Exercise 3

- Conduct a survey as comprehensive as possible of at least 10 journals that publish astronomy- or astrophysics-related research results. Which of them have associated publications, e.g., letters or supplements?
- Select a handful of '**core**' journals (definition?), and summarize how often each journal publishes, in what language, by what publisher.
- Compare the 'style' of the core journals. Note the layout of the title, abstract, references, etc. (e.g., ApJ vs A&A)
- Zoom in to one journal and browse through one recent paper of your choice. What is it about? By whom?
- Identify one off-core journal. Does our library subscribe to it.
- What is the ***Science Citation Index***? What is the ***Impact Factor***? What is the ***Open Access*** policy? *PLOS One*?

Scientific Writing Exercise 2

March 21 2024

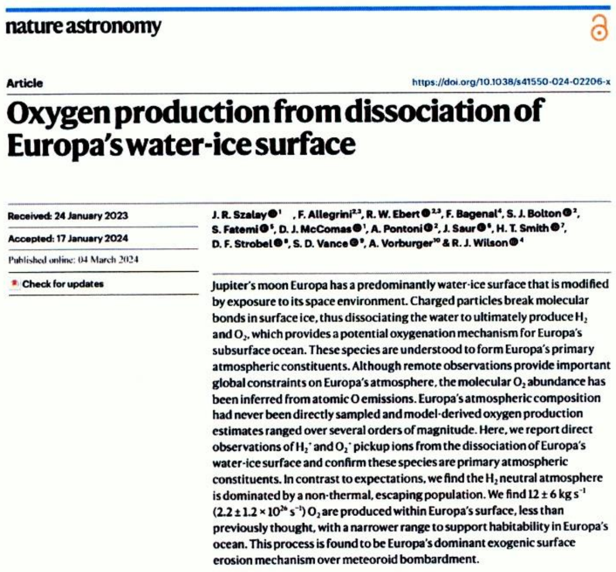
1 Core Journals Comparison

1.1 *Nature: Astronomy*

Nature: Astronomy is a specialized journal of Nature journal, which is one of the most cited scientific and prestigious academic journals. It is published by *Nature Portfolio* monthly and was first published in January 2017. *Nature: Astronomy* publishes cutting edge research including astronomy, astrophysics and planetary science and reviewed by a robust peer-review community. According to the *Journal Citation Reports*, the journal impact factor of 2021 is 15.647 and ranked 5th among all 69 journals in Astronomy field.

The format of the journal's articles includes (reference: Nature Astronomy Official Website):

1. Main text: up to 3,000 words.
2. Abstract: up to 150 words and unreferenced.
3. Display items: up to 6 items (figures and/or tables).
4. Article should be divided as follows:
   (a) Introduction (without heading)
   (b) Results (should be divided by topical subheadings)
   (c) Discussion (does not contain subheadings)
   (d) Online Methods (should be divided by topical subheadings)
5. Reference: up to 50 (recommended).


nature astronomy

Article

https://doi.org/10.1038/s41550-024-02206-x

Oxygen production from dissociation of Europa's water-ice surface

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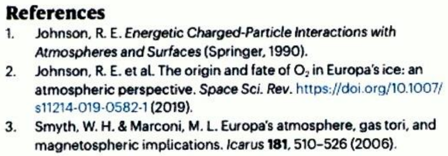
Check for updates

J. R. Szalay[1], F. Allegrini[2,3], R. W. Ebert[2,3], F. Bagenal[4], S. J. Bolton[2], S. Fatemi[5], D. J. McComas[1], A. Pontoni[2], J. Saur[6], H. T. Smith[7], D. F. Strobel[8], S. D. Vance[9], A. Vorburger[10] & R. J. Wilson[4]

Jupiter's moon Europa has a predominantly water-ice surface that is modified by exposure to its space environment. Charged particles break molecular bonds in surface ice, thus dissociating the water to ultimately produce H_2 and O_2, which provides a potential oxygenation mechanism for Europa's subsurface ocean. These species are understood to form Europa's primary atmospheric constituents. Although remote observations provide important global constraints on Europa's atmosphere, the molecular O_2 abundance has been inferred from atomic O emissions. Europa's atmospheric composition had never been directly sampled and model-derived oxygen production estimates ranged over several orders of magnitude. Here, we report direct observations of H_2^+ and O_2^+ pickup ions from the dissociation of Europa's water-ice surface and confirm these species are primary atmospheric constituents. In contrast to expectations, we find the H_2 neutral atmosphere is dominated by a non-thermal, escaping population. We find 12 ± 6 kg s^{-1} ($2.2 \pm 1.2 \times 10^{26}$ s^{-1}) O_2 are produced within Europa's surface, less than previously thought, with a narrower range to support habitability in Europa's ocean. This process is found to be Europa's dominant exogenic surface erosion mechanism over meteoroid bombardment.

