

Gaia Archive for DR2

Jesús Salgado (ESDC), Thomas Boch (CDS), Gregory Mantelet (ARI)

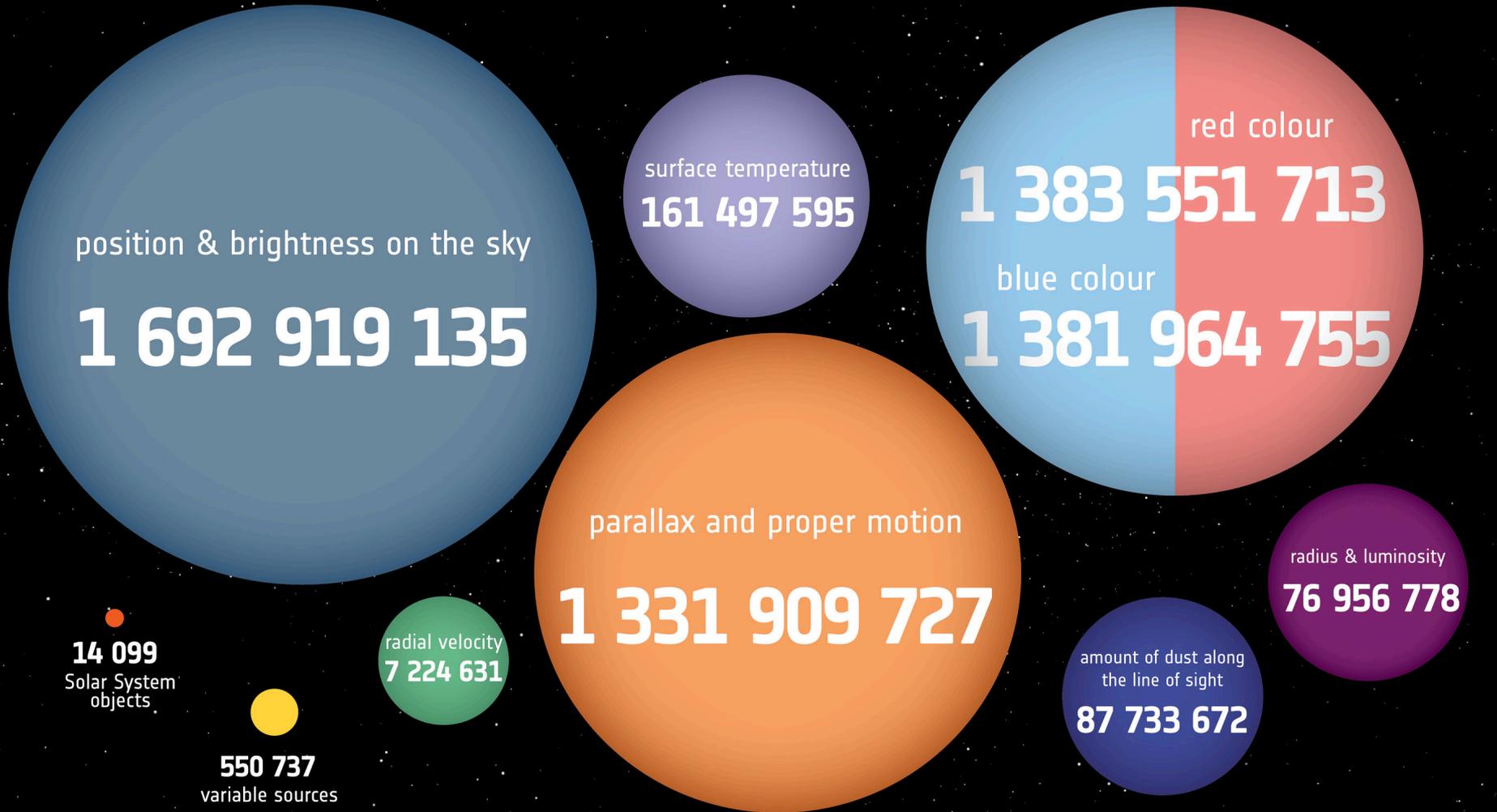
ESA Gaia Archive

J. González-Núñez, A. Mora**, J. Bakker**, E. Racero*, D. Baines*, R. Gutiérrez-Sánchez*, J.C. Segovia*, J. Durán*, C. Arviset**

* ESAC Science Data Center (ESDC)

** ESA Gaia SOC

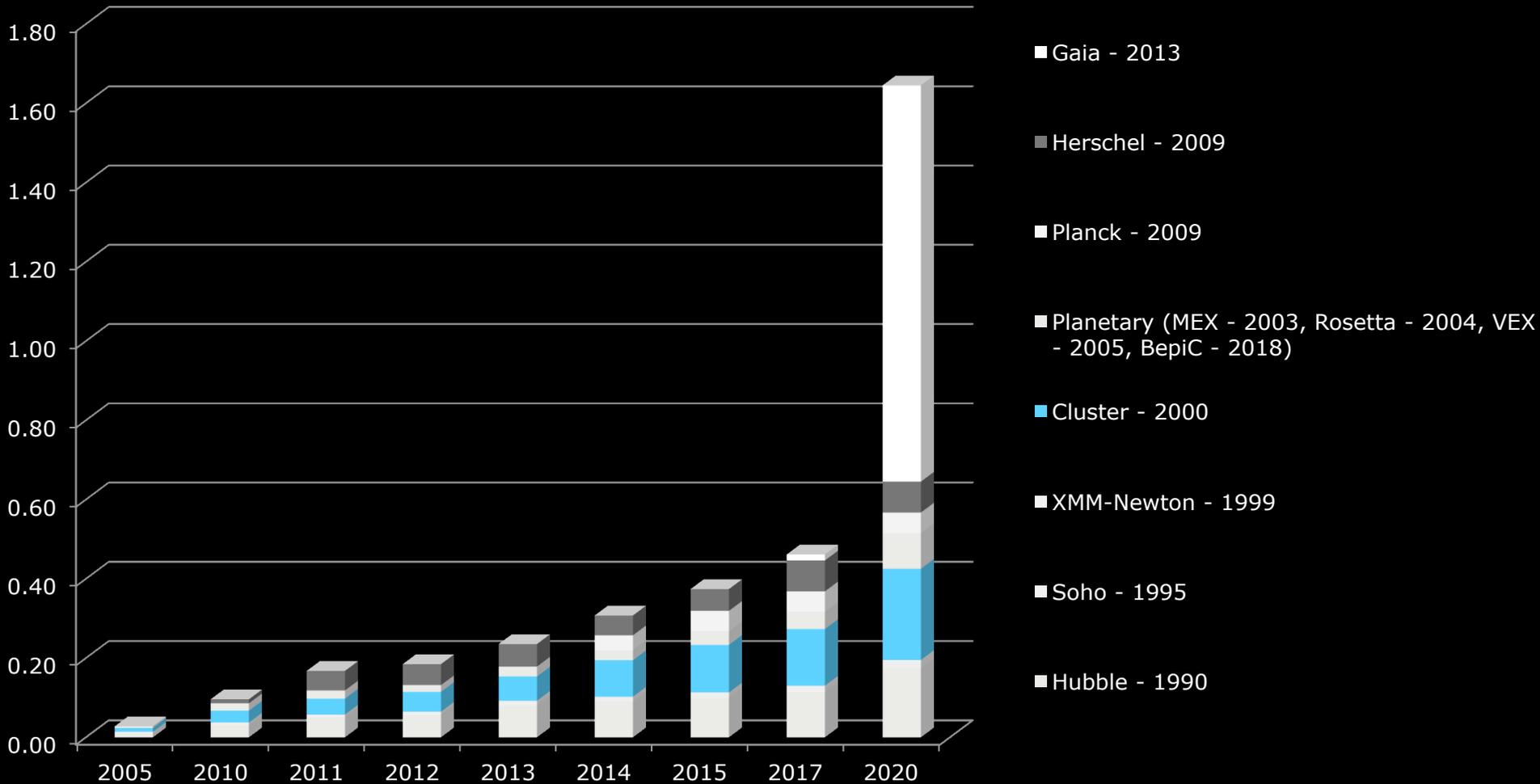
→ HOW MANY STARS WILL THERE BE IN THE SECOND GAIA DATA RELEASE?



