

Expansion Study and Proposals

Michael Kurtz & the ADS Team

ADS Users Group Meeting - 11/29/2018



Overview

- **Background and Motivation**
 - ADS Users Group Recommendation on Exoplanets
 - NASA's Strategic Plan for Scientific Data and Computing
 - NASA's Role in Search for Life in the Universe
- **Progress in 2018**
 - The ADS Information Model
 - Expanded exoplanet literature coverage
 - Submitted Whitepaper to Exoplanet 2020 Task Force
 - Solicited Planetary Expansion Proposal sent to NASA Astrophysics
 - Submitted NASA RFI input for NASA Archives Roles
- **Currently Pending**
 - Submission of whitepaper to Astro2020 Decadal Survey
 - Outcome of NASA Archives Plans

ADSUG Recommendation on Exoplanets

ADSUG Nov. 2017 Report

During its first meeting, the ADSUG cited the growing importance and prevalence of exoplanet studies and the inevitable confluence of astronomy and planetary science in the literature and data archives. [...]

As a first step, ADSUG recommends that ADS begin with a focused effort to improve coverage of exoplanets and related topics, ensuring complete coverage of exoplanets within the core content and services. This will provide a high-value return for the broadest user community at a modest cost to the agencies. This focused effort will also serve as an important proof-of-concept for the general expansion of the core to include Planetary Science.

http://ads.harvard.edu/adsug/2017b/ADSUG_Report_Jan2018.pdf

ADS Users Group Report (Nov. 2017): "As a first step, ADSUG recommends that ADS begin with a focused effort to improve coverage of exoplanets and related topics, ensuring complete coverage of exoplanets within the core content and services. This will provide a high-value return for the broadest user community at a modest cost to the agencies. This focused effort will also serve as an important proof-of-concept for the general expansion of the core to include PS."

Citation analysis and feedback from Dawn Gelino and Carrie Anderson allowed us to greatly improve the ADS coverage of exoplanet literature and Planetary Science literature in general

Done	To do
<ol style="list-style-type: none"> 1. Greatly improved coverage of PS literature (e.g. by adding missing journals to our CrossRef feed): <i>all current literature identified as crucial for exoplanet research is now discoverable through the ADS</i> (caveat: no full text for some journals) 2. Joint presentation with PDS at 2018 meeting of <i>Asia Oceania Geosciences Society</i> 3. Presentation at 2018 DPS meeting 4. Participation at the 2018 AGU meeting (NASA booth) 	<ol style="list-style-type: none"> 1. Approach publishers to provide us with full text. <p>For example:</p> <ul style="list-style-type: none"> • Ann Liebert Inc (Astrobiology) • Cambridge University Press (International Journal of Astrobiology, ...) • American Optical Society • American Meteorological Society • EGU/Copernicus (Annales Geophysicae, ...) <ol style="list-style-type: none"> 2. Identify/fill gaps in older material* 3. Additional citation analysis 4. Liaise with PDS / ESA to improve linking datasets to PS literature

* note: chemistry journals can only live in the ADS outer boundary

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references(abs:(exoplanet atmosphere) year:2012-2018) -database:astronomy year:2007-2018

