

ESDC VO Services Status

Sara Nieto on behalf of the ESAC Science Data Centre

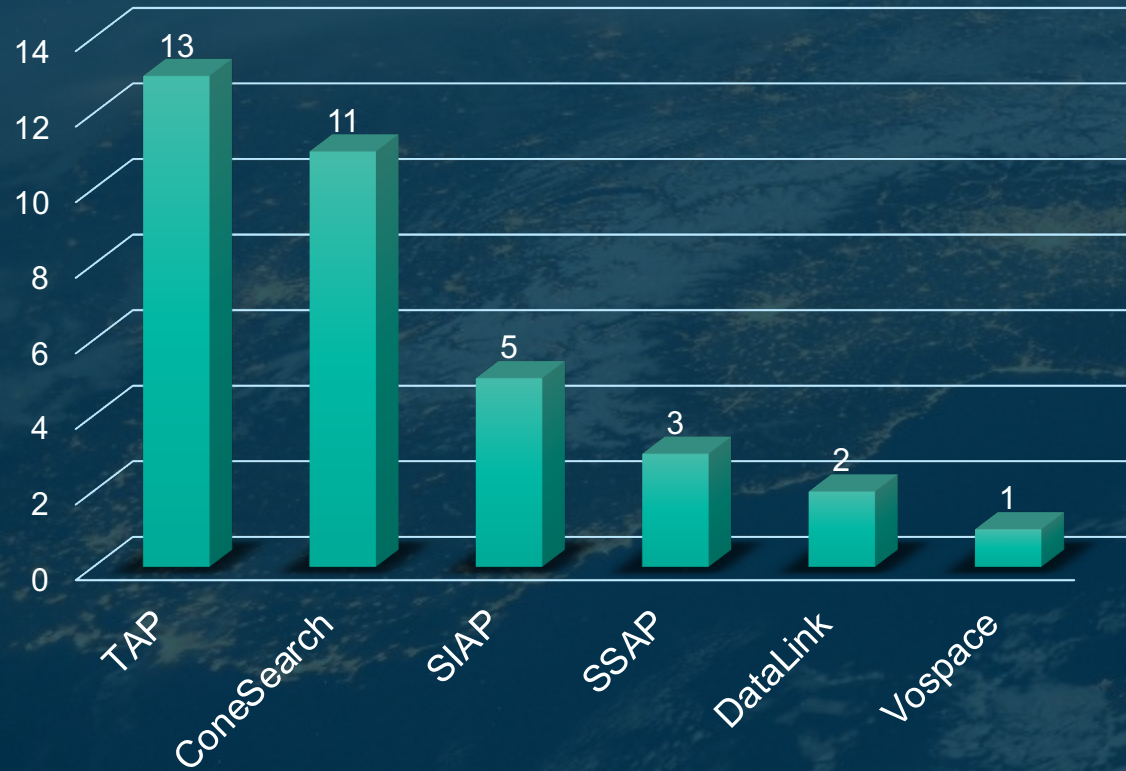
Ignacio Leon, Monica Fernandez, Jose Osinde, Carlos Rios, Ruben DoCasal, Anastasia Andres, Pilar de Teodoro,
Joaquim Oliveira, Hector Perez

