SIMBAD : the bibliographic database

A meta-compilation of astronomical objects of interest

CDS Council
November 2023

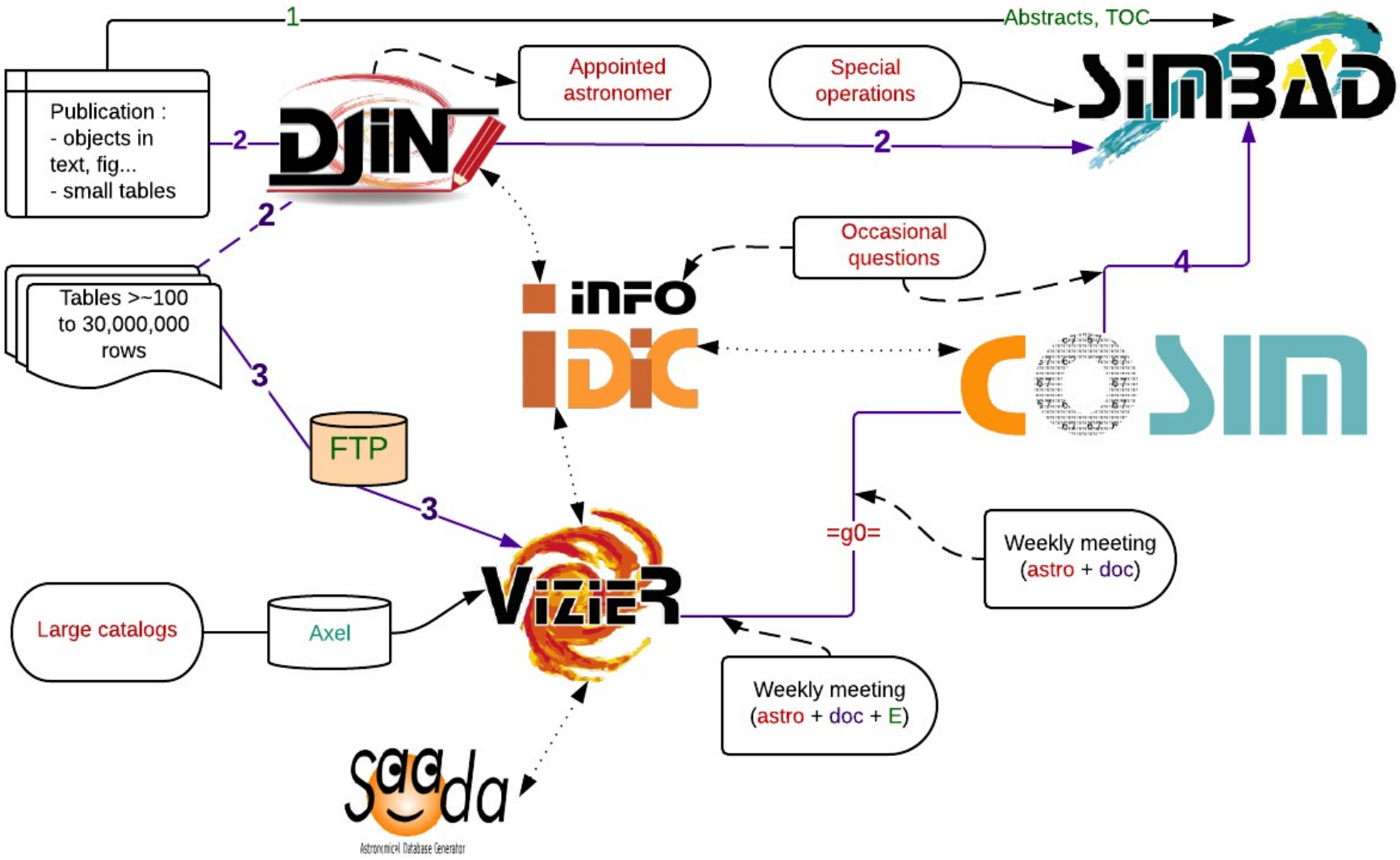
CDS team

The Team

- **Bibliography & coordination** : S. Lesteven (engineer)
- **Scientific content** : C. Loup (astronomer)
- **Database & softwares** : A. Oberto (developer)
- **Nomenclature** : B. Vollmer (astronomer)