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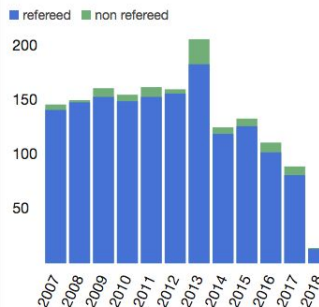
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2	<input type="checkbox"/> 2008QJRMS.134..165A 2008/01 cited: 34 A high-latitude convective cloud feedback and equable climates Abbot, Dorian S.; Tziperman, Eli
3	<input type="checkbox"/> 2009JAtS...66..519A 2009 cited: 16 Controls on the Activation and Strength of a High-Latitude Convective Cloud Feedback Abbot, Dorian S.; Tziperman, Eli
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5	<input type="checkbox"/> 2010JGRD...115.3104A 2010/01 cited: 39 Mudball: Surface dust and Snowball Earth deglaciation Abbot, Dorian S.; Pierrehumbert, Raymond T.
6	<input type="checkbox"/> 2011JGRD...11618103A 2011/09 cited: 52 The Jormungand global climate state and implications for Neoproterozoic glaciations Abbot, Dorian S.; Voigt, Aiko; Koll, Daniel
7	<input type="checkbox"/> 2014JCli...27.4391A 2014/06 cited: 16 Resolved Snowball Earth Clouds Abbot, Dorian S.
8	<input type="checkbox"/> 2011JPCA...115.6805A 2011/06 cited: 15 Collision-Induced Absorption by H₂Pairs: From Hundreds to Thousands of Kelvin Abel, Martin; Frommhold, Lothar; Li, Xiaoping <i>and 1 more</i>
9	<input type="checkbox"/> 2012JChPh.136d4319A 2012/01 cited: 23 Infrared absorption by collisional H₂-He complexes at temperatures up to 9000 K and frequencies from 0 to 20 000 cm⁻¹ Abel, Martin; Frommhold, Lothar; Li, Xiaoping <i>and 1 more</i>
10	<input type="checkbox"/> 2008JNS....18..303A 2008/08 cited: 37 New Approximations and Tests of Linear Fluctuation-Response for Chaotic Nonlinear Forced-Dissipative Dynamical Systems Abramov, Rafail V.; Majda, Andrew J.

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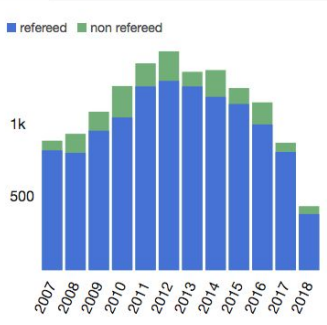
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		no author information available					
2	<input type="checkbox"/>	2011ARA&A...49..281A	2011/09	cited: 34			
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		A'Hearn, Michael F.					
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		Solar Flares and Coronal Mass Ejections: A Statistically Determined Flare Flux - CME Mass Correlation					
		Aarnio, A. N.; Stassun, K. G.; Hughes, W. J. <i>and 1 more</i>					
4	<input type="checkbox"/>	2012ApJ...760....9A	2012/11	cited: 38			
		Mass Loss in Pre-main-sequence Stars via Coronal Mass Ejections and Implications for Angular Momentum Loss					
		Aarnio, Alicia N.; Matt, Sean P.; Stassun, Keivan G.					
5	<input type="checkbox"/>	2011ApJ...735L..27A	2011/07	cited: 18			
		The Steppenwolf: A Proposal for a Habitable Planet in Interstellar Space					
		Abbot, D. S.; Switzer, E. R.					
6	<input type="checkbox"/>	2012ApJ...756..178A	2012/09	cited: 60			
		Indication of Insensitivity of Planetary Weathering Behavior and Habitable Zone to Surface Land Fraction					
		Abbot, Dorian S.; Cowan, Nicolas B.; Ciesla, Fred J.					
7	<input type="checkbox"/>	2012GeoRL...3920711A	2012/10	cited: 18			
		Clouds and Snowball Earth deglaciation					
		Abbot, Dorian S.; Voigt, Aiko; Branson, Mark <i>and 4 more</i>					
8	<input type="checkbox"/>	2016ApJ...827..117A	2016/08	cited: 9			
		Analytical Investigation of the Decrease in the Size of the Habitable Zone Due to a Limited CO₂ Outgassing Rate					
		Abbot, Dorian S.					
9	<input type="checkbox"/>	2016PhRvL.116f1102A	2016/02	cited: 3286			
		Observation of Gravitational Waves from a Binary Black Hole Merger					
		Abbott, B. P.; Abbott, R.; Abbott, T. D. <i>and 1010 more</i>					
10	<input type="checkbox"/>	2017ApJ...850L..39A	2017/12	cited: 47			
		Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817					
		Abbott, B. P.; Abbott, R.; Abbott, T. D. <i>and 1100 more</i>					

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NASA's Strategic Plan for Data & Computing

Strategic Data Management Working Group Meeting (Aug 2018)

NASA Request for Information (Oct 2018)

This Request for Information (RFI) invites comments and suggestions to assist NASA's Science Mission Directorate (SMD) in the development of a new Strategic Plan for Scientific Data and Computing. Over the next five years the plan will be used to *guide the evolution of the array of data and computing systems supporting research across four science areas: Astrophysics, Earth Science, Heliophysics and Planetary Science*. This notice is published to solicit input from all stakeholders, including but not limited to members of scientific community, academic institutions, other agencies, the private sector, professional societies, advocacy groups, the general public, and international collaborators. Information gathered through this RFI will solely be used for strategic planning purposes and program development.

