POLITECNICO DI TORINO
Repository ISTITUZIONALE

Impactful Datasets in Earth, Space, and Environmental Sciences: Highlighting the Data That Transform Research

Original
Impactful Datasets in Earth, Space, and Environmental Sciences: Highlighting the Data That Transform Research / Gum, J., Caprarelli, G., Montanari, A., Sedora, B., Stall, S., Biddle, M., Blake, R., Jones, M., Joyner, E., Kc, B., Newman, D., Schuster, D., Thomer, A.K., Wilson, B., Wyborn, L., Aben, I., Acker, J., Ahmadisharaf, E., Anderson, W., Aoki, Y., et al.. - In: AGU ADVANCES. - ISSN 2576-604X. - ELETTRONICO. - 7:6(2026). [10.1029/2026av002623]

Availability:
This version is available at: 11583/3015778 since: 2026-09-22T07:39:16Z

Publisher:
Wiley

Published
DOI:10.1029/2026av002623

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

11 November 2026

Check for updates

AGU ADVANCING EARTH AND SPACE SCIENCES

AGU Advances

COMMENTARY

10.1029/2026AV002623

Impactful Datasets in Earth, Space, and Environmental Sciences: Highlighting the Data That Transform Research

Joseph Gum[1], Graziella Caprarelli[2,3], Alberto Montanari[4], Brian Sedora[5], Shelley Stall[5], Mathew Biddle[6], Rachael Blake[7], Matt Jones[8], Elizabeth Joyner[9], Binita KC[10], Doug Newman[11], Doug Schuster[12], Andrea K. Thomer[13], Bruce Wilson[14], Lesley Wyborn[15], Ilse Aben[16], James Acker[17], Ebrahim Ahmadisharaf[18], Weston Anderson[19], Yosuke Aoki[20], Christina Arras[21], Ross Bagwell[22], Ashley Ballard[23], Lindsay Barbieri[24], Sylvain Barbot[25], Emily Becker[26], David Berghmans[27], Justine Blanford[28], Gil Bohrer[29], Tobias Braun[30,31], Ian Brosnan[32], Patrick Broxton[33], Brendan Byrne[34], Danica Linda Cantarero[35], Peiyu Cao[36], Sarah Carter[37], Rob Casey[38], Kerry Cawse-Nicholson[39], Daniel Cayan[40], K. Dana Chadwick[39], Kunal Chakraborty[41], Ernest Cisneros[42], Alexandru T. Codilean[43], James Crawford[9], Noel Cressie[39,43], David Crisp[44], Alfredo A. Cruz[11], Elisabetta D'Anastasio[45], Robert E. Daniell Jr.[46], Fabien Darrouzet[47], Saswati Das[48], Kyle Frankel Davis[49], Ankur R. Desai[50], Alex de Sherbinin[51], Catia M. Domingues[52], Wenhao Dong[53], Kelsey Druken[54], Nelia W. Dunbar[55], Bethany Ehlmann[56], James S. Eldrett[57], Shane Elipot[26], Jing Fang[58], Nicolas Fernandez[59], Florence Fetterer[35], Alison Fritz[60], Jing Gao[49], Xueyuan Gao[61], Sarah Gille[40], Sven Gilliams[62], Peter H. Gleick[63], Christopher R. Hakkenberg[64], Jonathan B. Hanson[45], Henry C. Henson[65], Tracey Holloway[50], Candice Hopkins[66], Mark James Hopwood[67], Faisal Hossain[68], George J. Huffman[11], Nicole Jacobs[69], Daniel Jaffe[68], Dylan Jones[69], Apurva P. Joshi[41], Julie Kalansky[40], Leander Kallas[70], Nikita Kaushal[71], Endalkachew Kebede[49], Trevor F. Keenan[72], Gretchen Keppel-Aleks[73], Tae Kim[74], Fraser King[50], Marthe Klöcking[75], Wouter Knoben[76], Mark Koenig[77], Greg Kopp[56], Gerbrand Koren[78], Nicholas Kruskamp[79], Zachary Labe[80], Anthony Lanati[75], Matthias Lankhorst[40], Joshua Laughner[39], Oana Leahu-Aluas[81], Christine Lee[39], Laure Lefevre[27], Kerstin Lehnert[82], Einat Lev[82], Yuan Li[58], Zhong Liu[11], Avni Malhotra[83], Scott Marshall[84], Landon Marston[85], Ariadna Martin[86], Nick Marzolf[87], Paola Mazzoglio[88], Art Miller[40], Sanchit Minocha[68], Arpita Mondal[89], Jean-Paul Montagner[90], Laurent Montesi[19], Nils Moosdorf[91,92], James T. Morris[93], Md Golam Mostafa[94], Katelyn Mountjoy[95], Thiago V. M. do Nascimento[96], Kiwamu Nishida[20], Angus Nixon[97], Ceri Nunn[39], Martha Cary Eppes[98], Nasrin Mostafavi Pak[99], Gerard Gallardo i Peres[100,101], Dean Pesnell[102], Antonio Martínez Picar[27], Claire Porter[103], Prithviraj Pramanik[104,105], Sara C. Pryor[36], Marcelo Uriburu Quirno[106], Federico Rabuffi[39], Balaji Rajagopalan[56], Yuhan Rao[107], A. J. Reiss[108], Axel D. Renno[109], Siddharth Rout[110], Manabendra Saharia[111], Ricardo Sánchez-Murillo[112], Tatsuhiko Sato[113], Erin Satterthwaite[40], Anna Savage[114], Ted A. Scambos[35], Jacob Schaperow[11], Nirdesh Kumar Sharma[111], Christine A. Shields[12], Debjani Sihi[107], Elizabeth A. Silber[115], Terry Sohl[116], Sarath Suresh[68], James H. Swift[40], Zoltan Szantoi[117,118], Joao Teixeira[39], Glen Thackray[119], Anne Tillery[120], Mike Timmons[55], Marie Katrine Traun[70], Martin Vallée[90], Sara M. Vallejo-Bernal[30,31], José Manuel Vaquero[121], Voltaire A. Velazco[122], Isabel Wargowsky[123], Dominique Weis[109], Nina Welti[124], Thomas Westerhold[125], John W. Williams[50], Ann Windnagel[35], Ryan J. Woosley[126], Debra Wunch[69], Jingfeng Xiao[127], Ben Zaitchik[128], Enze Zhang[129], Xiaoyi Zhao[130], Li Zhen[58], Lin Zhiheng[131], Steven C. Bergman[132], and Daniel Minisini[133]