ESA Science Archives Volume Evolution (2000-2020)



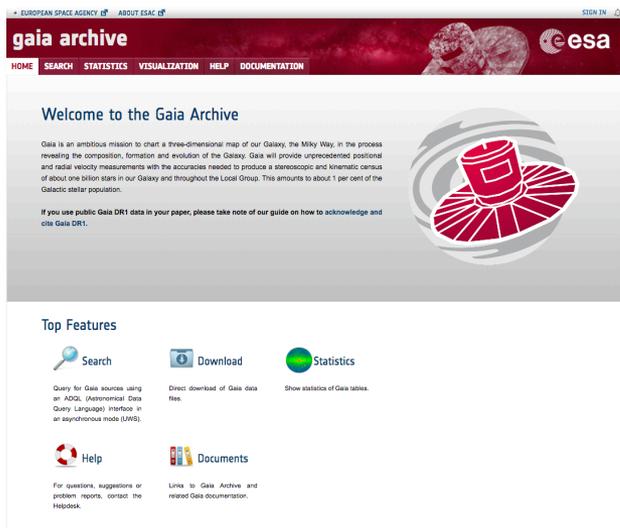
ESA Space Science Archives - Volume (PB)



1. Based on TAP+
 - a. **TAP compatible service**
 - b. DB Schemas for the users
 - c. Non-volatile upload
 - d. Tables can be shared to other users (user groups)
 - e. User DB and job results Quotas
 - f. Quotas configurable by user
2. Simple Form based on normal astronomy forms
 - a. Single object and object list
3. Advanced form based on ADQL
 - a. **Users have to learn ADQL** to really do data exploitation
4. Connection to **VOSpace**
5. Time Series through **DataLink**
6. **SAMP**



DataLink/SSAP int. with TAP+



TAP+

DataLink

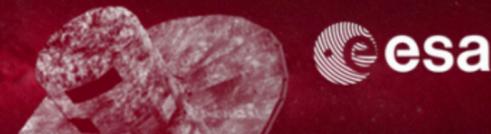
* DR2

TAP+ Data Mining

* DR3



gaia archive (INTEGRATION)



- HOME
- SEARCH
- STATISTICS
- VISUALISATION
- HELP
- DOCUMENTATION
- VOSPACE
- SHARE
- ADMIN

Simple Form ADQL Form **Query Results**

15188854838611 

source_id	ra Angle[deg]	dec Angle[deg]	pmra Angular Velocity[mas/year]	pmdec Angular Velocity[mas/year]	access_url	epoch_photometry_url
2346303873180702592	14.444425082209584	-22.413907611106715	26.702880885311735	15.11617303234476	 Datalink	 Open link
6054269467627607424	180.34560660401743	-63.80811219976254	-9.248094960511688	-0.09546860145566304	 Datalink	 Open link
4307310211671855616	287.97783235326506	8.269550243743119	-2.9323123861332423	-4.859144129821458	 Datalink	 Open link
2346285215842774784	14.500848201180862	-22.59287199821362	29.4556497257245	-4.015653487784574	 Datalink	 Open link
2346239478735063552	13.9758772173184	-23.187561759255747	-0.750155176968177	-0.5805467130020315	 Datalink	 Open link
2346332731065463040	13.683887683347049	-22.586964512635276	-1.3625382118713947	-2.8894301347667373	 Datalink	 Open link
4344655673866477824	244.7836465138878	-9.670049082670001	-5.932365504729957	1.135187613331195	 Datalink	 Open link
86845342532283008	35.98873137665501	19.083961362297025	1.8237519020686648	-1.1509857606066753	 Datalink	 Open link
4121773293903500672	262.394963246321	-18.966331837738625	0.39750221808583075	-2.5248355831663902	 Datalink	 Open link
4307319213926801408	288.00990659102195	8.317748732723798	-0.01553303634349977	-2.928011296682184	 Datalink	 Open link
4069503541852069376	269.6615212377872	-22.693983111293797			 Datalink	 Open link
4121776003967478784	262.1290495343353	-18.981000727575456	-6.027531691756052	-6.270232388633332	 Datalink	 Open link
6054275755501281024	181.23314062692185	-63.57817349225457	-7.40520989184401	0.817755864597298	 Datalink	 Open link
3451529314994701312	89.93963030950817	33.54414948465304	3.706277448725516	-5.5602967731490995	 Datalink	 Open link