RHEA for ESA and Aurora for ESA

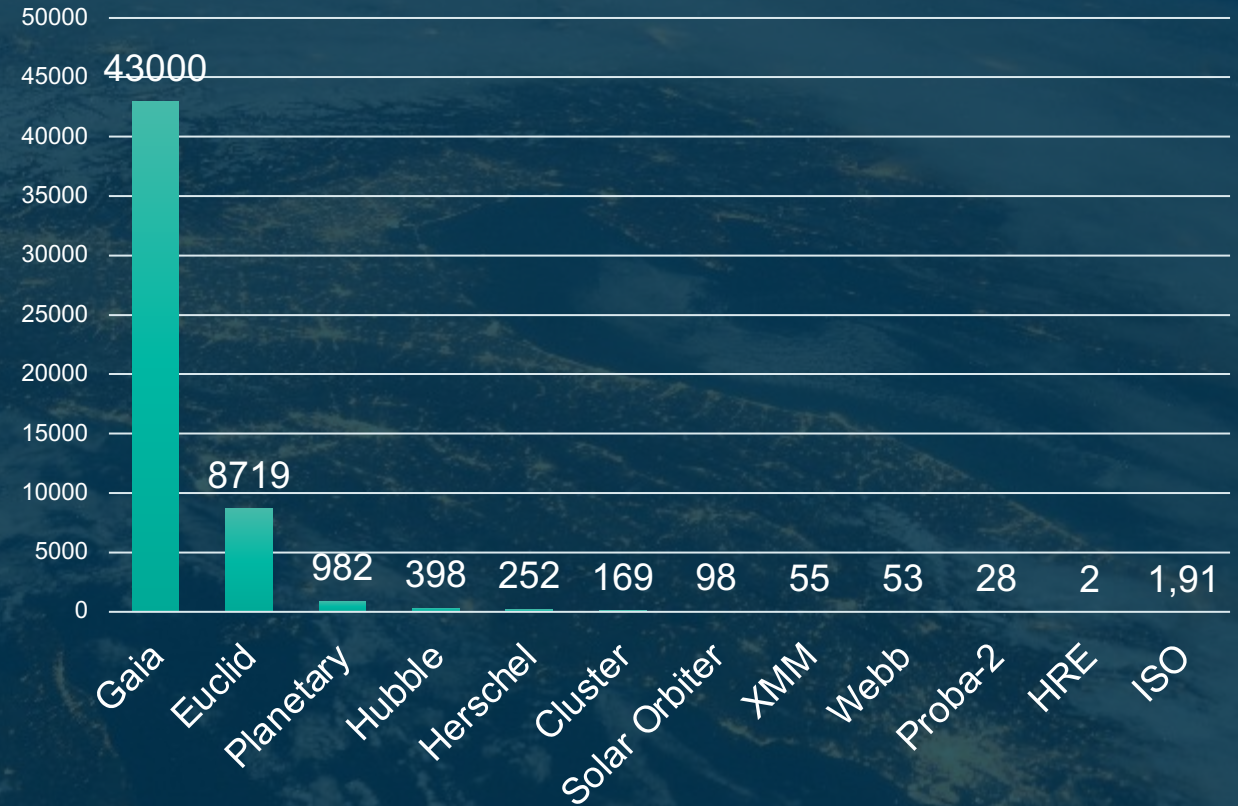
IVOA interoperability meeting, 10/05/2023