ADS RFI Response

- Facilitate crossing of silos
 - Literature can be seen as a central, organizing point to find, link to related resources
 - What ADS and the other archives do for Astro to be done for other disciplines
 - Adopt Data Citation across SMD (implies dataset registration)
 - Provide text mining services over the published literature to the larger SMD community using discipline-curated knowledge bases and thesauri

https://docs.google.com/document/d/1LWxdc4BW48SPd_MvKm53hvTZKiOmApp4LmKJ3WwWVJE/edit?usp=sharing

NASA's Search for Life in the Universe

Jim Green (NASA PS):

“This interdisciplinary endeavor connects top research teams and provides a synthesized approach in the search for planets with the greatest potential for signs of life,” says Jim Green, NASA’s Director of Planetary Science. “The hunt for exoplanets is not only a priority for astronomers, it’s of keen interest to planetary and climate scientists as well.”

(<https://www.nasa.gov/feature/nasa-s-nexss-coalition-to-lead-search-for-life-on-distant-worlds>)

Paul Hertz (NASA AP):

“Just as we expected, there are exciting discoveries lurking in our archived Kepler data, waiting for the right tool or technology to unearth them,” said Paul Hertz, director of NASA’s Astrophysics Division in Washington. “This finding shows that our data will be a treasure trove available to innovative researchers for years to come.”

(<https://www.nasa.gov/press-release/artificial-intelligence-nasa-data-used-to-discover-eighth-planet-circling-distant-star>)

Thomas Zurbuchen (SMD):

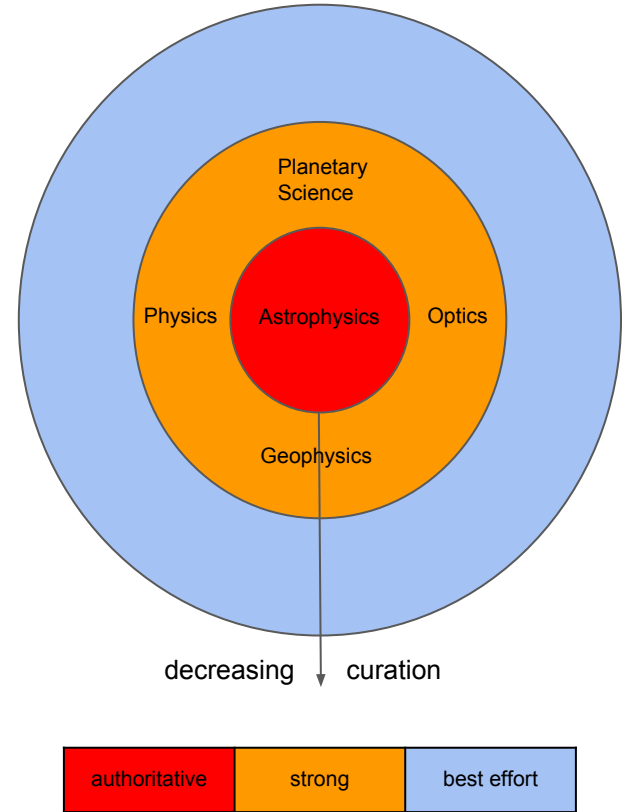
"For astrobiology, the key thing to remember is that answering the fundamental question of “is there life out there?” will require scientific breakthroughs from many different science fields, including ones that are not currently engaged in this exciting endeavor. This, however, demonstrates the nature of great research: it’s not just about answering questions that have been asked in the past, it is about finding entirely new questions that will have impact for a long time to come.”