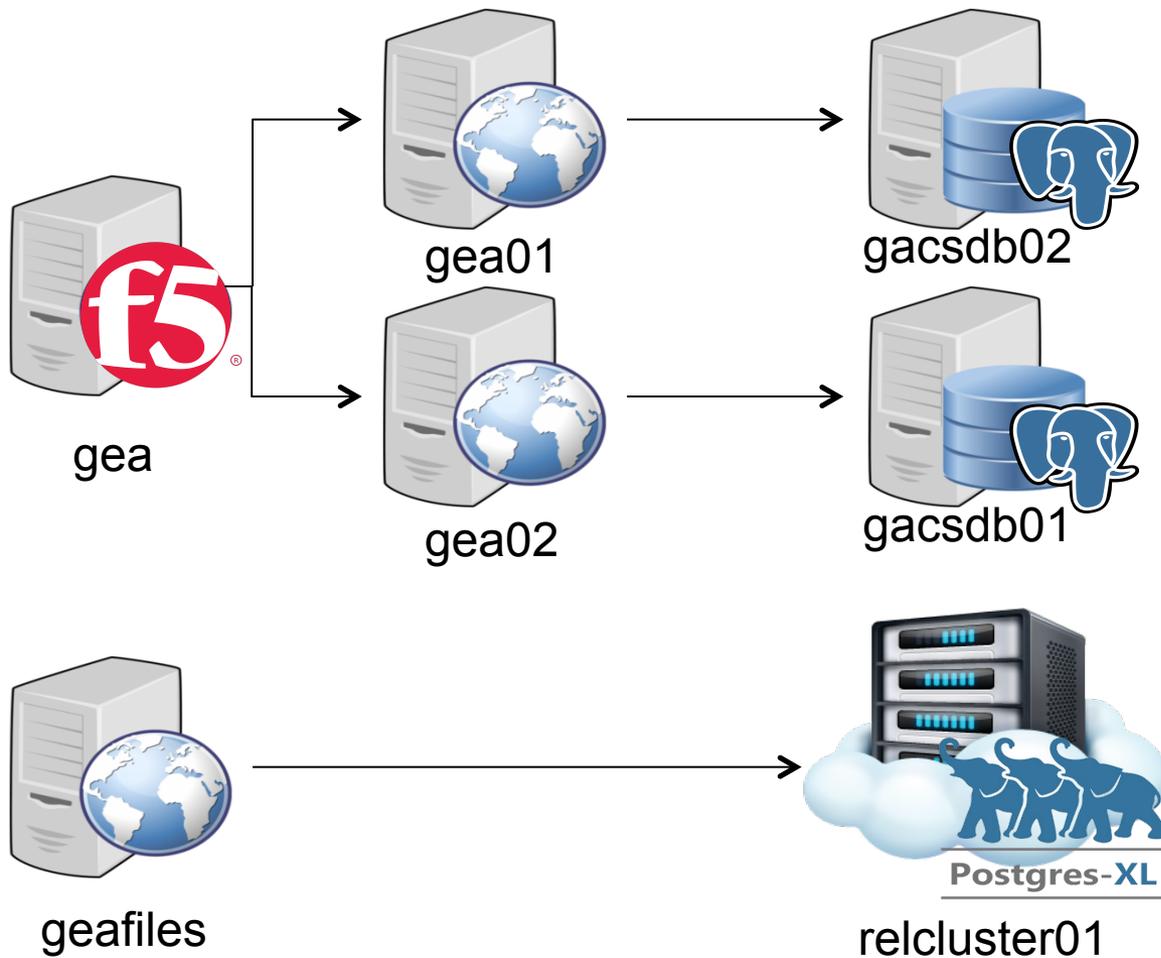
1-20 of 1,000  

Gaia Data Model

Show query in ADQL form



DR2 Architecture



Partner Data Centers



gaia archive

Welcome to the Gaia Archive

Gaia is an ambitious mission to chart a three-dimensional map of our Galaxy, the Milky Way. In the process revealing the composition, formation and evolution of the Galaxy, Gaia will provide unprecedented positional and radial velocity measurements with the accuracies needed to produce a stereoscopic and kinematic census of about one billion stars in our Galaxy and throughout the Local Group. This amounts to about 1 per cent of the Galactic stellar population.

If you use public Gaia DR1 data in your paper, please take note of our guide on how to acknowledge and cite Gaia DR1.

Top Features

- Search
- Download
- Statistics
- Help
- Documents

Gaia at CDS

This page presents how to access Gaia data available at CDS and summarize Gaia mission.

SSDC Gaia Portal DR1

WELCOME!

Dear user, welcome to the GaiaPortal, the online service provided by ASDC to access:

- Gaia data (GaiaSource, TypeSource, GaiaVariable, GaiaAur(ISO+ICRF2+name));
- External Catalogues matched with Gaia (SIMBAD, PRG, CCAC, IFRON, GSC 2.3, SDSS6p, AITWSE, UKAT 1);
- Cross-Match Results tables;
- External Catalogues not matched with Gaia (RAVE).

Moreover, you can find information about all data based and the services provided. While each catalogue can be interrogated individually, inter-catalogues queries between Gaia data, a matched external catalogue (and the corresponding Cross-Match result table, if standard) are available.

Users can choose two different ways to work with the query service provided:

- anonymous user: for anonymous users only synchronous queries are allowed. A query can run for 2 minutes before reaching the timeout. The maximum number of entries allowed is 20000. The download of the query results will be available in the Query Results tab at the end of the job.
- registered user: for registered users a query is run in asynchronous mode for a maximum time of 30 minutes. The maximum number of entries allowed is output is 10 millions. At the end of the query, an e-mail is sent to the user with a link for the results download (which are also available in the Query Results tab). Query results will be stored on servers for one week. The user query history is saved and always available to each registered user at any time. Please, click on login (link at the top of this page) to register as a new user or to login in the GaiaPortal service. Please, note that queries with no condition added (and that can potentially download the full catalogues) will yield less than 20000 entries in output.

Acknowledgement and citation of Gaia DR1: If you use public Gaia DR1 data in your paper, please take note of our guide on how to acknowledge and cite Gaia DR1: https://www.esa.int/ESA/ScienceData/Gaia/How_to_acknowledge_and_cite_Gaia_DR1

Gaia DR1 content: https://www.esa.int/ESA/ScienceData/Gaia/How_to_acknowledge_and_cite_Gaia_DR1

Available services and User manual: [1.1 Query Job](#), [1.2 Downloading Job](#)

Gaia@AIP Ser

hosted by the Leibniz-Institute for Astrophysics

Welcome to Gaia@AIP services

Launched in December 2017, Gaia@AIP is dedicated to create the most accurate map yet of the Milky Way. By making accurate measurements of the positions and motions of stars in the Milky Way, it will answer questions about the origin and evolution of our home galaxy.