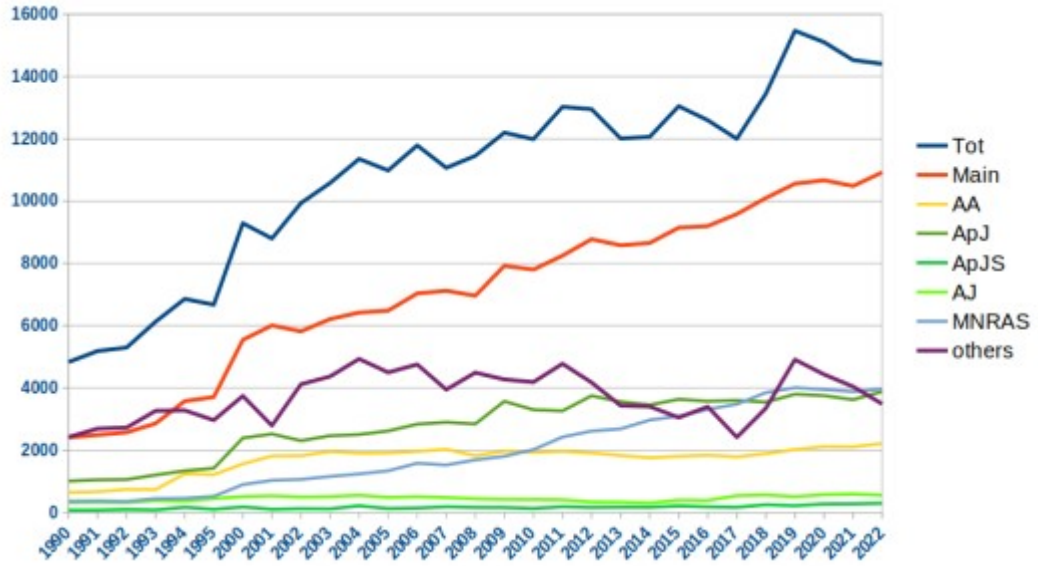
- **Documentalists** (Data Stewards) :
  - Nomenclature : M. Brouty
  - Ingestion of references via DJIN : A. Eisele, *E. Son*, M. Neuville, P. Vonflie
  - Ingestion of lists of objects via COSIM : C. Brunet, E. Collas, K. van der Woerd, M. Buga, E. Perret
- **Astronomers** : C. Bot, L. Cambrésy, S. Derrière, F. Genova, G. Monari, A. Nebot, P. Ocvirk, A. Siebert
- **Developer for Simbad** : G. Mantelet
- **Developer for Special Operations** (massive Xid) : T. Boch, F.-X. Pineau

Workflow


1
Abstracts, TOC
Publication :
- objects in
text, fig...
- small tables
2
DJIN
Appointed
astronomer
Special
operations
SIMBAD
2
2
Occasional
questions
4
Tables >~100
to 30,000,000
rows
3
INFO
IDC
COSIM
FTP
3
=g0=
Weekly meeting
(astro + doc)
Large catalogs
Axel
VIZIER
Weekly meeting
(astro + doc + E)
Saada
Astronomical Database Generator

Bibliography

Number of references per year of publication since 1991



Main journals: 10921 articles published in 2022 (10485 in 2021) : stable
Other journals: 3487 articles published in 2022 (4043 in 2021) : decreasing

Workload for the DJIN team : 15 to 25 articles per day

Tables of objects : prioritisation

Apraisal in bi-weekly meetings with astronomers & documentalists :
From 01/01 to 31/10/2023 : 1354 references evaluated, 66% with priority 1 for ingestion, 9% with priority 2

Criteria for priority 1
- Well characterized (nature, evolutionary stage) or rare objects (e.g. Blazars or Hot Subdwarfs)
- Spectroscopy of Stars & Galaxies, but also Molecular Clouds or Dense Cores
- Secure members of sets of Stars / Galaxies (mostly clusters, but also Streams, Moving Group, Group of G)
- Validated cross-identifications
- Known objects with additional data or just to link the reference

Criteria for priority 2 : mostly unsecure candidates

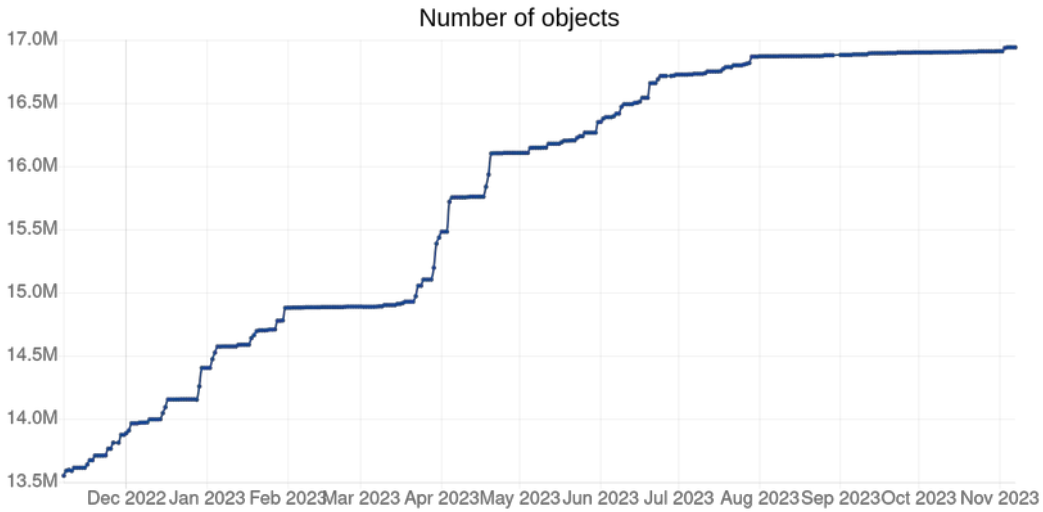
Criteria for non ingestion
- Photometric catalogues of uncharacterized sources
- X-match catalogues
- Poor astrometry or lack of coordinates

- Workload for the COSIM team : 700 to 1000 tables per year, from ~10 to more than 1 million objects
- Done in 2023 until end of October : 900, compared to 766 in 2022
- The improvement of the astrometry with Gaia and the revised relations between object types have speed up the cross-identifications process with the content of SIMBAD

Statistics on the Content

From 31/10/2022 to 31/10/2023

Overview	N (million)	+ in 1 yr
Objects	16.946	2.977
Identifiers	61.474	6.645
References	0.427	0.015
Citations of objects in articles	38.134	7.104
Basic data		
HRV/redshift	7.636	1.136
Proper motions	9.065	1.788
Parallax	7.713	1.141
Spectral type	0.946	0.088
Morphological type	0.147	0.003
Collection of measurements		
HRV/redshift	12.290	2.187
Proper motions	15.819	1.865
Parallax	15.884	1.249
Distance	9.543	0.281
Spectral type (spectroscopic only)	2.019	0.797
Teff logg Fe/H (spectroscopic only)	4.120	1.293
Variability	3.283	0.153



The spectacular grow of nearly 3 million objects last year reflects an important - and expected - change in astronomy surveys which increasingly include spectroscopically characterized sources that make them suitable for ingestion in SIMBAD.