Figure 1: Layout of the Nature Astronomy journal paper (Szalay et al. 2024 [2])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2. Johnson, R. E. et al. The origin and fate of O_2 in Europa's ice: an atmospheric perspective. *Space Sci. Rev.* https://doi.org/10.1007/s11214-019-0582-1 (2019).
3. Smyth, W. H. & Marconi, M. L. Europa's atmosphere, gas tori, and magnetospheric implications. *Icarus* **181**, 510–526 (2006).

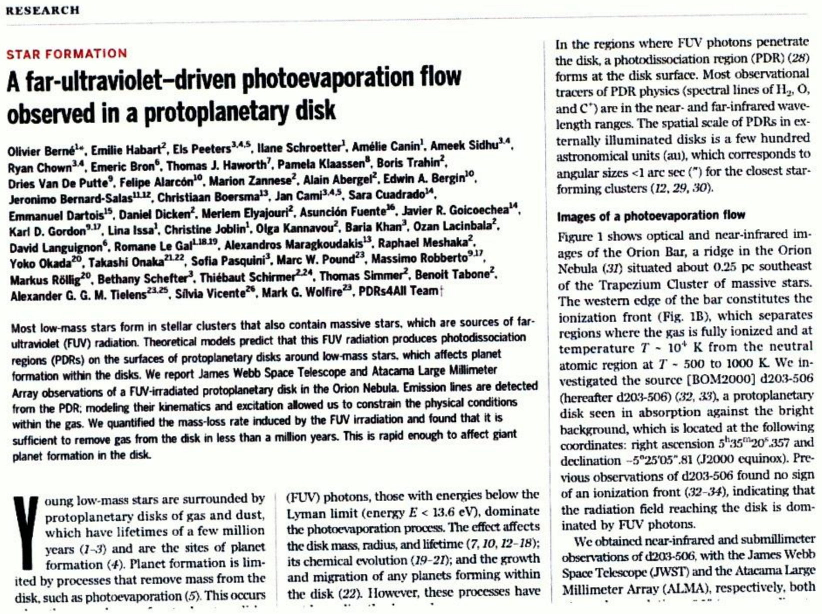
Figure 2: Reference of the Nature Astronomy journal paper (Szalay et al. 2024 [2])

1.2 *Science*

Science is one of the world's top academic journals and was first published in 1880. It is a peer-reviewed journal publishes in research across varied fields in sciences. *Science* family of publications include *Science Translational Medicine*, *Science Signaling*, *Science Immunology*, *Science Robotics* and the open access journal *Science Advances*. Unlike *Nature* journal publishes specialized journals, such as *Nature: Astronomy*, astronomy related articles only were published in *Science* magazine. The 2022 impact factor of *Science* is 63.714, which is slightly higher than the impact factor of *Nature* which is 64.8 in the same year.

The format of the journal includes (reference: Science Official website):

1. Title, Authors, Affiliations: Titles should be no more than 96 characters (including spaces).
2. Abstract: should be 125 words or less.
3. Main text: is divided into subheading.
4. Reference and Notes: are numbered in the order wheere they are cited:
   (a) the main text
   (b) text boxes (if any)
   (c) figure and table captions
   (d) references notes and acknowledgements
   (e) supplementary materials
5. Acknowledgements:
6. List of Supplementary Materials



RESEARCH

STAR FORMATION

A far-ultraviolet–driven photoevaporation flow observed in a protoplanetary disk

Olivier Berné[1*], Emilie Habart[2], Els Peeters[3,4,5], Ilane Schroetter[1], Amélie Canin[1], Ameek Sidhu[3,4], Ryan Chown[3,4], Emeric Bron[6], Thomas J. Haworth[7], Pamela Klaassen[8], Boris Trahin[2], Dries Van De Putte[9], Felipe Alarcón[10], Marion Zannese[2], Alain Abergel[2], Edwin A. Bergin[10], Jeronimo Bernard-Salas[11,12], Christiaan Boersma[13], Jan Cami[3,4,5], Sara Cuadrado[14], Emmanuel Dartois[15], Daniel Dicken[2], Meriem Elyajouri[2], Asunción Fuente[16], Javier R. Goicoechea[14], Karl D. Gordon[9,17], Lina Issa[1], Christine Joblin[1], Olga Kannavou[2], Baria Khan[3], Ozan Lacinbala[2], David Languignon[6], Romane Le Gal[1,18,19], Alexandros Maragkoudakis[13], Raphael Meshaka[2], Yoko Okada[20], Takashi Onaka[21,22], Sofia Pasquini[3], Marc W. Pound[23], Massimo Robberto[9,17], Markus Röllig[20], Bethany Schefter[3], Thiébaut Schirmer[2,24], Thomas Simmer[2], Benoit Tabone[2], Alexander G. G. M. Tielens[23,25], Sílvia Vicente[26], Mark G. Wolfire[23], PDRs4All Team†