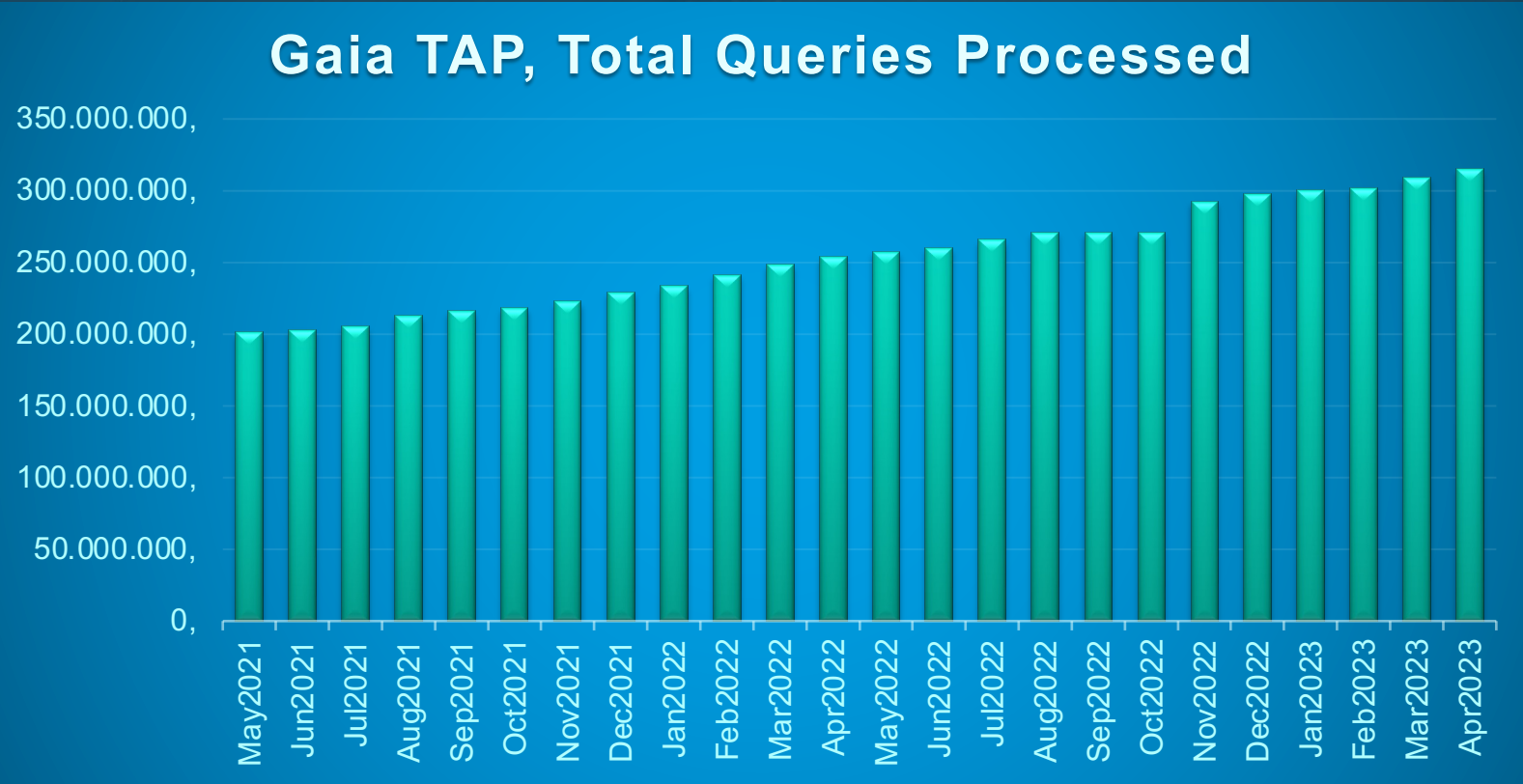
Summary of ESDC VO services

ESDC VO Services

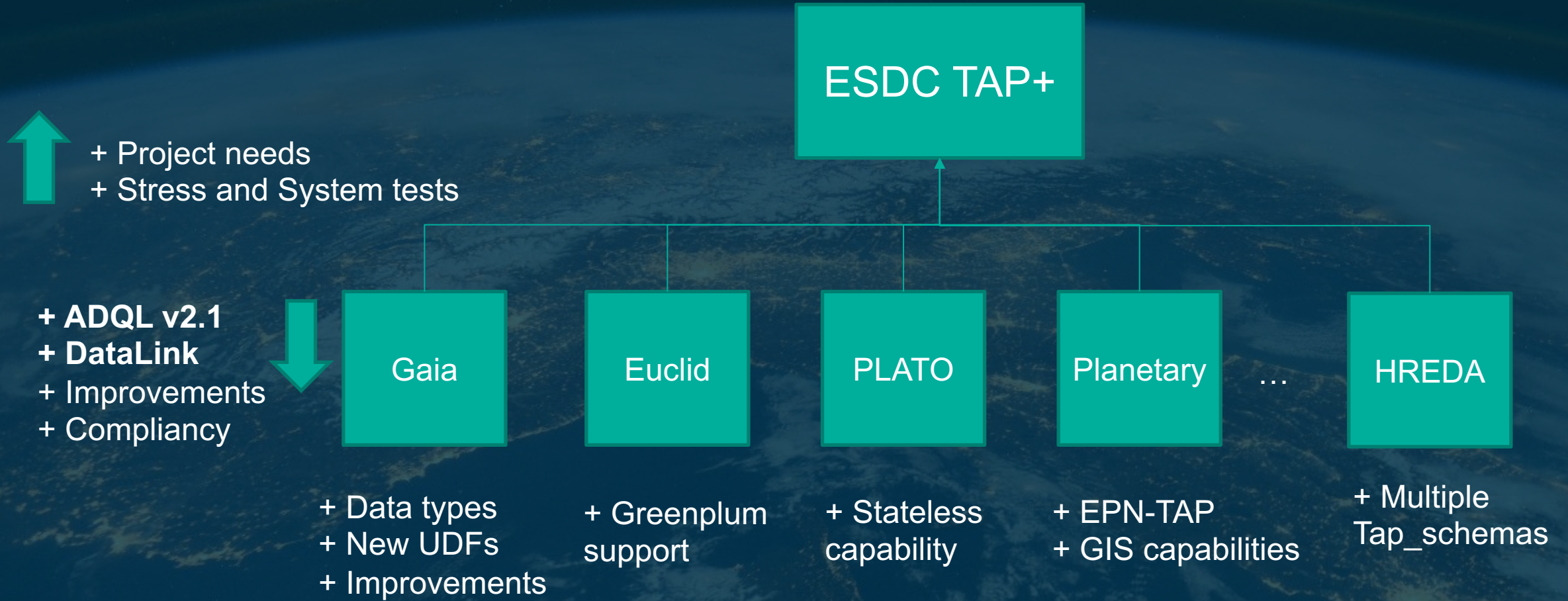


TAP Database Size (GB)