Large catalogues ingested in SIMBAD

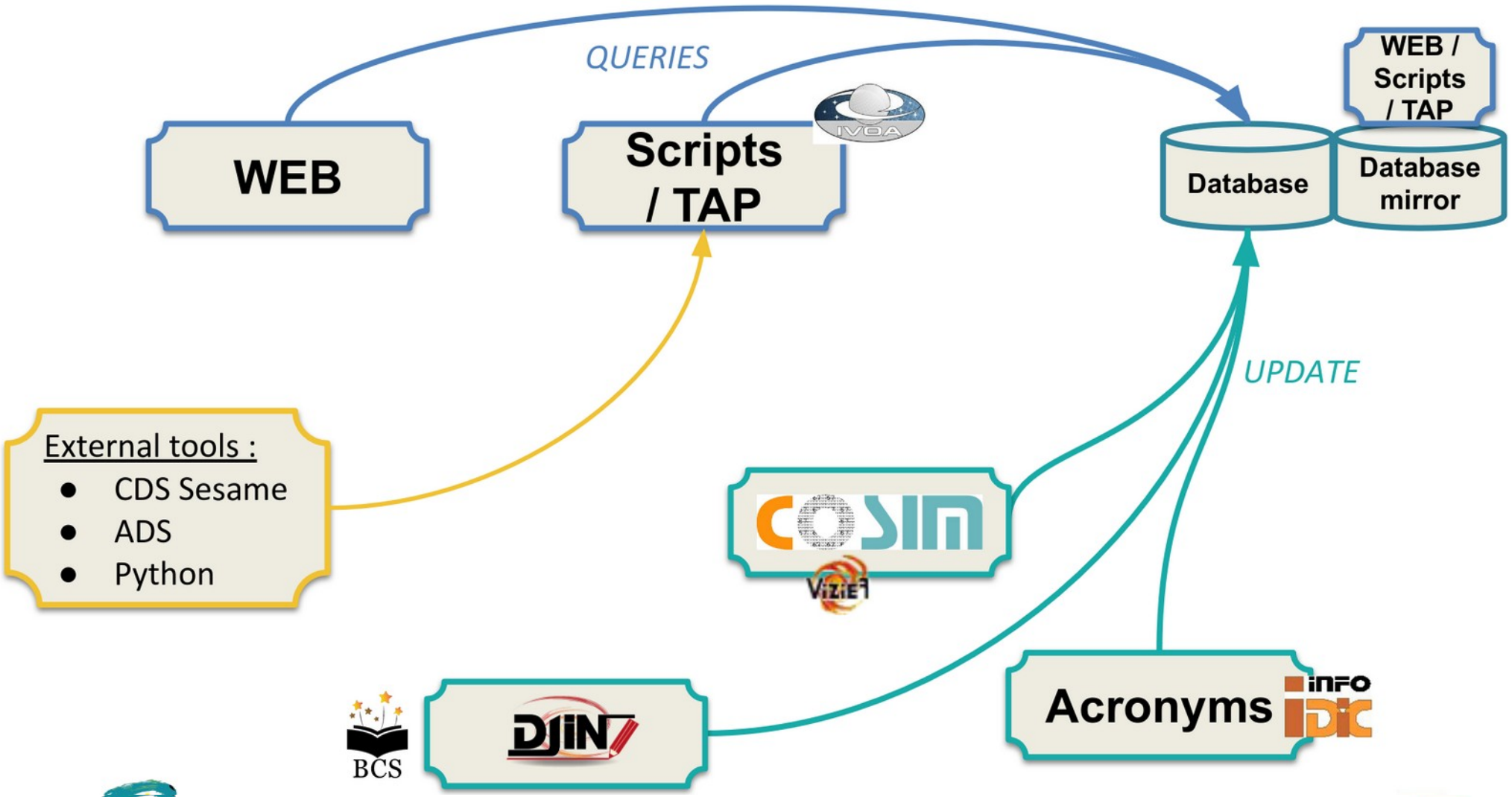
Spectroscopic surveys
- SDSS catalogues of QSOs (DR7,9,10,12,14,16) : 750k objects
- RAVE DR2 to DR6 : 451k objects
- GALAH DR2 & DR3 : 589k objects
- APOGEE-2 DR16 : 366k objects (DR17 still to be done)

Memberships (from many references)
- 999k stars (candidates) members of clusters, associations, streams, or moving group
- 1336k galaxies (candidates) members of groups or clusters

Variable Stars
- OGLE Variables (several articles) : 756k objects
- Gaia DR3 Long Period Variables : 1721k objects
- Gaia DR3 RR Lyrae : 272k objects
- (Gaia DR3 Eclipsing Binaries still to be done)

