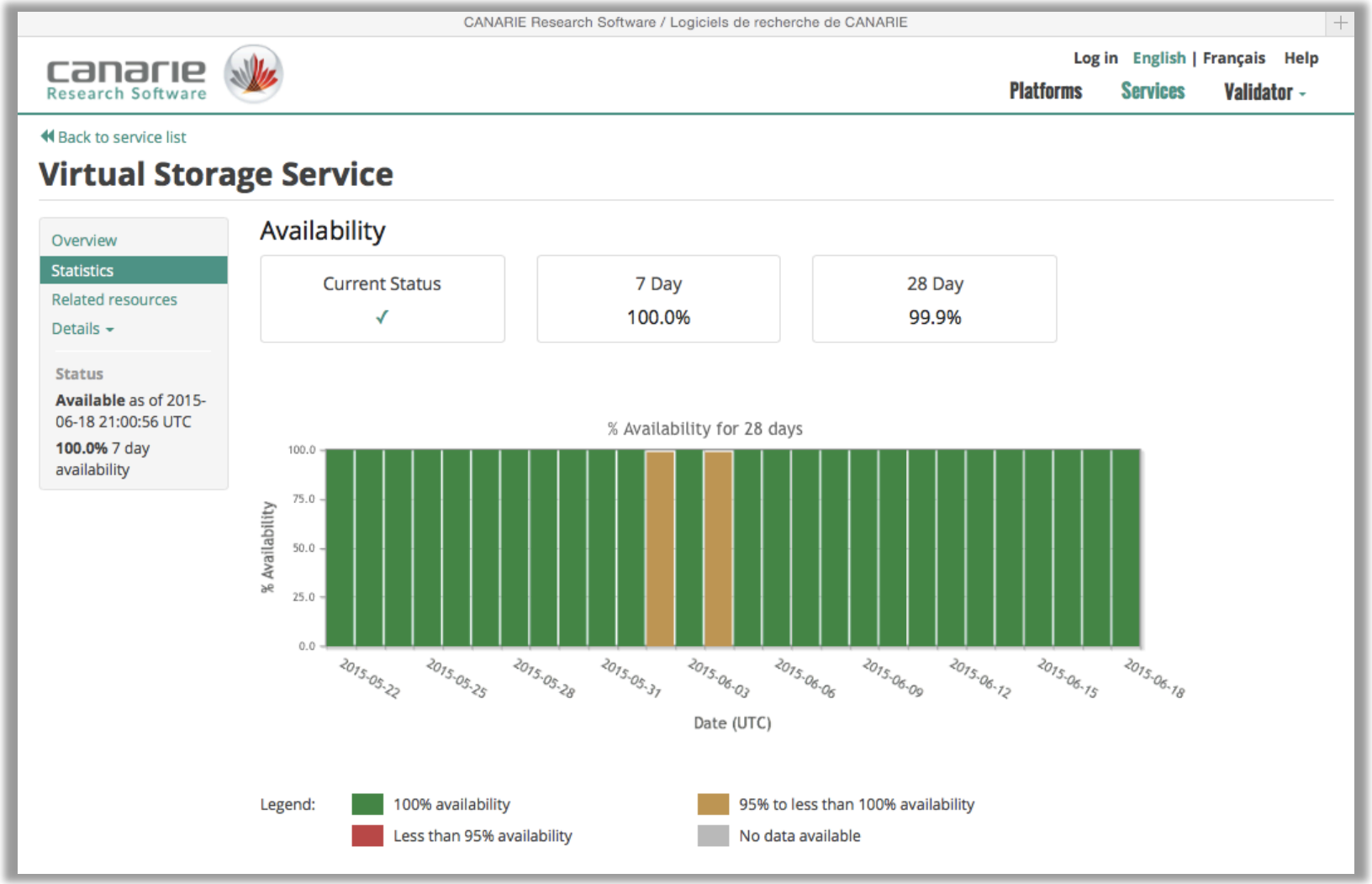
Geography of VOSpace GETs



Usage Numbers

Service	Kibana query	May 2015	Average per day
CDP	service:"cred_ws" AND phase:"END"	3,729,581	120,309
TAP	service:"tap_ws" AND phase:"END"	211,500	6,823
UWS	method:"UWS"	14,099,486	454,822
SIAv1	service:"sia_ws" AND "/sia/query" AND phase:"END"	3,848	124
VOSpace	service:"vospace_ws" AND phase:"END"	6,447,554	207,986
DataLink	service:"caom2ops_ws" AND datapath:"/caom2ops/datalink"	44,610	1,439
AccessData	msg:"cutout" AND msg:"http" AND !msg:"Cutout request.”	205	7
SIAv2	service:"sia_ws" AND "/sia/v2query" AND phase:"END"	29	1
GMS	(service:"ac_ws" OR service:"gms_ws") AND phase:"END"	4,452,772	143,638
Proc	service:"proc_ws" AND phase:"END"	441	14

Example: Service Registration and Monitoring



Questions?