

The NASA Astrophysics Data System: a Discovery tool for Open Science

Alberto Accomazzi & the ADS Team

aaccomazzi@cfa.harvard.edu | [@aaccomazzi](https://twitter.com/aaccomazzi)

NASA Astrophysics Data System | [@adsabs](https://twitter.com/adsabs) | <https://ui.adsabs.harvard.edu>

NASA Open Source Science Workshop - October 14, 2021



Building a Better Information System for Open Science

NASA SMD research requires expertise spanning across boundaries

- Astronomy & Astrophysics
- Planetary Sciences, Geophysics, Astrobiology
- Solar Physics, Space Weather, Plasma Physics

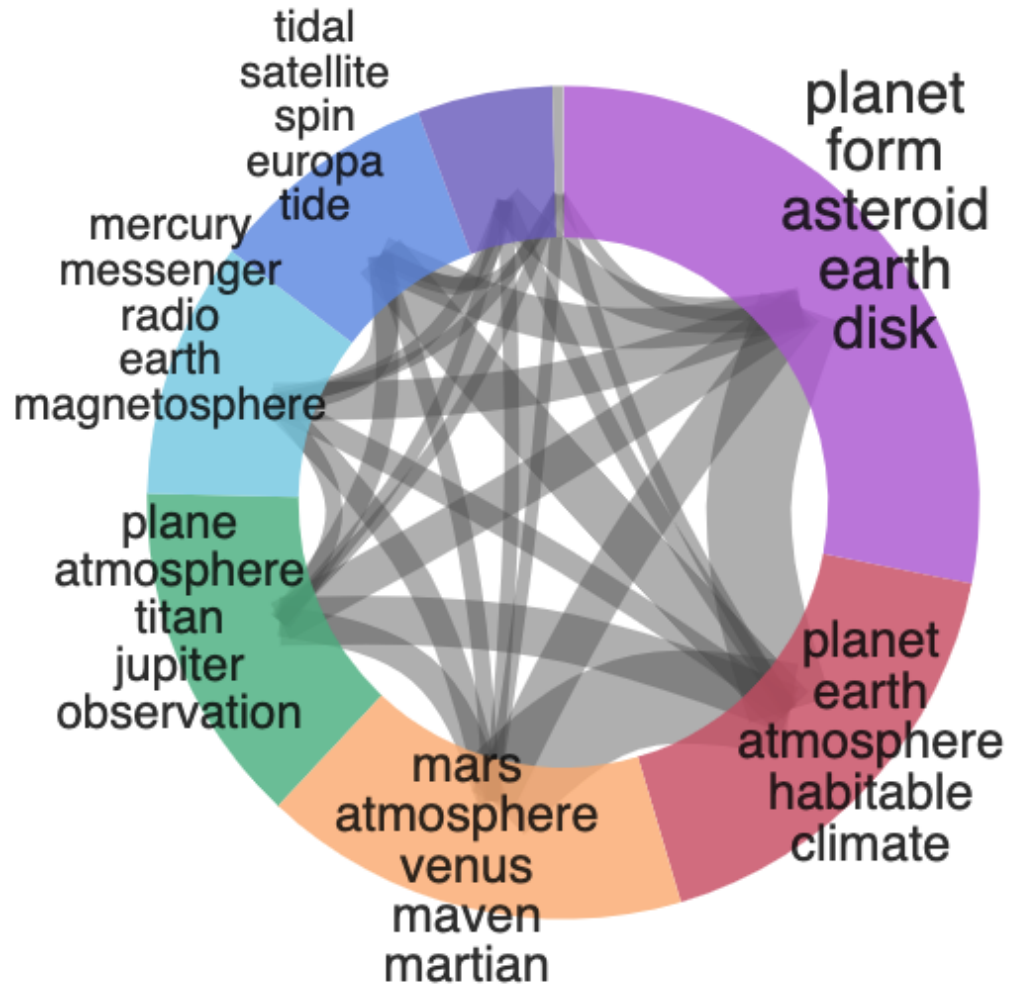
Literature can be seen as central, organizing point to navigate research fields