The first intermediate data release, combining among other things three-dimensional positions and two-dimensional motions of a subset of two million stars, demonstrates that Gaia's measurements are as precise as planned, paving the way to create the full map of the billion stars to be released towards the end of 2017.

The AIP hosts the Gaia data as one of the external data centers along with the main Gaia Archive maintained by ESA.

Gaia first data release (DR1)

The first release catalog includes positions and G-band magnitudes for more than a billion sources. The five-parameter astrometric solution (positions, parallaxes and proper motions) is available for over 2 million stars that are shared between Gaia and Tycho-2 and Hipparcos catalogs. More information about the release can be found here.

RAVE DR5 and TYCHO2

RAVE Data Release 5 crossmatched with TGAS is available now. Additionally, Gaia@AIP offers TYCHO2 catalog for the crossmatch purposes.

Getting started

- Register via the Registration Form.
- After registration, you can use the Query Form using plain SQL.
- Use the example queries in the Query Form to get started.
- Contact us if you need further assistance.

ARI's Gaia Services

Welcome!

The Gaia team at ARI proudly presents you its online services to access the Gaia catalogue. On this website you will find information and a simple web form for each of the provided services.

Below you will find a short description of all the available services. It should help you to understand their purposes and guide you toward the best serviced for your needs.

Most of them are based on IVOA standards and thus are compatible with famous VO clients like TOPCAT and Aladin.

Acknowledgement and citation of Gaia DR1

If you use public Gaia DR1 data in your paper, please take note of our guide on how to acknowledge and cite Gaia DR1.

Gaia DR1 download

You can download any Gaia DR1 table from the ESA's CDN service.

RSS/Atom feed

To be notified about new Gaia related features/services/data provided by ARI you can subscribe to this RSS/Atom feed: [http://www.ari.it/feeds/gaia](#)

Data & Statistics

The provided TAP service lets you query the Gaia catalogue and also allows crossmatches with either your own tables or with other catalogues which are also available through the same TAP service. All these catalogues are available as tables which are described, column by column, on the page Data & Statistics.

The provided statistical information are provided for some meaningful numerical columns with at least one value in the whole catalogue:

- Basic statistics: count, minimum, maximum, mean, standard deviation and quartiles
- Histogram
- Density map
- Sky map: same as the density map but for each numeric column. A such map displays the average of the column values on the whole sky.



□ Gaia DR2 at CDS

Services and tools involved:

- VizieR

- web interface



- TAP

- light curves visualisation

- cross-match service



- Sesame

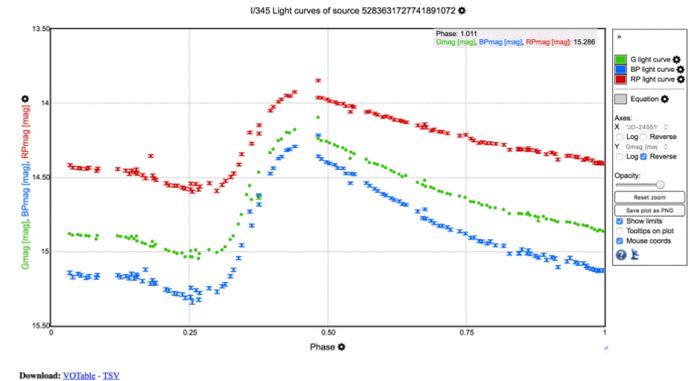


- Aladin Desktop

- dedicated form to access Gaia DF



- Aladin Lite



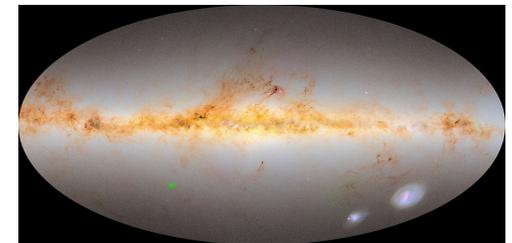
Derived products:

- catalogue HiPS

- integrated HiPS flux map

- (see T. Boch slides in Apps 1 for details)