(http://www.dailygalaxy.com/my_weblog/2017/06/nasa-poised-to-discover-alien-life-we-are-on-the-verge-of-making-one-of-the-most-profound-discoveries-in-history-taking.html)

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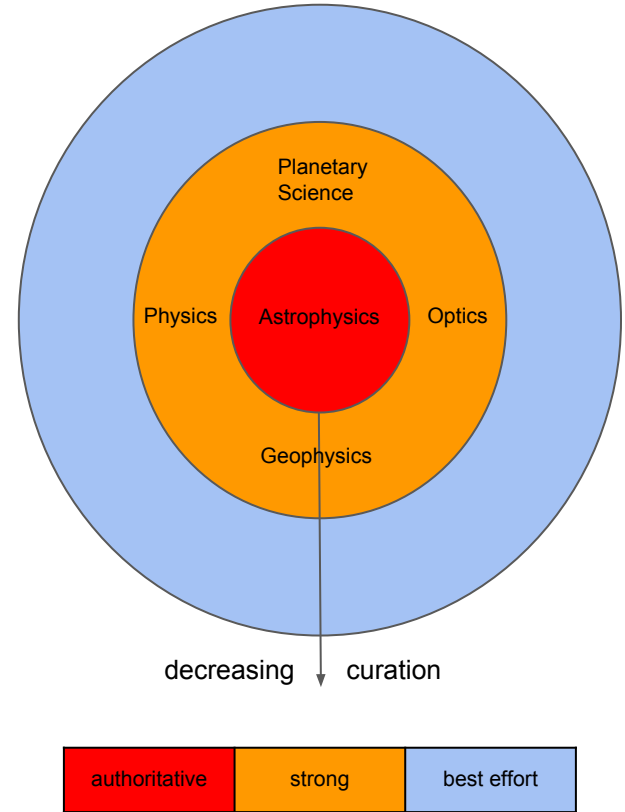
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Astrophysics

- Complete literature coverage: not just the refereed journals, but also books, conferences, reports, PhD thesis, the so called gray literature
- Substantial effort into collaborating with outside groups (CDS, NED, MAST, HEASARC, ESO, NASA HQ) to include high level data products, observing and funding proposals
- Work with data centers and archives to link papers in our database to the raw and reduced data behind them



Testing Weak Lensing Maps With Redshift Surveys: A Subaru Field

Michael J. Kurtz, Margaret J. Geller, Yousuke Utsumi, Satoshi Miyazaki, Ian P. Dell'Antonio, Daniel G. Fabricant

(Submitted on 28 Feb 2011 (v1), last revised 2 Apr 2012 (this version, v2))

We use a dense redshift survey in the foreground of the Subaru GTO2deg² weak lensing field (centered at $\alpha_{2000} = 16^{\text{h}}04^{\text{m}}44^{\text{s}}.\delta_{2000} = 43^{\circ}11'24''$) to assess the completeness and comment on the purity of massive halo identification in the weak lensing map. The redshift survey (published here) includes 4541 galaxies; 4405 are new redshifts measured with the Hectospec on the MMT. Among the weak lensing peaks with a signal-to-noise greater than 4.25, 2/3 correspond to individual massive systems; this result is essentially identical to the Geller et al. (2010) test of the Deep Lens Survey field F2. The Subaru map, based on images in substantially better seeing than the DLS, enables detection of less massive halos at fixed redshift as expected. We demonstrate that the procedure adopted by Miyazaki et al. (2007) for removing some contaminated peaks from the weak lensing map improves agreement between the lensing map and the redshift survey in the identification of candidate massive systems.

Comments: Astrophysical Journal accepted version

Subjects: **Cosmology and Nongalactic Astrophysics (astro-ph.CO)**; Instrumentation and Methods for Astrophysics (astro-ph.IM)

DQJ: [10.1088/0004-637X/750/2/168](https://arxiv.org/abs/10.1088/0004-637X/750/2/168)

Cite as: [arXiv:1102.5743](https://arxiv.org/abs/1102.5743) [astro-ph.CO]

(or [arXiv:1102.5743v2](https://arxiv.org/abs/1102.5743v2) [astro-ph.CO] for this version)














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D. N. Spergel, R. Bean, O. Doré, M. R.olta, C. L. Bennett, J. Dunkley, G. Hinshaw, N. Jarosik, E. Komatsu, L. Page, ...
  