- Big challenges require communities of experts from different fields working together
- As interdisciplinary research develops, different fields become organically connected and discoverable through topics, citations, co-readership

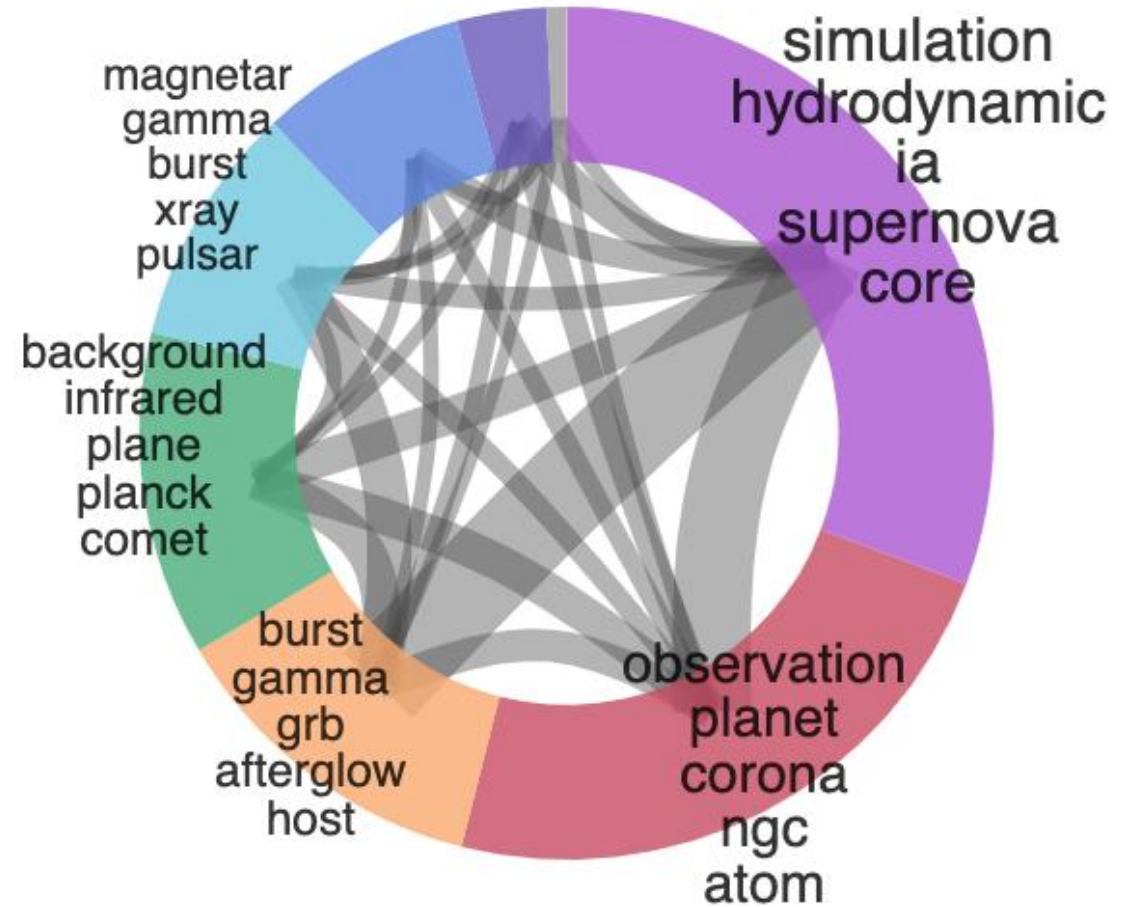
Connections between literature, software and data products increase discovery of all research artifacts

- Links to archives crucial for making data more discoverable and shared

Cross-Disciplinary Analysis (2020)



A subject matter clustering of recent cited Planetary Science and Astrobiology literature from the 2020 papers discussing exoplanets. % of the cited exoplanet literature appears in solar system papers.