Most low-mass stars form in stellar clusters that also contain massive stars, which are sources of far-ultraviolet (FUV) radiation. Theoretical models predict that this FUV radiation produces photodissociation regions (PDRs) on the surfaces of protoplanetary disks around low-mass stars, which affects planet formation within the disks. We report James Webb Space Telescope and Atacama Large Millimeter Array observations of a FUV-irradiated protoplanetary disk in the Orion Nebula. Emission lines are detected from the PDR; modeling their kinematics and excitation allowed us to constrain the physical conditions within the gas. We quantified the mass-loss rate induced by the FUV irradiation and found that it is sufficient to remove gas from the disk in less than a million years. This is rapid enough to affect giant planet formation in the disk.

Young low-mass stars are surrounded by protoplanetary disks of gas and dust, which have lifetimes of a few million years (1–3) and are the sites of planet formation (4). Planet formation is limited by processes that remove mass from the disk, such as photoevaporation (5). This occurs

(FUV) photons, those with energies below the Lyman limit (energy $E < 13.6$ eV), dominate the photoevaporation process. The effect affects the disk mass, radius, and lifetime (7, 10, 12–18); its chemical evolution (19–21); and the growth and migration of any planets forming within the disk (22). However, these processes have

In the regions where FUV photons penetrate the disk, a photodissociation region (PDR) (28) forms at the disk surface. Most observational tracers of PDR physics (spectral lines of H_2, O, and C^+) are in the near- and far-infrared wavelength ranges. The spatial scale of PDRs in externally illuminated disks is a few hundred astronomical units (au), which corresponds to angular sizes <1 arc sec (″) for the closest star-forming clusters (12, 29, 30).

Images of a photoevaporation flow

Figure 1 shows optical and near-infrared images of the Orion Bar, a ridge in the Orion Nebula (31) situated about 0.25 pc southeast of the Trapezium Cluster of massive stars. The western edge of the bar constitutes the ionization front (Fig. 1B), which separates regions where the gas is fully ionized and at temperature $T \sim 10^4$ K from the neutral atomic region at $T \sim 500$ to 1000 K. We investigated the source [BOM2000] d203-506 (hereafter d203-506) (32, 33), a protoplanetary disk seen in absorption against the bright background, which is located at the following coordinates: right ascension $5^h35^m20^s.357$ and declination −5°25′05″.81 (J2000 equinox). Previous observations of d203-506 found no sign of an ionization front (32–34), indicating that the radiation field reaching the disk is dominated by FUV photons.

We obtained near-infrared and submillimeter observations of d203-506, with the James Webb Space Telescope (JWST) and the Atacama Large Millimeter Array (ALMA), respectively, both

Figure 3: Layout of the *Science* journal paper (Berné et al. 2024 [1])

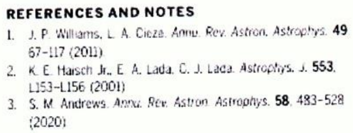


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Figure 4: Reference of the *Science* journal paper (Berné et al. 2024 [1])

2 Recent Paper

Szaley et al. 2024 [2] provides direct observations confirming that H^{2+} and O^{2+} pickup ions, generated from the dissociation of Europa's water-ice surface, are indeed primary atmospheric constituents. Contrary to previous assumptions, the study reveals a lower-than-expected production rate of oxygen ($12 \pm 6\,\mathrm{kg\,s^{-1}}$), narrowing the range to support habitability in Europa's subsurface ocean and highlighting the dominant role of this process in surface erosion. The observational data are obtained by Jovian Auroral Distributions Experiment (JADE) equipped on the Juno Mission during the flyby of Europa on 29 Septemer 2022.