[1]Independent Researcher, San Diego, CA, USA, [2]Centre for Astrophysics, University of Southern Queensland, Toowoomba, QLD, Australia, [3]Istituto Nazionale di Astrofisica-Istituto di Radioastronomia (INAF-IRA), Bologna, Italy, [4]Department of DICAM, University of Bologna, Bologna, Italy, [5]American Geophysical Union, Washington, DC, USA, [6]NOAA United States Integrated Ocean Observing System, Silver Spring, MD, USA, [7]Intertidal Agency, Berkeley, CA, USA, [8]National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara, Santa Barbara, CA, USA, [9]NASA Langley Research Center, Hampton, VA, USA, [10]ADNET Systems, Inc., Greenbelt, MD, USA, [11]NASA Goddard Space Flight Center, Greenbelt, MD, USA, [12]National Center for Atmospheric Research (NCAR), Boulder, CO, USA, [13]University of Arizona College of Information Science, Tucson, AZ, USA, [14]Independent Researcher, Lenoir City, TN, USA, [15]The Australian National University, Canberra, ACT, Australia, [16]SRON Space Research Organisation Netherlands, Leiden, The Netherlands, [17]NASA Goddard Earth Sciences Data and Information Services Center (GES DISC), NASA Goddard Space Flight Center, Greenbelt, MD, USA, [18]Florida A&M University-Florida State University College of Engineering, Tallahassee, FL, USA, [19]University of Maryland, College Park, MD, USA, [20]Earthquake Research

Special Collection:
Impactful Datasets in Earth, Space, and Environmental Sciences

Peer Review The peer review history for this article is available as a PDF in the Supporting Information.