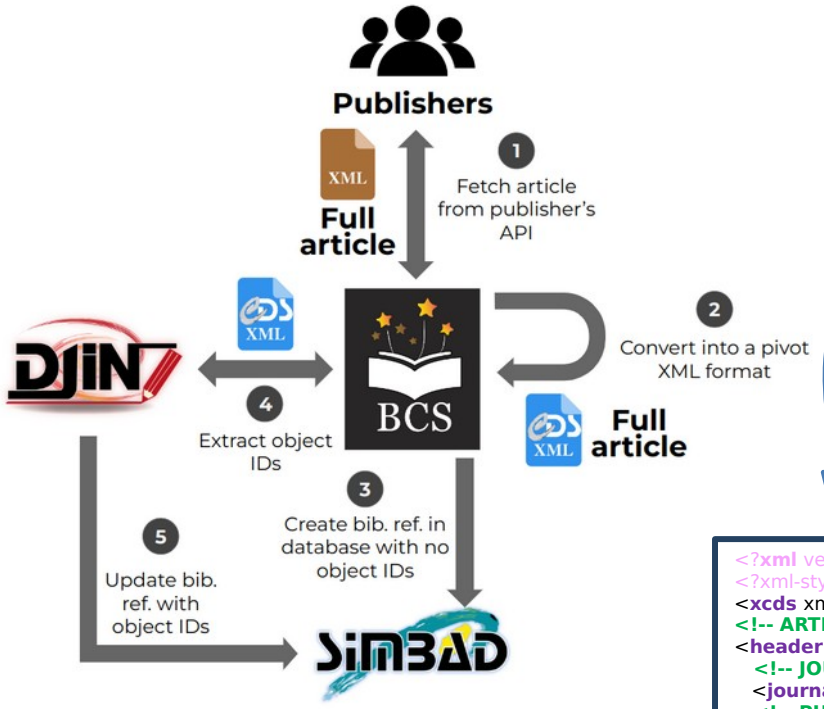
Historical
- Hipparcos : 118k objects
- Tycho2 : 2559k objects
- HYPERLEDA : 956k objects

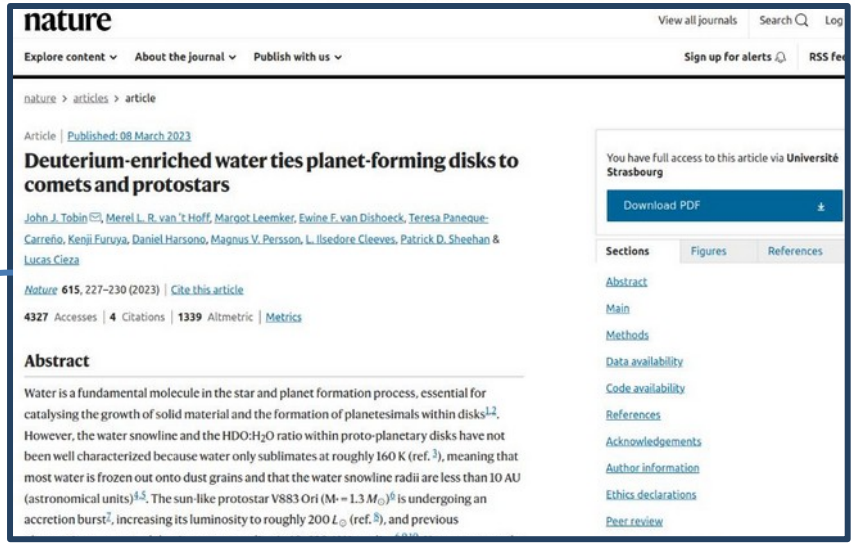
SIMBAD software



Bibliographical Center

- Journal
- A&A
- AJ
- ApJ
- ApJL
- ApJS
- ATel
- MNRAS
- MNRASL
- NatAs
- Natur
- PASP
- PASJ
- PASJS
- RAA
- RNAAS
- Sci




nature

View all journals | Search | Log

Explore content | About the journal | Publish with us | Sign up for alerts | RSS fe

nature > articles > article

Article | Published: 08 March 2023

Deuterium-enriched water ties planet-forming disks to comets and protostars

John J. Tobin, Merel L. R. van 't Hoff, Margot Leemker, Ewine F. van Dishoeck, Teresa Paneque-Carreño, Kenji Furuya, Daniel Harsono, Magnus V. Persson, L. Ilsedore Cleeves, Patrick D. Sheehan & Lucas Cieza

Nature 615, 227–230 (2023) | Cite this article

4327 Accesses | 4 Citations | 1339 Altmetric | Metrics

You have full access to this article via Université Strasbourg

Download PDF

Sections | Figures | References

Abstract
Main
Methods
Data availability
Code availability
References
Acknowledgements
Author information
Ethics declarations
Peer review

Abstract

Water is a fundamental molecule in the star and planet formation process, essential for catalysing the growth of solid material and the formation of planetesimals within disks[1,2]. However, the water snowline and the HDO:H_2O ratio within proto-planetary disks have not been well characterized because water only sublimates at roughly 160 K (ref. [3]), meaning that most water is frozen out onto dust grains and that the water snowline radii are less than 10 AU (astronomical units)[4,5]. The sun-like protostar V883 Ori ($M_* = 1.3\ M_\odot$)[6] is undergoing an accretion burst[7], increasing its luminosity to roughly 200 $L_\odot$ (ref. [8]), and previous