- velocity map

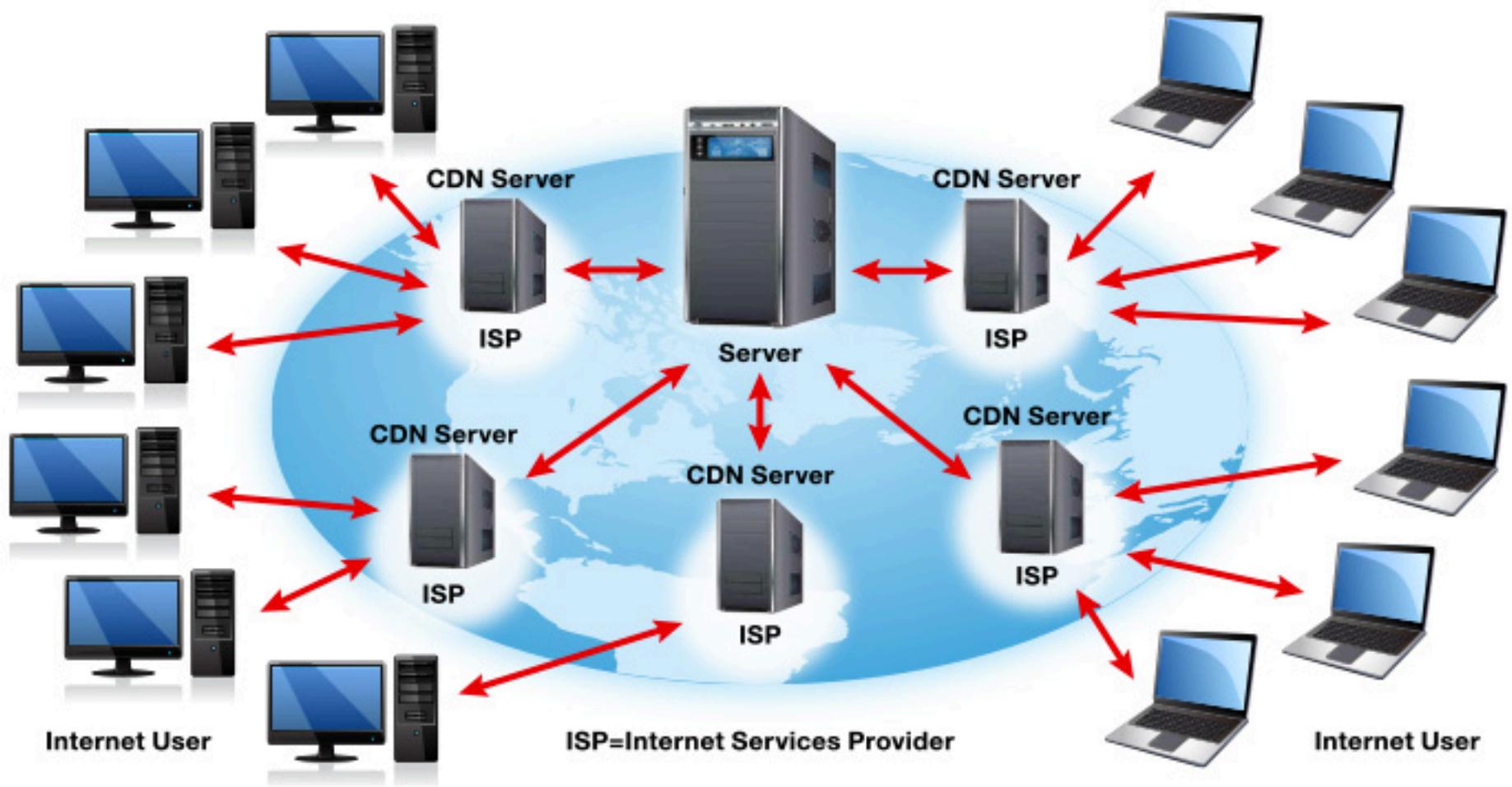


ARI's Gaia Archive

- Registered VO Services:
 - Cone Search (DR1, TGAS and DR2)
 - TAP (DR1, some external catalogues, DR2 + geometric_distance by [Coryn Bailer-Jones et al.](#))

- Non-VO Services:
 - Single Source Search (DR1, TGAS and DR2)
 - Only accessible from Web-page or script (wget/ curl, ...)

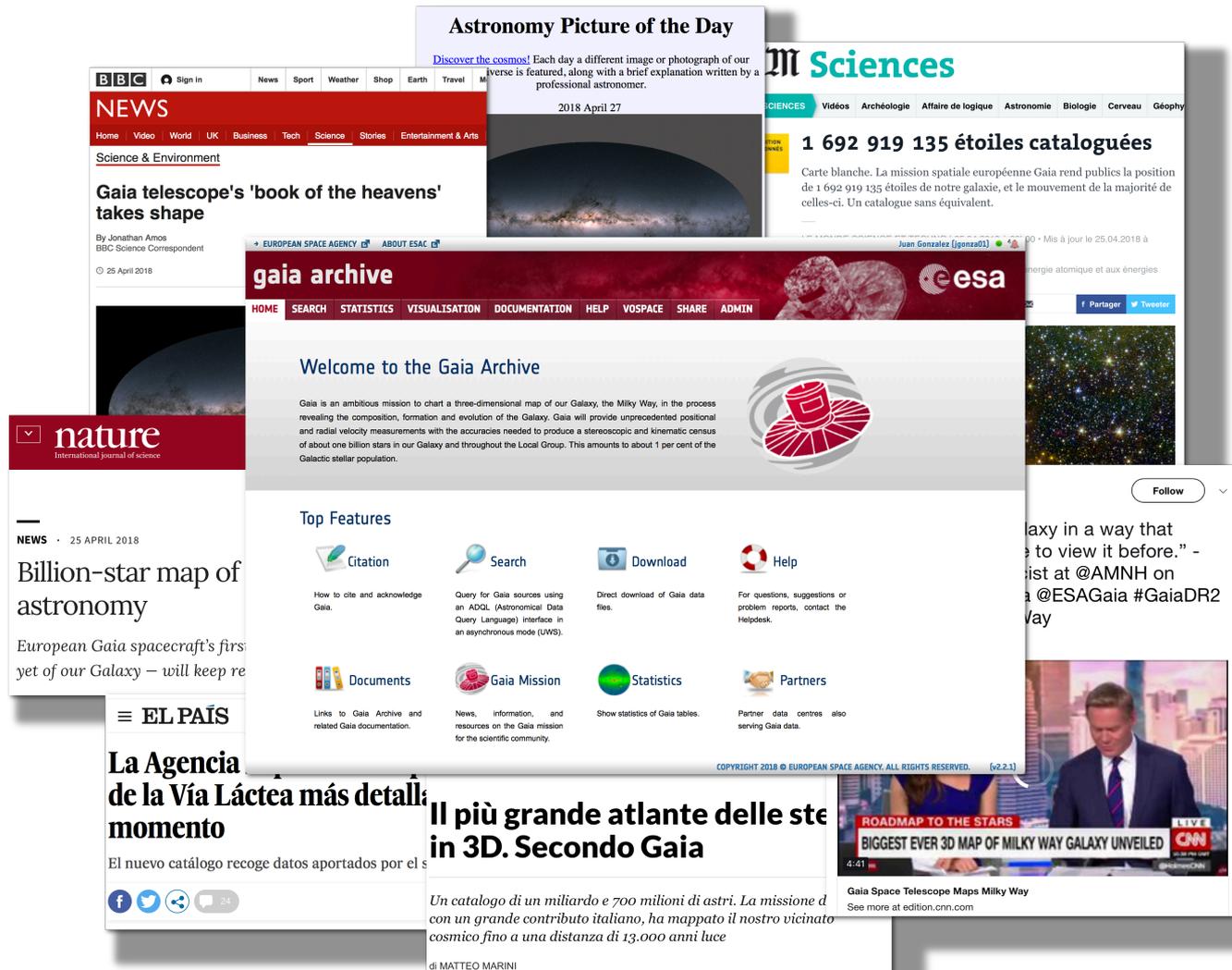
CDN (Content Delivery Network)



A large, dark, grainy image of a galaxy, likely the Milky Way, filling the upper two-thirds of the slide. A bright red rectangular box is overlaid on the center of the galaxy.