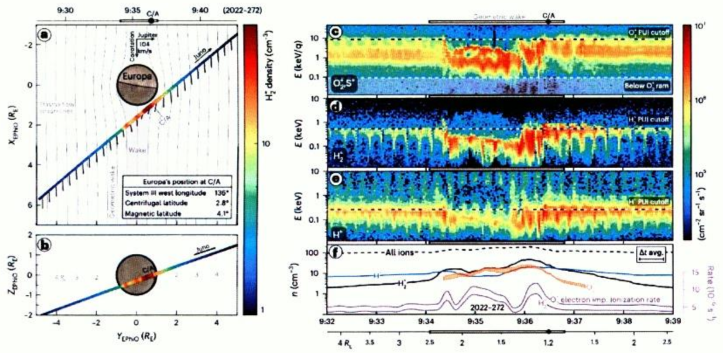

Figure 5: Overview of Europa flyby and plasma observations. (Szaley et al. 2024)

The author Dr. Jamey R. Szalay is a research scientist in the Department of Astrophysical Sciences at Princeton University. He got his PhD from the University of Colorado (CU), Boulder in 2015. Dr. Szalay is interested in space plasma and dust phenomena throughout the solar system. He also led the scientific analysis and operations for New Horizons mission to Pluto and Juno mission to Jupiter. One of the coauthors in this paper, Dr. Fran Bagenal, is an expert leads a research group studying about the Magnetosphere of Outer Planets in CU Boulder.

3 Off-core journal

Our institute has not subscribed the *Planetary and Space Science* journal since 2015 due to the end of Aim for the Top University Project.

Planetary and Space Science publishes original articles as well as short communications (letters). Ground-based and space-borne instrumentation and laboratory simulation of solar system processes are included. It publishes every 15 days and its 2023 impact factor is 2.4. The article publishing charge for open access is \$3420 and the average submission to acceptance period is 177 days.

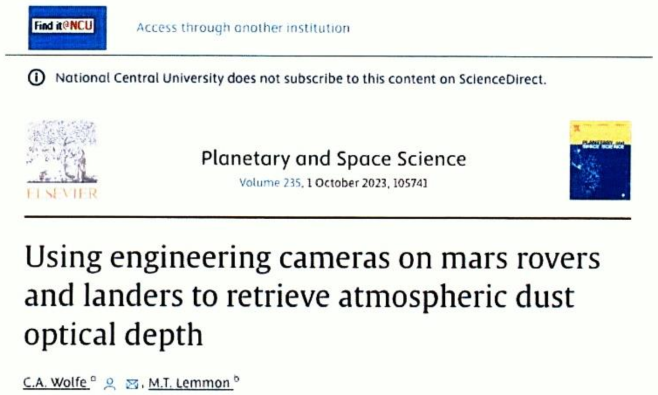

Figure 6: Screenshot of a *Planetary Space Science* paper.

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et al.

[1] O. Berné, E. Habart, E. Peeters, I. Schroetter, A. Canin, A. Sidhu, R. Chown, E. Bron, T. J. Haworth, P. Klaassen, B. Trahin, D. V. D. Putte, F. Alarcón, M. Zannese, A. Abergel, E. A. Bergin, J. Bernard-Salas, C. Boersma, J. Cami, S. Cuadrado, E. Dartois, D. Dicken, M. Elyajouri, A. Fuente, J. R. Goicoechea, K. D. Gordon, L. Issa, C. Joblin, O. Kannavou, B. Khan, O. Lacinbala, D. Languignon, R. L. Gal, A. Maragkoudakis, R. Meshaka, Y. Okada, T. Onaka, S. Pasquini, M. W. Pound, M. Robberto, M. Röllig, B. Schefter, T. Schirmer, T. Simmer, B. Tabone, A. G. G. M. Tielens, S. Vicente, M. G. Wolfire, P. Team†, I. Aleman, L. Allamandola, R. Auchettl, G. A. Baratta, C. Baruteau, S. Bejaoui, P. P. Bera, J. H. Black, F. Boulanger, J. Bouwman, B. Brandl, P. Brechignac, S. Brünken, M. Buragohain, A. Burkhardt, A. Candian, S. Cazaux, J. Cernicharo, M. Chabot, S. Chakraborty, J. Champion, S. W. Colgan, I. R. Cooke, A. Coutens, N. L. Cox, K. Demyk, J. D. Meyer, C. Engrand, S. Foschino, P. García-Lario, L. Gavilan, M. Gerin, M. Godard, C. A. Gottlieb, P. Guillard, A. Gusdorf, P. Hartigan, J. He, E. Herbst, L. Hornekaer, C. Jäger, E. Janot-Pacheco, M. Kaufman, F. Kemper, S. Kendrew, M. S. Kirsanova, C. Knight, S. Kwok, Álvaro Labiano, T. S.-Y. Lai, T. J. Lee, B. Lefloch, F. L. Petit, A. Li, H. Linz, C. J. Mackie, S. C. Madden, J. Mascetti, B. A. McGuire, P. Merino, E. R. Micelotta, J. A. Morse, G. Mulas, N. Neelamkodan, R. Ohsawa, R. Paladini, M. E. Palumbo, A. Pathak, Y. J. Pendleton, A. Petrignani, T. Pino, E. Puga, N. Rangwala, M. Rapacioli, A. Ricca, J. Roman-Duval, E. Roueff, G. Rouillé, F. Salama, D. A. Sales, K. Sandstrom, P. Sarre, E. Sciamma-O'Brien, K. Sellgren, M. J. Shannon, A. Simonnin, S. S. Shenoy, D. Teyssier, R. D. Thomas, A. Togi, L. Verstraete, A. N. Witt, A. Wootten, N. Ysard, H. Zettergren, Y. Zhang, Z. E. Zhang, and J. Zhen. A far-ultraviolet–driven photoevaporation flow observed in a protoplanetary disk. *Science*, 383(6686):988–992, 2024.