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Margaret J. Geller, Ho Seong Hwang, Ian P. Dell'Antonio, Harus Jabran Zahid, Michael J. Kurtz, Daniel G. Fabricant
  

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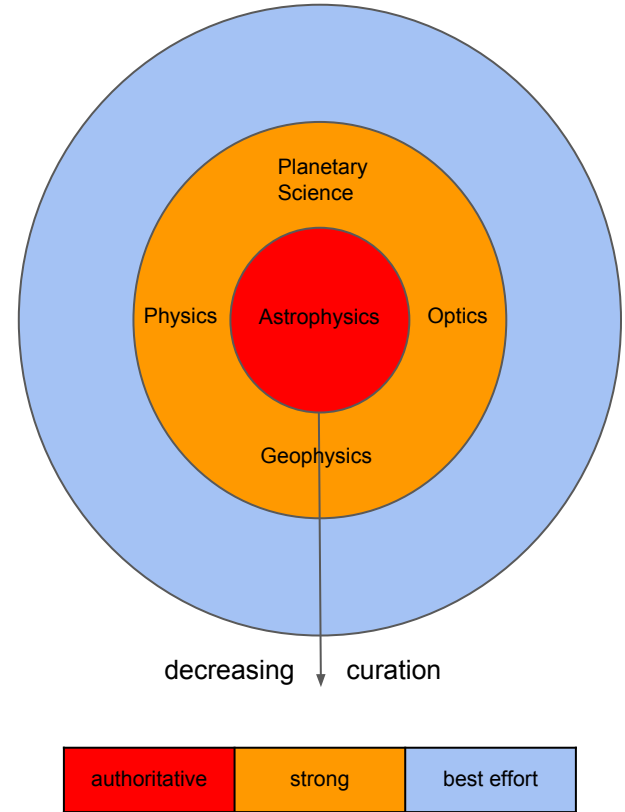
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- Many of the larger conference series from the major publishers (e.g. AIP)
- No attempt to curate this content at the same level of the core
- We do not seek the kind of close collaborations which we have in the bullseye core



Spin-orbit coupling assisted by flexural phonons in graphene

H. Ochoa, A. H. Castro Neto, V. I. Fal'ko, F. Guinea

(Submitted on 19 Sep 2012 (v1), last revised 11 Dec 2012 (this version, v2))

We analyze the couplings between spins and phonons in graphene. We present a complete analysis of the possible couplings between spins and flexural, out of plane, vibrations. From tight-binding models we obtain analytical and numerical estimates of their strength. We show that dynamical effects, induced by quantum and thermal fluctuations, significantly enhance the spin-orbit gap.

Comments: 9 pages, final version accepted in PRB
 Subjects: **Mesoscale and Nanoscale Physics (cond-mat.mes-hall)**
 Journal reference: Phys. Rev. B 86, 245411 (2012)
 DOI: 10.1103/PhysRevB.86.245411
 Cite as: arXiv:1209.4382 [cond-mat.mes-hall]
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 Wei Han, Roland K. Kawakami, Martin Gmitra, Jaroslav Fabian
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 B. Amorim, A. Cortijo, F. de Juan, A. G. Grushin, F. Guinea, A. Gutiérrez-Rubio, H. Ochoa, V. Parente, R. Roldán, P. San-Jose, ...
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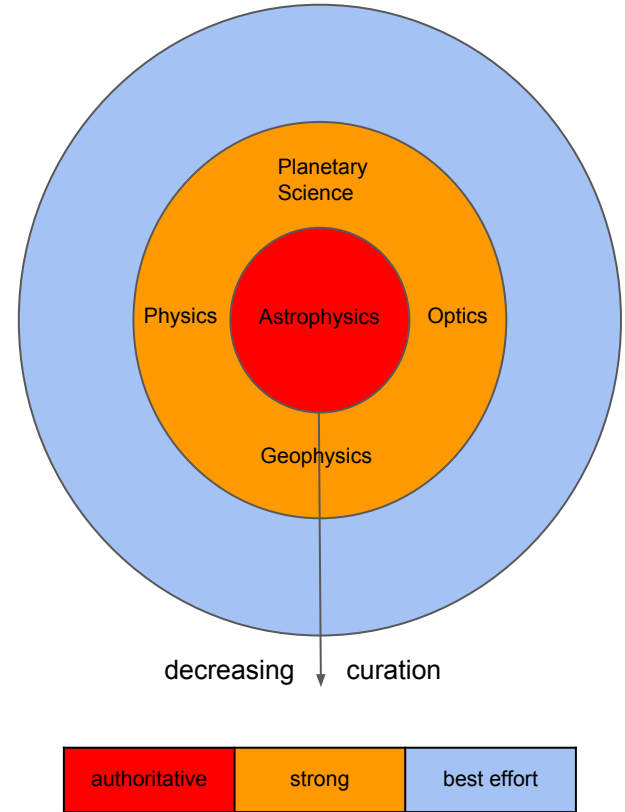
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- Apart from error checking we perform no curation on these documents