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="../../../../../_XSL/HTML/xcds.xsl"?>
<xcds xmlns:fn="http://www.w3.org/2005/xpath-functions" xmlns:xsi="http://www.w3.org/2001/XMLSchema
<!-- ARTICLE HEADER -->
<header>
  <!-- JOURNAL -->
  <journal id="Natur" issn="1476-4687">Nature</journal>
  <!-- PUBLICATION -->
  <volume>615</volume>
  <issue>7951</issue>
  <publisher>Nature Publishing Group</publisher>
  <page type="first">227</page>
  <page type="last">230</page>
  <page type="count">4</page>
  <pub_date>
    <month>03</month>
    <year>2023</year>
  </pub_date>
  <copyright>2023 The Author(s), under exclusive licence to Springer Nature Limited</copyright>
  <!-- TITLE -->
  <title>Deuterium-enriched water ties planet-forming disks to comets and protostars</title>
  <!-- IDs -->
  <idno type="bibcode">2023Natur.615..227T</idno>
  <idno type="DOI">10.1038/s41586-022-05676-z</idno>
  <!-- AUTHORS -->
  <authors>
    <author><firstname>John J.</firstname> <lastname>Tobin</lastname><affiliation ref="AFF0"
/><idno type="ORCID">0000-0002-6195-0152</idno><email>jtobin@nrao.edu</email></author>
```

New: Transformation from HTML web article to CDS-XML format to easily process (and **homogeneously**)

Dictionary of Nomenclature

The dictionary is a registry of all acronyms and their formats. It serves the users to correctly write an identifier, and it is a key stone for SIMBAD to check that all identifiers are correct.

Dictionary of Nomenclature of Celestial Objects
(Last update: 02-Nov-2023)

Result of query: info cati **TYC**

	Obj. Type	Acronym	(Explanation)	Format
E	Star	ACT	(Astrographic Catalogue Tycho)	TYC FFFF NNNNN N
E	Star	TRC	(Tycho Reference Catalogue)	TYC FFFF NNNNN N
E	Star	TYC	(Tycho mission)	TYC FFFF-NNNNN-N
+	Star	Tycho	(Tycho SNR)	[RCM2004] Tycho AN
E	Star	Tycho	(Tycho mission)	TYC FFFF NNNNN N

Acronyms flagged by + are completely incorporated in Simbad
Acronyms flagged by E are available in electronic form at CDS

```
cat = TYC
description = Tycho mission
credate = 06.11.06
update = 06.11.06
version = 1.0 23-Oct-1998: Genova
version = 1.1  05-Mar-2009: bvollmer;
version = 1.2  05-Mar-2009: bvollmer;
type = Star
pgm = space()
      uint(binaire, maximum=9999, minimum=0, justification=d)
      text(facultatif, texte="-")
      uint(binaire, maximum=65535, minimum=0)
      text(facultatif, texte="-")
      uint(binaire, maximum=9, minimum=0)
format = FFFF-NNNNN-N
exemple = /TYC 1-13-1
exemple = /TYC 9537-380-1
exemple = /TYC 99-2884-2
exemple = /TYC 9038-2799-3
exemple = /TYC 1327   606 4/TYC 1327-606-4
```

Acronyms numbers:

12 638 acronyms like [ABC0000] (among 15 376) for SIMBAD usage

Eg:

[JE82] 296
[VV2000] J042315.8-012033

Dictionary of Nomenclature

Dictionary of Nomenclature of Celestial Objects
(Last update: 02-Nov-2023)

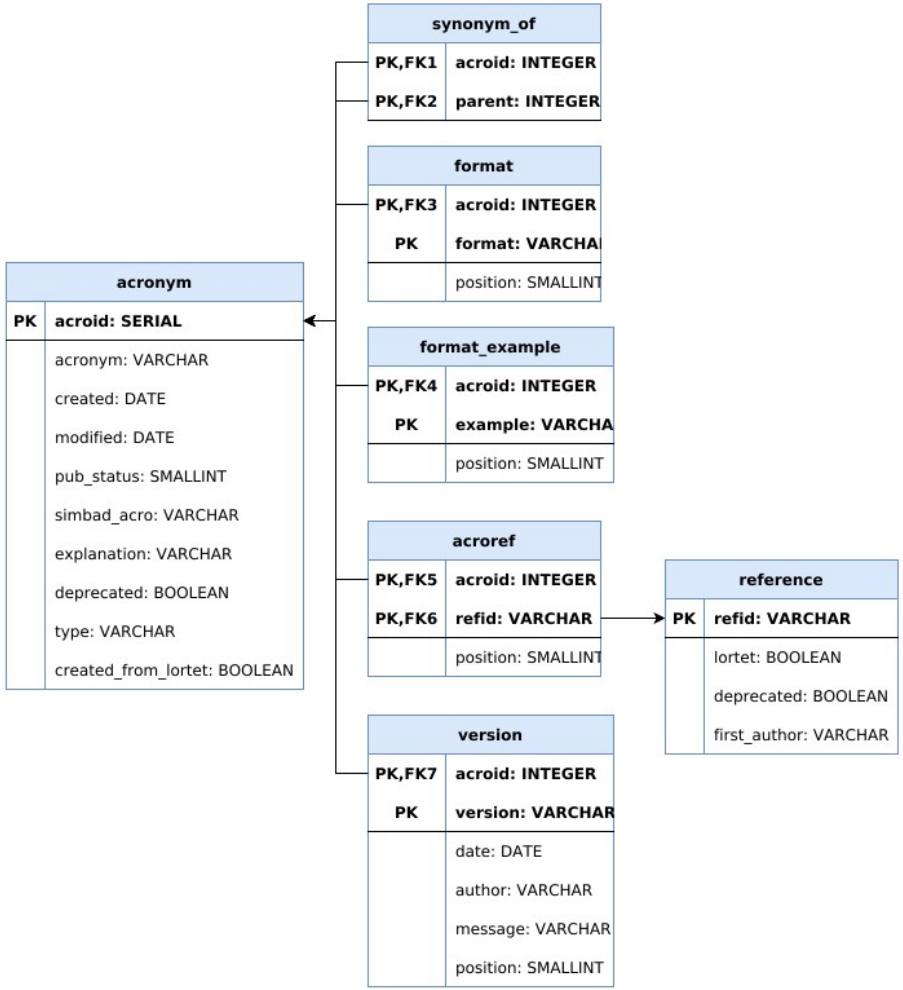
Result of query: info cati **TYC**

	Obj. Type	Acronym	(Explanation)	Format
E	Star	ACT	(Astrographic Catalogue Tycho)	TYC FFFF NNNNN N
E	Star	TRC	(Tycho Reference Catalogue)	TYC FFFF NNNNN N
E	Star	TYC	(Tycho mission)	TYC FFFF-NNNNN-N
+	Star	Tycho	(Tycho SNR)	[RCM2004] Tycho AN
E	Star	Tycho	(Tycho mission)	TYC FFFF NNNNN N

Acronyms flagged by + are completely incorporated in Simbad
Acronyms flagged by E are available in electronic form at CDS

2 text files