25 April 2018

Gaia second data release



The collage features several overlapping screenshots of news articles and the Gaia Archive website. At the top left is a BBC News article titled "Gaia telescope's 'book of the heavens' takes shape" with a sub-header "Astronomy Picture of the Day". To its right is a French article from Sciences magazine titled "1 692 919 135 étoiles cataloguées". Below these is the Gaia Archive website interface, showing a "Welcome to the Gaia Archive" message and a grid of "Top Features" including Citation, Search, Download, Help, Documents, Gaia Mission, Statistics, and Partners. On the left, a Nature article is partially visible with the headline "Billion-star map of astronomy". At the bottom left is an EL PAÍS article titled "La Agencia de la Vía Láctea más detallada en su momento". At the bottom center is an Italian article titled "Il più grande atlante delle stelle in 3D. Secondo Gaia". On the right, a Twitter post and a video player are visible. The video player shows a news anchor and the text "ROADMAP TO THE STARS" and "BIGGEST EVER 3D MAP OF MILKY WAY GALAXY UNVEILED".

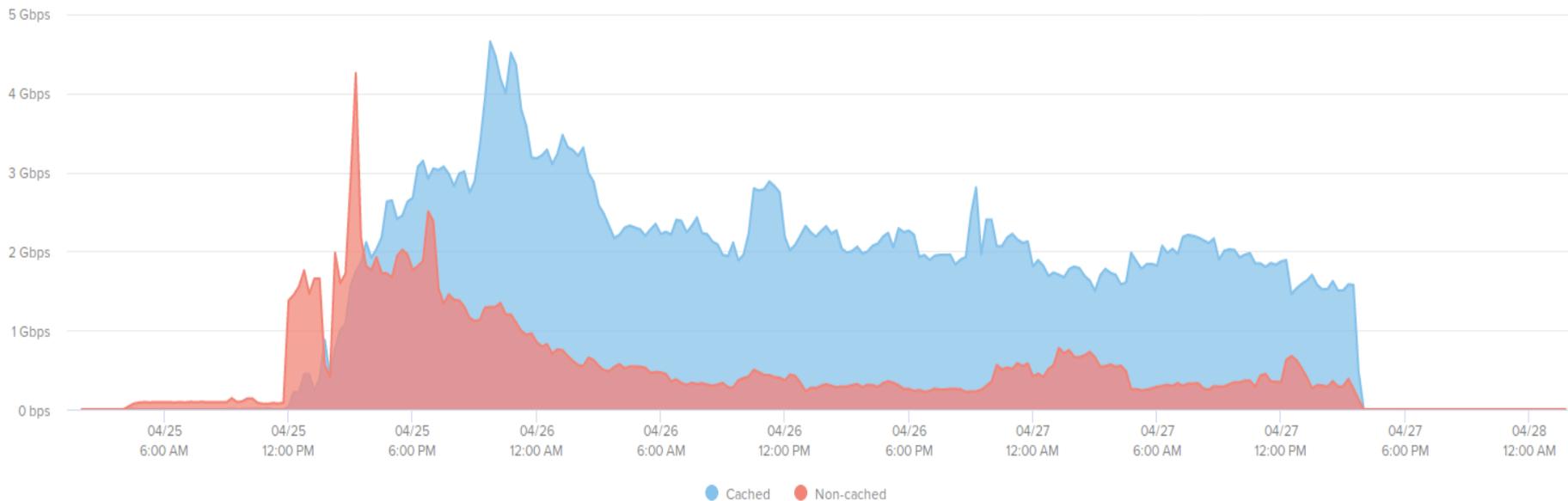
mapgaia

Edit Export

GAIA ACCESSES IN REAL TIME - 2018/04/24 01:00:00 AM



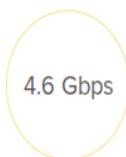
CDN response



Cached vs non-cached [?](#)



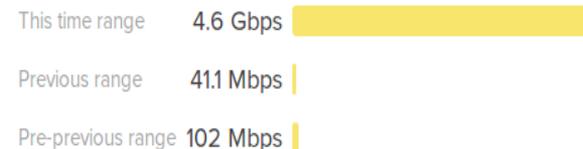
Bandwidth 95th [?](#)