ESDC TAP+ Evolution Model



- Implementation of ADQL v2.1 PR-ADQL-2.1-20210528
 - New proposal currently under review, ([20230418](#))
- Improve general compliancy according to the specification
 - Update data types according to DALI (20170517), VOTable v1.4 (20190131)
- ADQL/UDF
 - New UDFs ivo_* and gavo_* functions added as part of the library
 - New ESDC esdc_* UDF functions as part of the library: esdc_epoch_prop...
 - Backwards compatibility for former ESDC UDFs
- Integration tests
 - We currently use a local execution of stilts taplint checks
- Improved statistics gathering with a distributed analytical engine

ESDC Services Evolution: TAP+



- Compliance automation check using recent REST API at Euro-VO Registry service. See Henrik's presentation on Euro-VO v3.1
 - <https://registry.euro-vo.org/evor/eurovoweb/validation?type=TAP1.1&url=https://xxx/tap-server/tap>
- Visual dashboard for stored TAP+ statistics
- HEALPix UDFs. Implies a new extension required for a Postgres database running TAP
- VOTable types: Support for multi-dimensional arrays
- SSO next version compliance: Cookie Authentication and VOSI Capabilities

GACS (ivoa_cookie)

```
% curl --head https://geaint.esac.esa.int/tap-server/tap/capabilities
HTTP/1.1 500 500 --> HTTP/1.1 200 200
Date: Mon, 25 Apr 2022 15:07:14 GMT
Server: Apache/2.4.6 (Red Hat Enterprise Linux) OpenSSL/1.0.2k-fips mod_jk/1.2.43
--> WWW-Authenticate: ivoa_cookie standard_id="ivo://ivoa.net/sso#tls-with-password", access_url="https://geaint.esac.esa.int/tap-server/login"
Connection: close
Content-Type: text/html; charset=ISO-8859-1
...

% curl -D - -d username=mtaylo02 -d password=xxxx https://geaint.esac.esa.int/tap-server/login -s -o /dev/null
HTTP/1.1 200 200
Date: Mon, 25 Apr 2022 15:08:53 GMT
Server: Apache/2.4.6 (Red Hat Enterprise Linux) OpenSSL/1.0.2k-fips mod_jk/1.2.43
--> X-VU-Authenticated: mtaylo02
Set-Cookie: JSESSIONID=108FF2B1379BEFAE6FF580BFxxxxxxx; Path=/tap-server; Secure; HttpOnly
Transfer-Encoding: chunked
Content-Type: text/plain; charset=UTF-8
...

% curl --header 'Cookie: JSESSIONID=108FF2B1379BEFAE6FF580BFxxxxxxx' https://geaint.esac.esa.int/tap-server/tap/async -D -
HTTP/1.1 200 200
Date: Mon, 25 Apr 2022 15:28:34 GMT
Server: Apache/2.4.6 (Red Hat Enterprise Linux) OpenSSL/1.0.2k-fips mod_jk/1.2.43
--> X-VU-Authenticated: mtaylo02
Transfer-Encoding: chunked
Content-Type: text/xml; charset=UTF-8
...

<?xml version="1.0" encoding="UTF-8"?>
<uvs:jobs xmlns:uvs="http://www.ivoa.net/xml/UWS/v1.0" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xs="http://www.w3.org/2001/XMLSchema" ...>
  <uvs:jobref id="16508994201071" xlink:href="https://geaint.esac.esa.int/tap-server/tap/async/16508994201071"><uvs:phase>COMPLETED</uvs:phase></uvs:jobref>
  ...
```

Content in magenta is not currently provided by the service (it's hacked in by TOPCAT)