```
cat = TYC
description = Tycho mission
credate = 06.11.06
update = 06.11.06
version = 1.0 23-Oct-1998: Genova
version = 1.1  05-Mar-2009: bvollmer;
version = 1.2  05-Mar-2009: bvollmer;
type = Star
pgm = space()
      uint(binaire, maximum=9999, minimum=0, justification=d)
      text(facultatif, texte="-")
      uint(binaire, maximum=65535, minimum=0)
      text(facultatif, texte="-")
      uint(binaire, maximum=9, minimum=0)
format = FFFF-NNNNN-N
exemple = /TYC 1-13-1
exemple = /TYC 9537-380-1
exemple = /TYC 99-2884-2
exemple = /TYC 9038-2799-3
exemple = /TYC 1327   606 4/TYC 1327-606-4
```



GSC4SIM

published tables

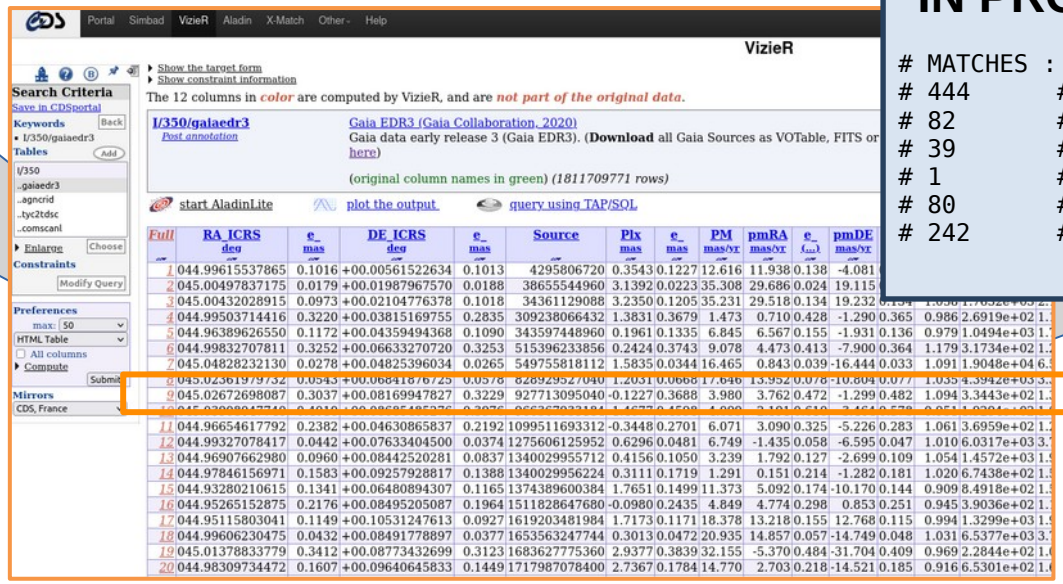
GSC4SIM

Specific query for large catalog to add in SIMBAD

Copy specific data

From position / name

Find corresponding data in Vizier



IN PROGRESS ...

```
# MATCHES :
# 444       #--- 2mass  :   1 matches
# 82        #--- gaia3  :   0 matches
# 39        #--- gaia3  :   2 matches
# 1         #--- gaia3  :   3 matches
# 80        #--- gaia3  :   (accepted < 1") 1 matches
# 242       #--- gaia3  :   ( too far > 1") 1 matches
```

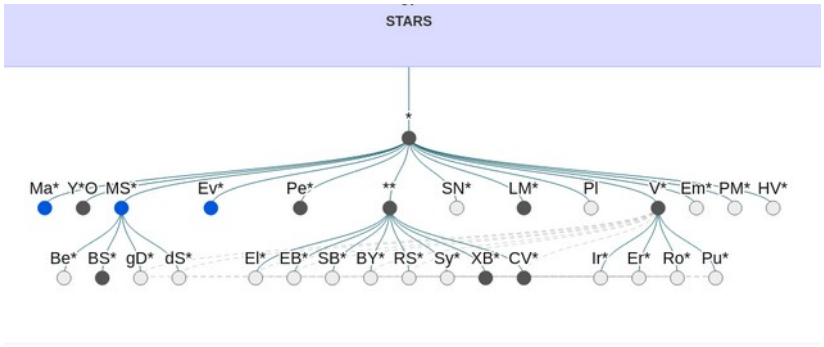
SIMBAD

SIMBAD API

New API to query SIMBAD by cone: allow filter by any criteria (distance/number of papers)