Key Points:

- American Geophysical Union announces the new living collection "Impactful Datasets in Earth, Space, and Environmental Sciences"
- Nominators submit datasets impactful to their work along with personal stories on how they interact with the dataset
- New nominations are being accepted, and the spreadsheet will be updated periodically

Supporting Information:

Supporting Information may be found in the online version of this article.

Correspondence to:

B. Sedora,
bsedora@agu.org

Citation:

Gum, J., Caprarelli, G., Montanari, A., Sedora, B., Stall, S., Biddle, M., et al. (2026). Impactful datasets in Earth, Space, and Environmental Sciences: Highlighting the data that transform research. *AGU Advances*, *7*, e2026AV002623. https://doi.org/10.1029/2026AV002623

Received 25 JUN 2026
Accepted 12 AUG 2026

Author Contributions:

Conceptualization: Joseph Gum, Graziella Caprarelli, Alberto Montanari, Brian Sedora, Shelley Stall
Data curation: Joseph Gum, Brian Sedora

© 2026. The Author(s). AGU Advances published by Wiley Periodicals LLC on behalf of American Geophysical Union. This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

25760424, 2026, 6, Downloaded from https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2026AV002623 by Politecnico Di Torino Sist. Bibl Del Polit Di Torino, Wiley Online Library on [21/09/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Methodology: Mathew Biddle, Rachael Blake, Matt Jones, Elizabeth Joyner, Binita KC, Doug Newman, Doug Schuster, Andrea K. Thomer, Bruce Wilson, Lesley Wyborn
Project administration: Joseph Gum, Brian Sedora
Supervision: Joseph Gum, Brian Sedora
Writing – original draft: Graziella Caprarelli, Alberto Montanari, Brian Sedora, Shelley Stall, Ilse Aben, James Acker, Ebrahim Ahmadisharaf, Weston Anderson, Yosuke Aoki, Christina Arras, Ross Bagwell, Ashley Ballard, Lindsay Barbieri, Sylvain Barbot, Emily Becker, David Berghmans, Justine Blanford, Gil Bohrer, Tobias Braun, Ian Brosnan, Patrick Broxton, Brendan Byrne, Danica Linda Cantarero, Peiyu Cao, Sarah Carter, Rob Casey, Kerry Cawse-Nicholson, Daniel Cayan, K. Dana Chadwick, Kunal Chakraborty, Ernest Cisneros, Alexandru T. Codilean, James Crawford, Noel Cressie, David Crisp, Alfredo A. Cruz, Elisabetta D'Anastasio, Robert E. Daniell Jr., Fabien Darrouzet, Saswati Das, Kyle Frankel Davis, Ankur R. Desai, Alex de Sherbinin, Catia M. Domingues, Wenhao Dong, Kelsey Druken, Nelia W. Dunbar, Bethany Ehlmann, James S. Eldrett, Shane Elipot, Jing Fang, Nicolas Fernandez, Florence Fetterer, Alison Fritz, Jing Gao, Xueyuan Gao, Sarah Gille, Sven Gilliams, Peter H. Gleick, Christopher R. Hakkenberg, Jonathan B. Hanson, Henry C. Henson, Tracey Holloway, Candice Hopkins, Mark James Hopwood, Faisal Hossain, George J. Huffman, Nicole Jacobs, Daniel Jaffe, Dylan Jones, Apurva P. Joshi, Julie Kalansky, Leander Kallas, Nikita Kaushal, Endalkachew Kebede, Trevor F. Keenan, Gretchen Keppel-Aleks, Tae Kim, Fraser King, Marthe Klöcking, Wouter Knoben, Mark Koenig, Greg Kopp, Gerbrand Koren, Nicholas Kruskamp, Zachary Labe, Anthony Lanati, Matthias Lankhorst, Joshua Laughner, Oana Leahu-Aluas, Christine Lee, Laure Lefevre, Kerstin Lehnert, Einat Lev, Yuan Li, Zhong Liu, Avni Malhotra, Scott Marshall, Landon Marston, Nick Marzolf, Paola Mazzoglio, Art Miller, Sanchit Minocha, Arpita Mondal, Jean-Paul Montagner, Laurent Montesi, Nils Moosdorf, James T. Morris, Md Golam Mostafa, Katelyn Mountjoy, Thiago V. M. do Nascimento, Kiwamu Nishida, Angus Nixon, Ceri Nunn, Martha Cary Eppes, Nasrin Mostafavi Pak, Gerard Gallardo i Peres, Dean Pesnell, Antonio Martínez Picar, Claire Porter, Prithviraj Pramanik, Sara C. Pryor, Marcelo Uriburu Quirno, Federico Rabuffi, Balaji Rajagopalan, Yuhan Rao, A. J. Reiss, Axel D. Renno, Siddharth Rout, Manabendra Saharia, Ricardo Sánchez-Murillo, Tatsuhiko Sato,