Peak time



Bandwidth 95th in time



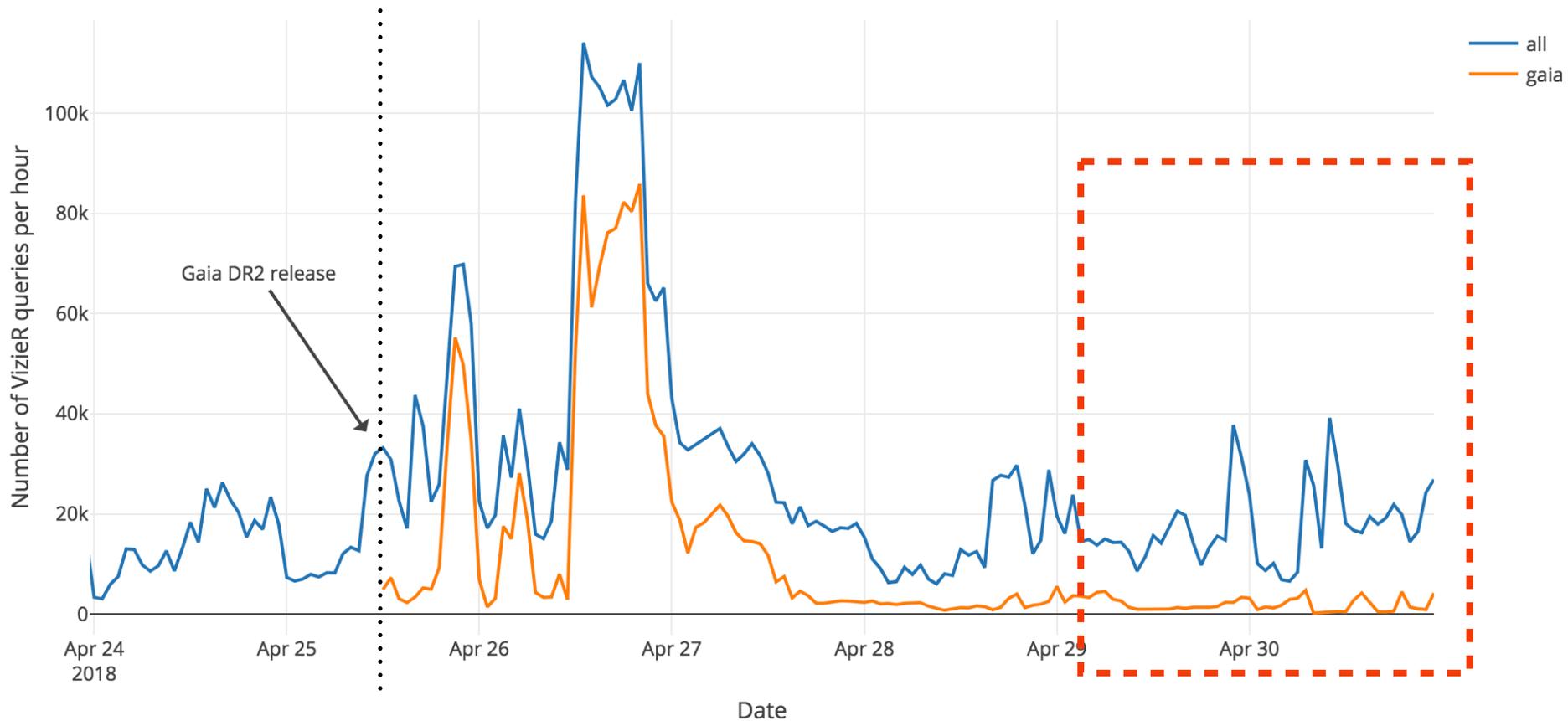
Some stats

- 1.535.752 queries during the first week (only Gaia archive)
- Around 40.000 UI users same period
- Around 5.000 different users doing advanced astronomical server side queries
 - Asynchronous ADQL
 - User DB schemas
 - Queries from user interface and scripts (python)
- Advanced users in line with Gaia community size



Statistics on April 25

- An anticipated release...



□ Statistics on one month

- VizieR
 - 6 million requests (TAP, cone search, web interface)
- Cross-match
 - 1 billion positions submitted for spatial xmatch against Gaia DR2 through the API
 - from 400 different IPs
- [astroquery](#) and [TOPCAT](#) most prominent clients

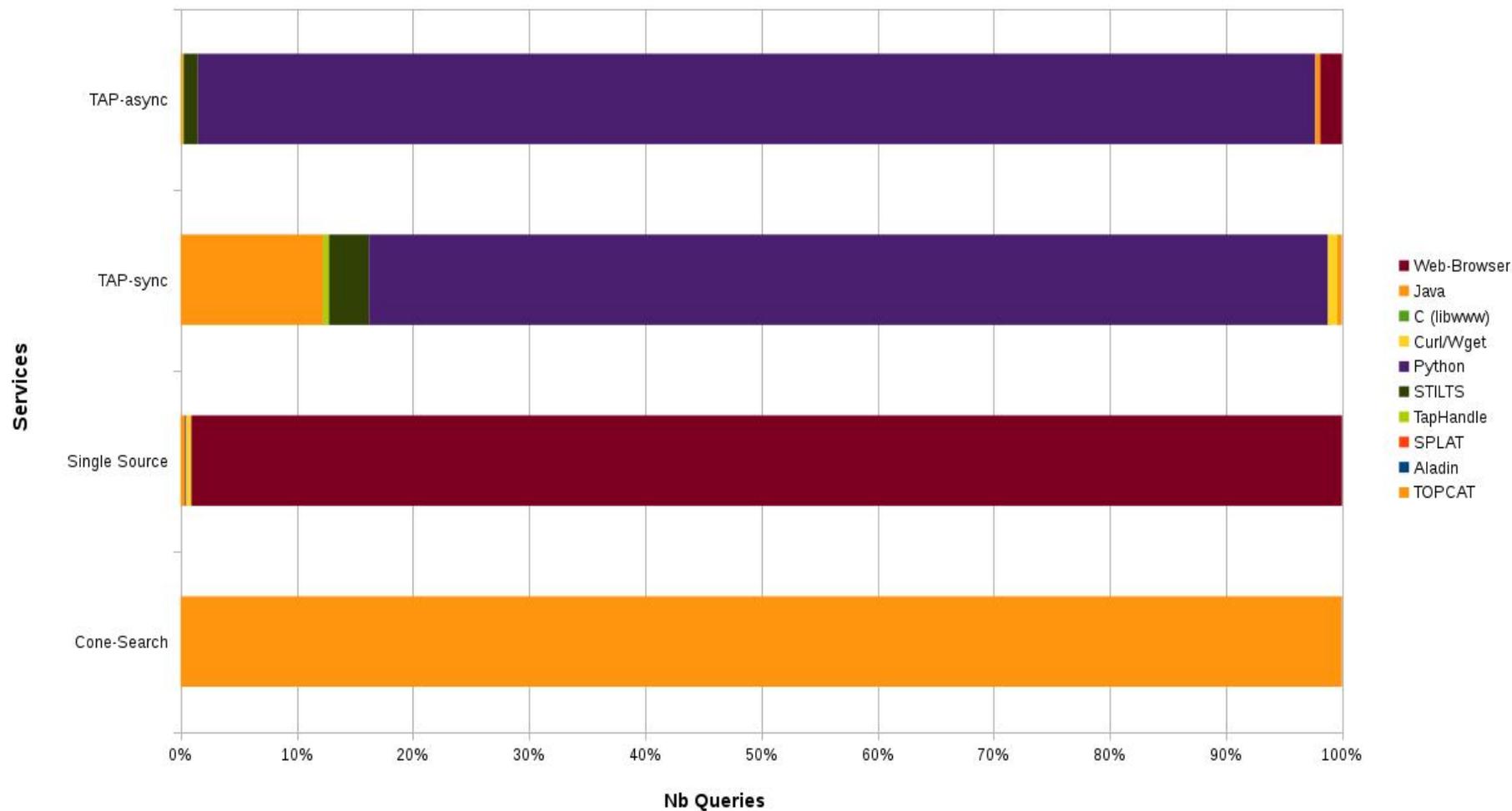
• Number of *input* queries per day

Before DR2			After DR2		
Service	Mean	Median	Service	Mean	Median
SS-TGAS	11	4	SS-TGAS	20	4
SS-DR1	5	2	SS-DR1	9	7
SS-DR2	-	-	SS-DR2	199	141
CS-TGAS	20357	47	CS-TGAS	1956	56
CS-DR1	8496	69	CS-DR1	2.4	1
CS-DR2	-	-	CS-DR2	1.4E+6	8201
TAP-sync	439	8	TAP-sync	992	167
TAP-async	798	11	TAP-async	8122	679