```
http[s]://.../simbad/sim-cone?RA=..&DEC=..&SR=0.1&RESPONSEFORMAT=json&MAXREC=5&ORDER_BY=biblist
```

Categorisation of object types, are now available programatically

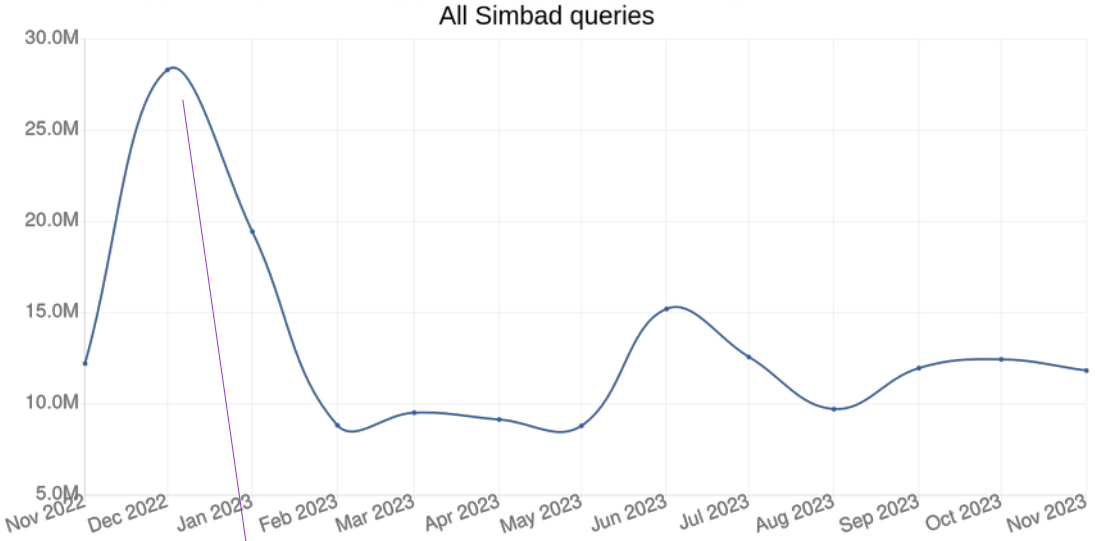


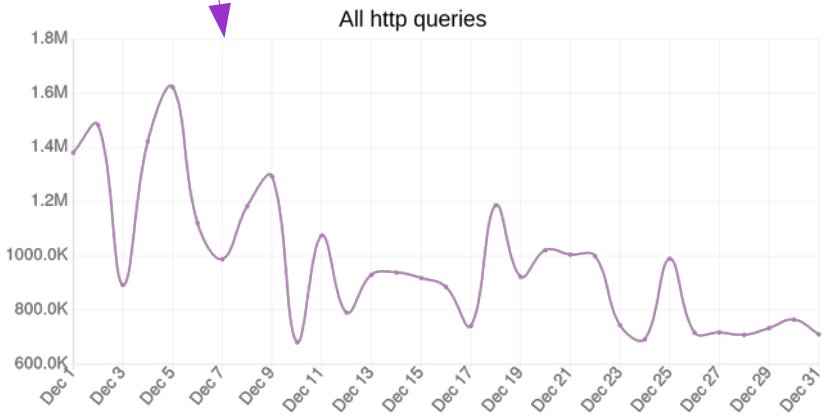