Institute, The University of Tokyo, Tokyo, Japan, [21]GFZ German Research Centre for Geosciences, Potsdam, Germany, [22]The Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, MD, USA, [23]Adiabat Weather (Adiabat, LLC), Roanoke, VA, USA, [24]Global Land Programme and Department of Geographical Sciences, University of Maryland, College Park, MD, USA, [25]University of Southern California, Los Angeles, CA, USA, [26]Rosenstiel School of Marine, Atmospheric, and Earth Science, University of Miami, Miami, FL, USA, [27]Royal Observatory of Belgium, Brussels, Belgium, [28]University of Twente, Enschede, The Netherlands, [29]Ohio State University, Columbus, OH, USA, [30]Institute for Earth System Science and Remote Sensing, Leipzig University, Leipzig, Germany, [31]Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany, [32]NASA Ames Research Center, Moffett Field, CA, USA, [33]University of Arizona, Tucson, AZ, USA, [34]Qube Technologies, Calgary, AB, Canada, [35]National Snow and Ice Data Center, CIRES, University of Colorado, Boulder, CO, USA, [36]Cornell University, Ithaca, NY, USA, [37]World Resources Institute (WRI) Europe, The Hague, The Netherlands, [38]EarthScope Consortium, Washington, DC, USA, [39]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, [40]Scripps Institution of Oceanography, UCSD, La Jolla, CA, USA, [41]Indian National Centre for Ocean Information Services (INCOIS), Ministry of Earth Sciences, Government of India, Hyderabad, Telangana, India, [42]Arizona State University, Tempe, AZ, USA, [43]Australia School of Science, University of Wollongong, Wollongong, NSW, Australia, [44]Crisp Specta LLC, Sedona, AZ, USA, [45]Earth Sciences New Zealand, Avalon, New Zealand, [46]Ionospheric Physics Consulting, Stoughton, MA, USA, [47]Royal Belgian Institute for Space Aeronomy, Uccle, Belgium, [48]University of Maryland, Baltimore County, Baltimore, MD, USA, [49]University of Delaware, Newark, DE, USA, [50]University of Wisconsin-Madison, Madison, WI, USA, [51]Center for Integrated Earth Systems Information (CIESIN), Columbia Climate School, Columbia University, Palisades, NY, USA, [52]Global Climate, National Oceanography Centre (NOC), Southampton, UK, [53]Department of Earth System Science, Ministry of Education Key Laboratory for Earth System Modeling, Institute for Global Change Studies, Tsinghua University, Beijing, China, [54]ACCESS-NRI, Australian National University (ANU), Acton, ACT, Australia, [55]New Mexico Bureau of Geology and Mineral Resources, New Mexico Tech., Socorro, NM, USA, [56]University of Colorado Boulder, Boulder, CO, USA, [57]Shell Research Ltd., London, UK, [58]Chinese Academy of Sciences, Beijing, China, [59]Water Institute, University of Florida, Gainesville, FL, USA, [60]National Energy Technology Laboratory, Morgantown, WV, USA, [61]Princeton University, Princeton, NJ, USA, [62]GEOGLAM, Geneva, Switzerland, [63]Pacific Institute for Studies in Development, Environment, and Security, Oakland, CA, USA, [64]University of California, Los Angeles, Los Angeles, CA, USA, [65]Department of Ecoscience, Aarhus University, Aarhus, Denmark, [66]US Geological Survey, Reston, VA, USA, [67]Southern University of Science and Technology, Shenzhen, China, [68]University of Washington, Seattle, WA, USA, [69]University of Toronto, Toronto, ON, Canada, [70]Geoscience Center, University of