A subject matter clustering of recent Astrophysics papers referencing articles funded by the NASA Heliophysics division.

The NASA Astrophysics Data System (ADS)

- ADS is a NASA-funded project which provides discovery services for scholarly literature in Astronomy & Physics
- 15M metadata records, most of them traditional publications
- 6M full-text documents from all major publishers
- A citation graph with over 8M nodes and 142M edges
- (Anonymous) usage data for 50k regular users

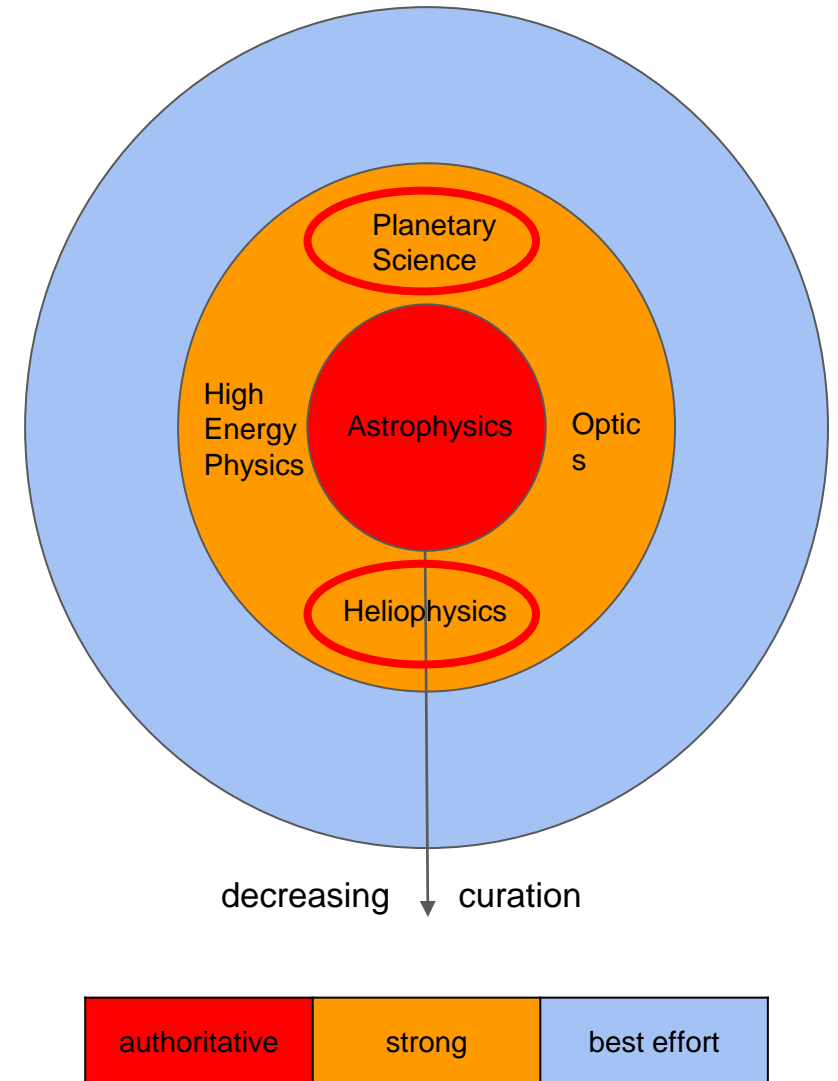
The screenshot shows the ADS search interface. At the top, there's a navigation bar with the ADS logo, a search icon, and links for Feedback, ORCID, About, and Account. Below this is a dark header with the text 'astrophysics data system' and three tabs: 'Classic Form', 'Modern Form' (which is selected), and 'Paper Form'. A search bar is present with a dropdown menu for 'QUICK FIELD:' containing 'Author', 'First Author', 'Abstract', and 'All Search Terms'. Below the search bar are two columns of search examples. The left column, titled 'Recommendations', includes fields for 'author' (author:"huchra, john"), 'first author' (author:"^huchra, john"), 'abstract + title' (abs:"dark energy"), 'year' (year:2000), 'year range' (year:2000-2005), 'full text' (full:"gravity waves"), and 'publication' (bibstem:ApJ). The right column, titled 'Search examples', includes 'citations' (citations(author:"huchra, j")), 'references' (references(author:"huchra, j")), 'reviews' (reviews("gamma-ray bursts")), 'refereed' (property:refereed), 'astronomy' (database:astronomy), and 'OR' (abs:(planet OR star)). At the bottom, there are three icons with corresponding text: a globe icon for 'Use a classic ADS-style form', a magnifying glass icon for 'Learn more about searching the ADS', and a code icon for 'Access ADS data with our API'.