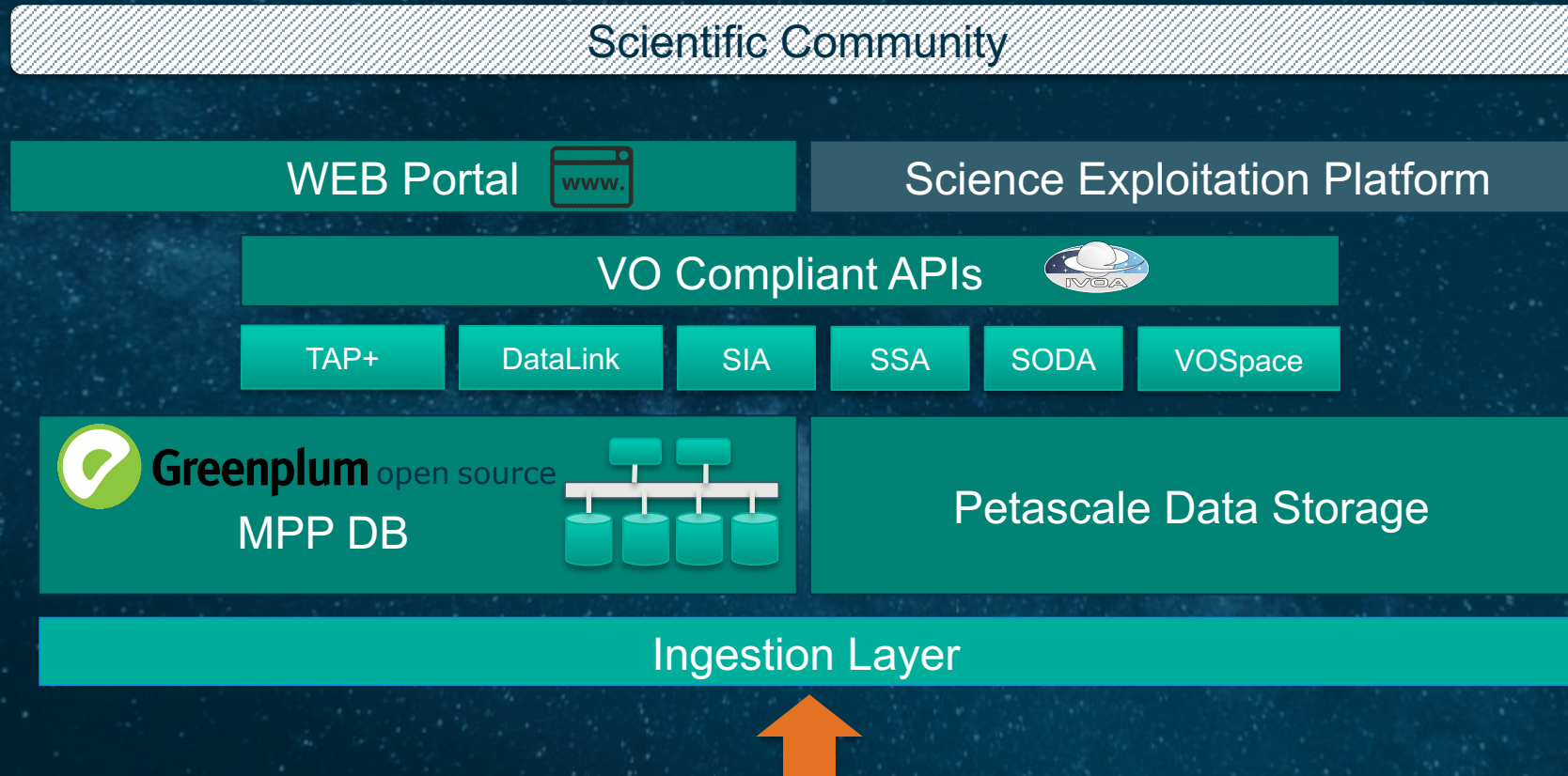


- New proposal currently under review, at <https://www.ivoa.net/documents/DataLink/20230413/index.html>
- GACS TAP+/DataLink Authentication method
- GACS DataLink will provide DR#4 data access
- Euclid DataLink will provide EROs data access

The screenshot displays the Gaia Job DataLink interface. On the left, the 'gaia archive' search results are shown, including categories like 'Other', 'Gaia Data Release 1-3', 'Astrophysical parameters', and 'User tables'. The main panel shows a search for 'gaia' with a 'Job name' field and a 'Status' column. A modal window titled 'Gaia Job DataLink' is open, providing information about the DataLink protocol and ancillary products. It lists several data products with their counts and download icons:

- MCMC MSC (126)
- XP mean continuous spectra (126)
- Epoch photometry (126)
- MCMC GSP-Phot (92)
- XP mean sampled spectra (18)

The modal also includes a 'Show Data' button, a 'Data release' dropdown set to 'Gaia DR3', a 'Data structure' dropdown set to 'INDIVIDUAL', and a 'Download format' dropdown set to 'VOTable'. A 'Save All Data' button is also present. At the bottom of the modal, it states: 'Depending on the amount and type of data retrieved, Archive response times range from seconds to minutes.' The background interface shows a table of data products with columns for 'rows' and 'Size', and various action icons for each row.