[2] J. R. Szalay, F. Allegrini, R. W. Ebert, F. Bagenal, S. J. Bolton, S. Fatemi, D. J. McComas, A. Pontoni, J. Saur, H. T. Smith, D. F. Strobel, S. D. Vance, A. Vorburger, and R. J. Wilson. Oxygen production from dissociation of europa's water-ice surface. *Nature Astronomy*, 2024.

Hsiang Yu Chen
Exercise III
March, 13 2024

Homework III

0.1. *Exercise*

Compare the 'style' of the core journals. Note the layout of the title, abstract. References, etc.

1. Research title: Title Cases + center align (ApJ) versus Sentence case + center align (A&A) versus Title Cases + center left (MNRAS)

2. Authors: center align (ApJ, A&A) versus center left (MNRAS)
3. Authors' institute: center align (ApJ) versus center left (A&A, MNRAS)
4. Page number: center align (ApJ) versus center left and right (A&A, MNRAS)
5. key words: *italics* (ApJ) versus **bold** (A&A, MNRAS)
6. Abstract: ALL CAPS (MNRAS, A&A) versus Title Cases (ApJ)
7. Subsections: ALL CAPS (MNRAS) versus Title Cases (ApJ, A&A)
8. sub-subsections: Title Cases + *italics* (ApJ) versus Sentence case + *italics* (A&A) versus Sentence case + **bold** (MNRAS)

Difficult to differentiate.

9. Appendix: half page (ApJ, MNRAS) versus full page (A&A)
10. Reference: Alphabetically (ApJ, A&A and MNRAS)

0.2. *Exercise*

Zoom in to one journal and browse through one recent paper of your choice. What is it about? By whom?

Title: ALMA-LEGUS. II. The Influence of Subgalactic Environments on Molecular Cloud Properties
Finn et al. (2024)
Journal: The Astrophysical Journal
Published date: 2024 March 12
Journal archive: vol 964, 2024
DOI 10.3847/1538-4357/ad198

The paper investigated the molecular cloud properties in subregions of two galaxies, a barred spiral NGC 1313 and a flocculent spiral NGC 7793. These two galaxies have similar masses (2.6×10^9 $M_\odot$ and 3.2×10^9 $M_\odot$), metallicities (12 + log(O/H) = 8.4 and 8.52), and SFRs (1.15 and 0.52 $M_\odot yr^{-1}$), but NGC 1313 is more active in forming massive clusters than NGC 7793. Combing their previous studies in Paper I (Finn et al. 2024), this research found a variation molecular properties in NGC 1313, which might results in the diverse cluster population from interarm (oldest and massive clusters), northern arm (youngest and least massive clusters), to southern arm (fewer clusters than the northern) of NGC 1313. The densities and pressures of the arms in NGC 7793 are more similar to the interarm regions, suggesting the cloud properties are uniform and cause less star formation in NGC 7793.

The first author, Dr. Molly K. Finn (ORCID: 0000-0001-9338-2594), a female astronomer graduated from Astronomy Department at the University of Virginia, who is interested in the properties of molecular dust and gas in variety of galactic environments. Her research focuses on the starburst galaxies such as Antennae galaxies, and interacting dwarf galaxies such as Magellanic Clouds. in order to understand what is the physical condition to form severely dense environment, and massive star clusters.

0.3. *Exercise*

Identify one off-core journal. Does our library subscribe to it?
Space Science Journal is one off-core journal. Our library does not subscribe it.

why?

REFERENCES

Finn, M. K., Johnson, K. E., Indebetouw, R., et al. 2024, ApJ, 964, 12. doi:10.3847/1538-4357/ad1eec

Finn, M. K., Johnson, K. E., Indebetouw, R., et al. 2024, ApJ, 964, 13. doi:10.3847/1538-4357/ad198a

why 2 references?