```
SELECT
  otypedef.path,description,COUNT(*)
  FROM ident,basic
  JOIN otypedef ON basic.otype=otypedef.otype
  JOIN h_link ON (oid=child AND parent=ident.oidref)
WHERE id = 'Hyades Moving Group' AND (membership >=90)
  AND is_candidate = 0 AND otypedef.otype='V*..'
GROUP BY otypedef.path,description
```

path	description	COUNT_ALL
"* > ** > BY*"	"BY Dra Variable"	66
"* > ** > EB*"	"Eclipsing Binary"	2
"* > ** > RS*"	"RS CVn Variable"	3
"* > MS* > dS*"	"delta Sct Variable"	1
"* > V*"	"Variable Star"	4
"* > V* > Er*"	"Eruptive Variable"	13
"* > V* > Ro*"	"Rotating Variable"	1

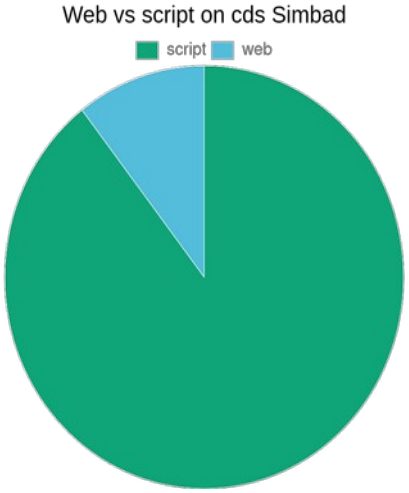
+ more in progress contributing
Python libraries

Usage

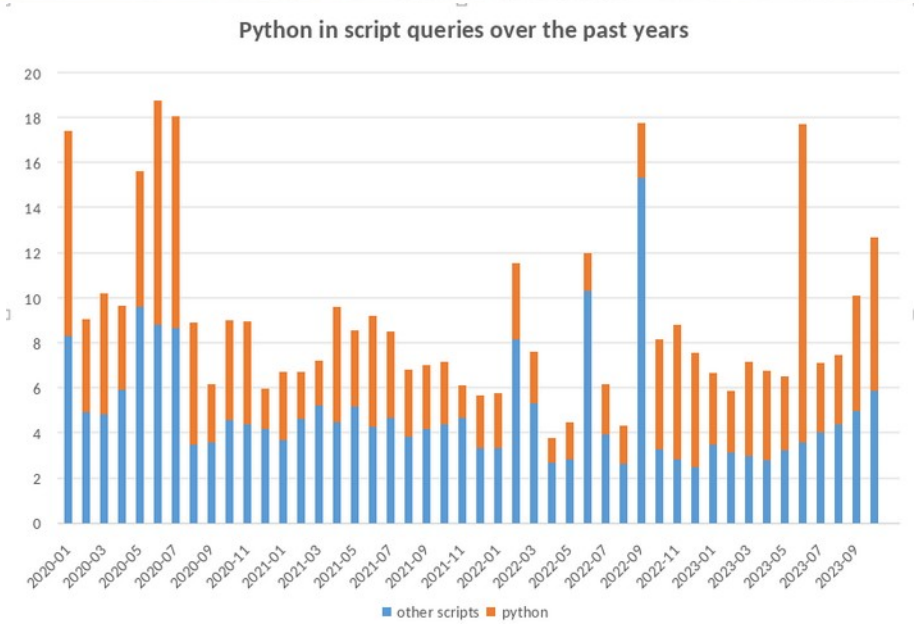




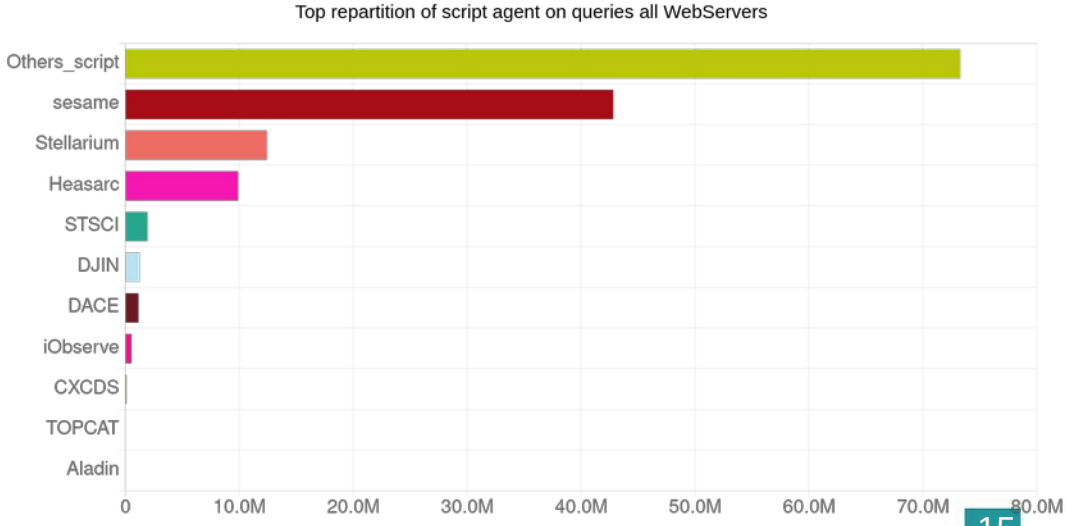
Queries per day : from 283K to 1.6M



Scripts usage

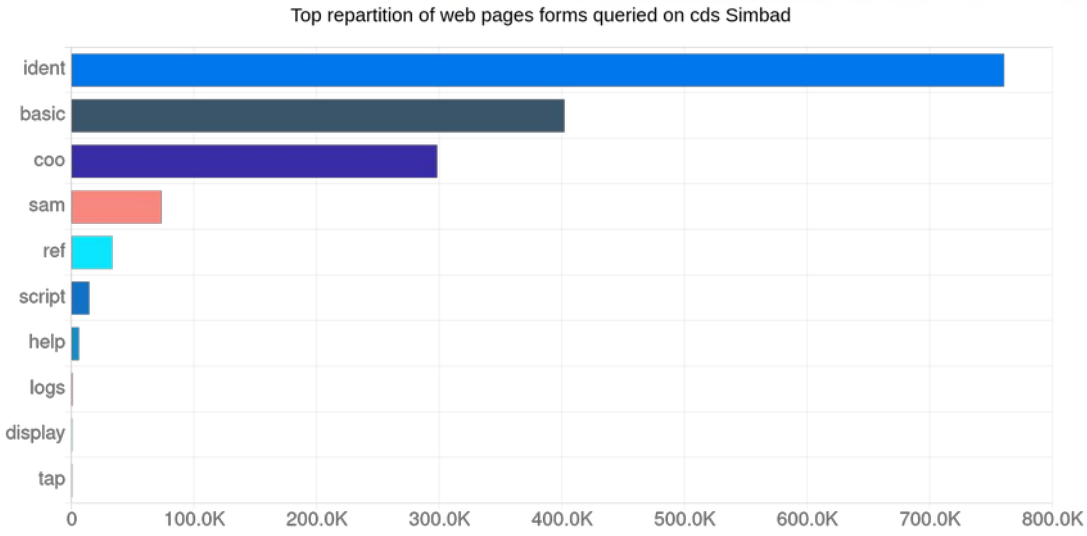


Queries (by scripts) grouped by the provenance of users



WEB usage

Distinct usage of web pages in SIMBAD



Provenance of users on the Web