Usage Bibliometrics

Michael J. Kurtz, Johan Bollen

(Submitted on 14 Feb 2011)

Scholarly usage data provides unique opportunities to address the known shortcomings of citation analysis. However, the collection, processing and analysis of usage data remains an area of active research. This article provides a review of the state-of-the-art in usage-based informetric, i.e. the use of usage data to study the scholarly process.

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Journal reference: Annual Review of Information Science and Technology, vol 44, p. 3–64 (2010)
DOI: [10.1002/aris.2010.1440440108](https://doi.org/10.1002/aris.2010.1440440108)
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Roger A. Brumback

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Henk F. Moed

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References & Citations

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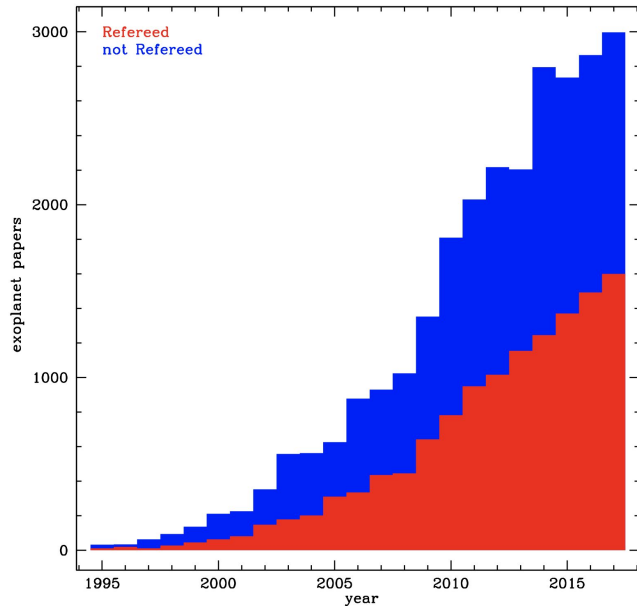
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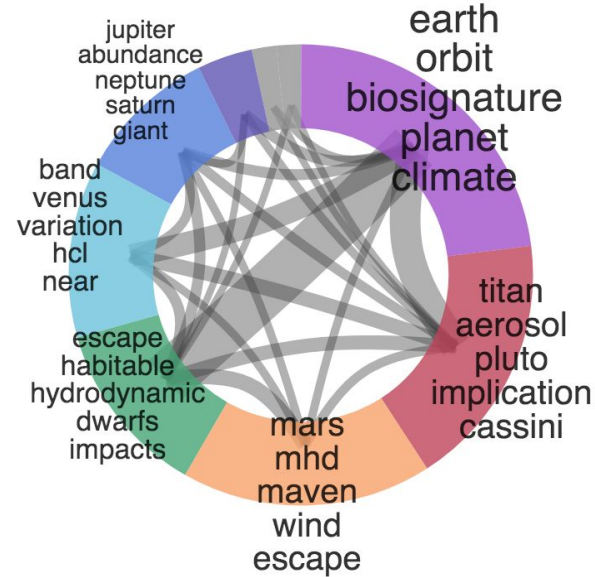
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ADS Exoplanets Whitepaper - [LINK](#)



The number of articles mentioning the word “exoplanet” since the discovery of 51Peg b. Currently 6% of all refereed astronomy articles contain the word “exoplanet.”



A subject matter clustering of recent cited Planetary Science and Astrobiology literature from the 2017 papers discussing atmospheres of exoplanets.

Planetary Expansion Proposal

- Develop methodology for identifying relevant content which is not already in ADS through community engagement
- Perform in-depth analysis of (exo)planetary content through citation and topic analysis
- Identify additional partners and alternate data sources which should be incorporated in ADS bibliographic database
- Harvest and index relevant content
- Community outreach
- Text mining and metadata enrichment
- Interoperability
- UI development