SS = Single Source search ; CS = Cone Search

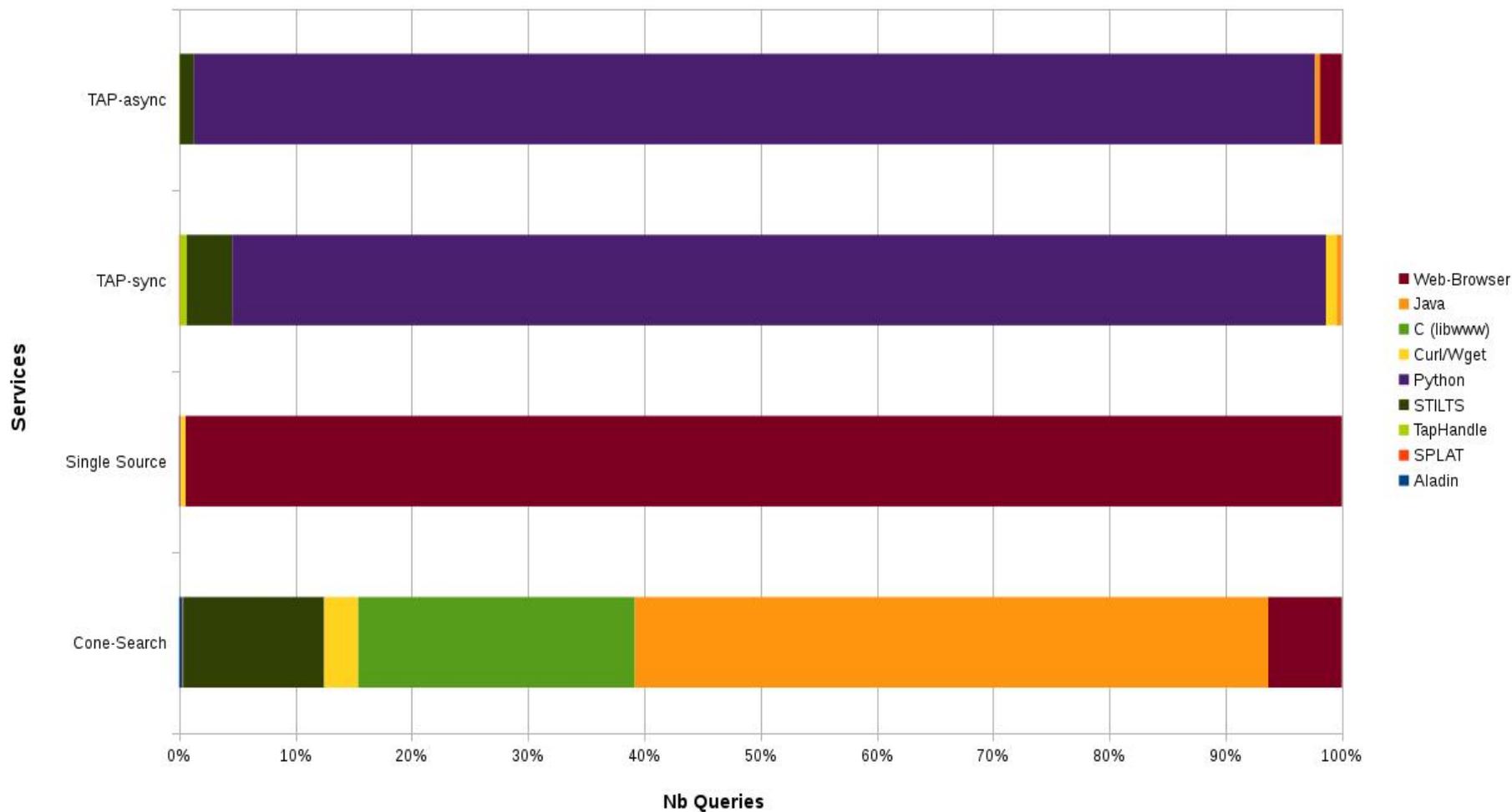
Used clients

Tools used from Gaia-DR2 release



Used clients *(without TOPCAT)*

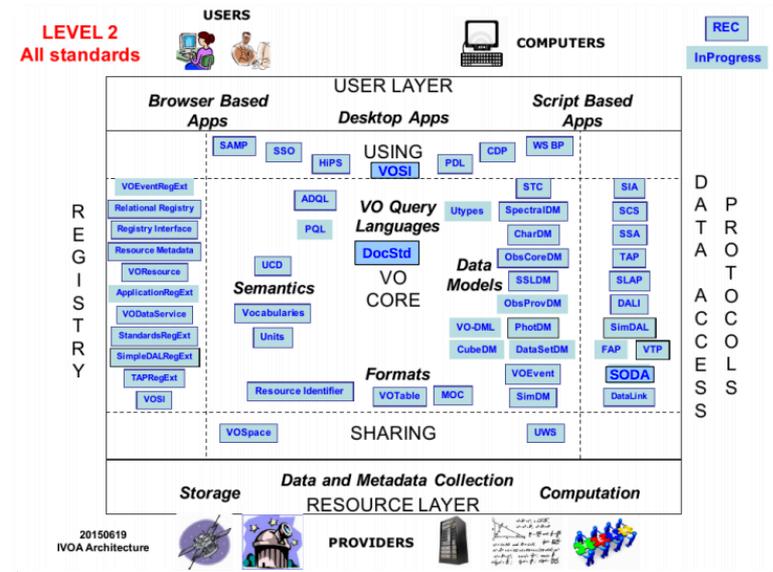
Tools used from Gaia-DR2 release (without TOPCAT)



VO is the present and future



1. Big success for the Virtual Observatory
2. Science community is using VO protocols in a transparent way:
 - a. SAMP
 - b. VOSpace
3. in a semi-transparent way:
 - a. TAP
 - b. DataLink
4. in a totally direct way:
 - a. ADQL
5. Some scientists are doing the more complex ADQL we have ever seen
6. Virtual Observatory is the present and the future of the astronomy (Gaia, LSST, Euclid)





Many thanks!