<https://ui.adsabs.harvard.edu>

Curation Levels of ADS Content

Core collection: Astrophysics

- **Complete literature coverage:** refereed journals, books, conferences, reports, PhD thesis, the so called “gray literature,” complete citation coverage
- **High level data products:** substantial effort collaborating with outside groups to link to measurements, index observing and funding proposals, software packages
- **Data links:** mine fulltext, collaborate with archives to link papers in our database to raw and reduced data behind them



Making Data Discoverable...

- DATA
 - SIMBAD 18
 - CDS 10
 - NExSci 9
 - ESO 4
 - MAST 3
 - KOA 2
 - Spitzer 2
 - IRSA 1

less

- SIMBAD OBJECTS
 - Other 19
 - K2-18b 19
 - K2-3b 7
 - K2-3d 6
 - K2-3c 5
 - K2-9b 5

more

a ads

[Feedback](#)
[ORCID](#)
[About](#)
[Account](#)

QUICK FIELD: [Author](#) [First Author](#) [Abstract](#) [All Search Terms](#)

← Start New Search 🔍

Your search returned **25** results

Sort: [Date](#)

[Export](#) [Explore](#)

[Add papers to library](#)

AUTHORS

- Benneke, B 8
- Crossfield, I 7
- Livingston, J 7
- Dressing, C 6
- Howard, A 6

more

COLLECTIONS

- astronomy 25

REFEREED

- refereed 20
- non-refereed 5

AFFILIATIONS

KEYWORDS

PUBLICATIONS

BIB GROUPS

[Show highlights](#)
[Show abstracts](#)
[Hide Sidebars](#)
[Go To Bottom](#)

- 1 2019arXiv190904642B 2019/09 📄 ☰ 📄
Water Vapor on the Habitable-Zone Exoplanet K2-18b
 Benneke, Björn; Wong, Ian; Piaulet, Caroline; Knutson, Heather A. *and 11 more*
- 2 2019AJ....157..242E 2019/06 *cited: 2* 📄 ☰ 📄
An Updated Study of Potential Targets for Ariel
 Edwards, Billy; Mugnai, Lorenzo; Tinetti, Giovanna; Pascale, Enzo *and 1 more*
- 3 2019AJ....157..211M 2019/05 *cited: 3* 📄 ☰ 📄
Detecting Unresolved Binaries in TESS Data with Speckle Imaging
 Matson, Rachel A.; Howell, Steve B.; Ciardi, David R.
- 4 2019AJ....157..174O 2019/05 *cited: 4* 📄 ☰ 📄
Discovery of a Third Transiting Planet in the Kepler-47 Circumbinary System
 Orosz, Jerome A.; Welsh, William F.; Haghighipour, Nader; Quarles, Billy *and 15 more*

Years Citations Reads

■ refereed ■ non refereed

Year	Refereed	Non-refereed	Total
2015	1	3	4
2016	2	1	3
2017	4	0	4
2018	7	0	7
2019	6	1	7

Limit results to papers from to [Apply](#)

... and Accessible

ads Feedback ORCID About Account

QUICK FIELD: Author First Author Abstract All Search Terms

Back to results "exoplanet atmospheres" X Q

VIEW

- Abstract
- Citations (23)
- References (59)
- Co-Reads
- Similar Papers
- Volume Content
- Graphics
- Metrics
- Export Citation