- Euclid TAP+ database support to Greenplum cluster. (See *Pilar de Teodoro's Talk at ADASS XXXII*)
 - In Greenplum tables can be distributed (default) or replicated across database worker nodes
 - When JOINing big with small tables, data was being moved between database worker nodes (broadcast motions)
 - Smaller tables are defined as replicated (instead of distributed) in order to remove the broadcast motions
- Datalink provides access to simulated 1D Spectra based on ID=sourceld
 - On-the-fly extracts the spectras requested within a multi-extension FITS file of thousands on spectras

```
<DATA>
  <TABLEDATA>
    <TR>
      <TD>SC8 2363845976131329179</TD>
      <TD><![CDATA[https://xxx/datalink/data?ID=SC8+2363845976131329179&RETRIEVAL_TYPE=SPECTRA]]></TD>
      <TD></TD>
    <TR>
      ...
  </TABLEDATA>
</DATA>
```


Dataproduct Type	Dataproduct Subtype	Obs Collection	Obs Id	filter column...	S Ra
mosaic	DpdMerBksMosaic	PVPR01	13	ivo://esavo/EUC?13/MER_ProcessTile_SelfCal_9.0.1-4-ON_THE_FLY-pcasenov-PLAN-000000-XE42FOZU-20220919-174959-008-all_mosaics-0	268.87
mosaic	DpdMerBksMosaic	PVPR01	13	ivo://esavo/EUC?13/MER_ProcessTile_SelfCal_9.0.1-4-ON_THE_FLY-pcasenov-PLAN-000000-XE42FOZU-20220919-174959-008-all_mosaics-0	268.87
mosaic	DpdMerBksMosaic	PVPR01	13	ivo://esavo/EUC?13/MER_ProcessTile_SelfCal_9.0.1-4-ON_THE_FLY-pcasenov-PLAN-000000-XE42FOZU-20220919-174959-008-all_mosaics-0	268.87
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mosaic	DpdMerBksMosaic	PVPR01	13	ivo://esavo/EUC?13/MER_ProcessTile_SelfCal_9.0.1-4-ON_THE_FLY-pcasenov-PLAN-000000-NZ02FNZY-20220919-174959-009-all_mosaics-0	268.00
mosaic	DpdMerBksMosaic	PVPR01	13	ivo://esavo/EUC?13/MER_ProcessTile_SelfCal_9.0.1-4-ON_THE_FLY-pcasenov-PLAN-000000-NZ02FNZY-20220919-174959-009-all_mosaics-0	268.00
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- SIAP v2 for images discovery
- Visualization Interface
 - Obscore exposes L2 observations and mosaics
 - Cutout links to download images
- Images Cutout functionality over pixel data

ESASky API integration in Euclid

- Unique science archive approach: uplink and downlink in the same database
- Central role in PLATO mission: ESDC one of the Science Operations Centre pillars, sole responsible for the database
- Highly demanding system:
 - Science Operations Centre pipelines
 - Call for proposals
 - Science Operations Centre planning system
 - PLATO Science Archive
- Stateless system will be key to support the mission requirements

HELIO and HREDA:

- Multiple tap_schema handling based on A&A
- Incremental publication of TAP services for Heliophysics archives

PLANETARY:

- TAP is public to offer the EPN-TAP service according to the IPDA standard.
- Publicly available in PSA 6.4.0
- TAP as machine interface with other teams in the organization

- ESDC currently develops and maintains a TAP+ Common library used across ESDC services
 - Compliant with TAP v1.1 and ADQL v2.1 (20210528)
 - Continuous improvements: UDFs Catalogue v1.0 (20210310), Data types DALI (20170517)
 - Evolution to support different databases: PostgreSQL, **Greenplum**
 - Database schema changes management solution
 - Improved quality metrics: test coverage, maintainability...
 - Gradually adopted by each ESDC mission/service
- Continuous evolution and improvement of ESDC TAP+ services and its compliance
- Increased the amount of metadata and data served through ESDC services
- What's next in the horizon?
 - New public services: Euclid, Planetary Science Archive, Legacy missions...
 - New data collections: Gaia DR#4, JUICE...
 - Full support for Greenplum DB
 - Automatic compliancy check as part of Integration tests layer with Euro-VO REST interface

THANKS!



<https://www.cosmos.esa.int/web/esdc>