Characterization of the K2-18 multi-planetary system with HARPS. A habitable zone super-Earth and discovery of a second, warm super-Earth on a non-coplanar orbit

Show affiliations

Cloutier, R.; Astudillo-Defru, N.; Doyon, R.; Bonfils, X.; Almenara, J. -M.; Benneke, B.; Bouchy, F.; Delfosse, X.; Ehrenreich, D.; Forveille, T.; Lovis, C.; Mayor, M.; Menou, K.; Murgas, F.; Pepe, F.; Rowe, J.; Santos, N. C.; Udry, S.; Wünsche, A.

Aims: The bright M2.5 dwarf K2-18 ($M_s = 0.36 M_\odot$, $R_s = 0.41 R_\odot$) at 34 pc is known to host a transiting super-Earth-sized planet orbiting within the star's habitable zone; K2-18b. Given the superlative nature of this system for studying an exoplanetary atmosphere receiving similar levels of insolation as the Earth, we aim to characterize the planet's mass which is required to interpret atmospheric properties and infer the planet's bulk composition.

Methods: We have obtained precision radial velocity measurements with the HARPS spectrograph. We then coupled those measurements with the K2 photometry to jointly model the observed radial velocity variation with planetary signals and a correlated stellar activity model based on Gaussian processes

FULL TEXT SOURCES

- My Institution
- Publisher
- arXiv

DATA PRODUCTS

- SIMBAD (7)
- NExSci (1)
- ESS (1)
- GDS (1)

Add paper to a library

GRAPHICS

Click to view more

ASSOCIATED WORKS (2)

- Catalog Description
- Source Paper

Links to Full Text

Links to Data

Related resources

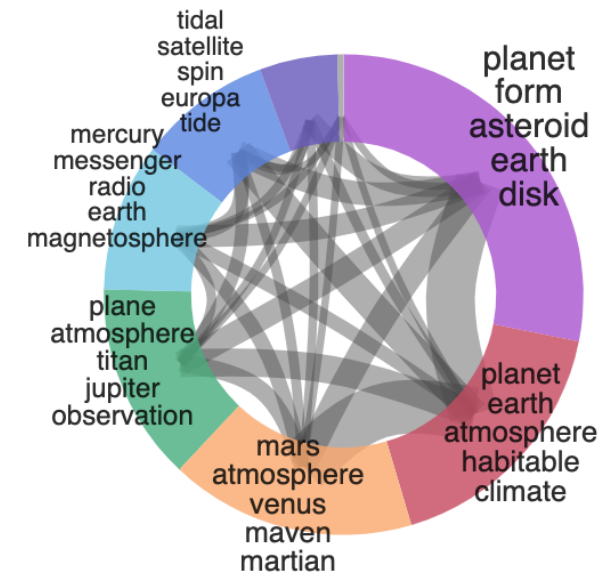
ADS now expanding its coverage to Planetary and Heliophysics literature & data

Literature

- Goal is for ADS to be as useful to PSD and HPD as it is to APD, providing current and accurate coverage of refereed and gray literature, preprints
- Effort has just begun, with main push over next two years

Software and data products

- Added 600 datasets from PDS SBN
- Added data links to 5.6K AGU journal articles
- Added links to 480 software packages cited in 513 AGU articles



data:PDS jupiter

JGR Planets

Research Article | Full Access

Jupiter's Great Red Spot: Str
Incoming Anticyclones in 20

A. Sánchez-Lavega, A. Anguiano-Arteaga, F.
Hueso, J. F. Sanz-Requena, S. Pérez-Hoyos, I.

First published: 17 March 2021 |

<https://doi-org.ezp-prod1.hul.harvard.edu/10.1029/2020JE006686> | Citations: 1

SECTIONS

PDF TOOLS SHARE

FULL TEXT SOURCES

My Institution

Publisher

DATA PRODUCTS

Zenodo (3)

MAST (1)

ESA (1)

PDS (3)

Figshare (1)