Göttingen, Göttingen, Germany, [71]American Museum of Natural History, New York, NY, USA, [72]Lawrence Berkeley National Laboratory, UC Berkeley, Berkeley, CA, USA, [73]University of Michigan, Ann Arbor, MI, USA, [74]The University of Alabama in Huntsville, Huntsville, AL, USA, [75]Institute for Mineralogy, University of Münster, Münster, Germany, [76]University of Calgary, Calgary, AB, Canada, [77]Eagle Rock Analytics, Sacramento, CA, USA, [78]Copernicus Institute of Sustainable Development, Utrecht University, Utrecht, The Netherlands, [79]RTI International, Durham, NC, USA, [80]Climate Central, Princeton, NJ, USA, [81]DC Department of Energy and Environment, Washington, DC, USA, [82]Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY, USA, [83]Biological Sciences Division, Pacific Northwest National Laboratory, Richland, WA, USA, [84]Appalachian State University, Boone, NC, USA, [85]Virginia Tech, Blacksburg, VA, USA, [86]University of Central Florida, Orlando, FL, USA, [87]The Jones Center at Ichauway, Newton, GA, USA, [88]Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Torino, Italy, [89]Indian Institute of Technology Bombay, Mumbai, Maharashtra, India, [90]Institut de physique du globe de Paris, CNRS, Université Paris Cité, Paris, France, [91]Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany, [92]Kiel University, Kiel, Germany, [93]University of South Carolina, Columbia, SC, USA, [94]Military Institute of Science and Technology (MIST), Dhaka, Bangladesh, [95]McMaster University, Hamilton, ON, Canada, [96]Eawag / University of Zurich, Dübendorf, Switzerland, [97]Adelaide University, Adelaid, SA, Australia, [98]University of North Carolina at Charlotte, Charlotte, NC, USA, [99]Karlsruhe Institute of Technology, Karlsruhe, Germany, [100]Imperial College London, London, UK, [101]isardSAT, Barcelona, Spain, [102]Independent Researcher, Greenbelt, MD, USA, [103]Polar Geospatial Center, University of Minnesota, Saint Paul, MN, USA, [104]Department of Computer Science and Engineering, National Institute of Technology Durgapur, Durgapur, West Bengal, India, [105]AQAI, Kolkata, West Bengal, India, [106]National Commission on Space Activities (CONAE, Argentina), Buenos Aires, Argentina, [107]North Carolina State University, Raleigh, NC, USA, [108]NOAA-NWS-Ocean Prediction Center, College Park, MD, USA, [109]Helmholtz Institute Freiberg for Resource Technology (HIF), Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Freiberg, Germany, [110]University of British Columbia, Vancouver, BC, Canada, [111]Indian Institute of Technology Delhi, New Delhi, Delhi, India, [112]The University of Texas at Arlington, Arlington, TX, USA, [113]Japan Atomic Energy Agency, Tokai-mura, Japan, [114]Sofar Ocean, San Francisco, CA, USA, [115]Sandia National Laboratories, Albuquerque, NM, USA, [116]US Geological Survey, Earth Resources Observation and Science (EROS) Center, Sioux Falls, SD, USA, [117]Directorate of Earth Observation Programmes, European Space Agency (ESA), Frascati, Italy, [118]Stellenbosch University, Stellenbosch, South Africa, [119]Idaho State University, Pocatello, ID, USA, [120]U.S. Geological Survey Water, Albuquerque, NM, USA, [121]Universidad de Extremadura, Badajoz, Spain, [122]Deutscher Wetterdienst, Offenbach am Main, Germany, [123]Woodwell Climate Research Center, Falmouth, MA, USA, [124]CSIRO,

Erin Satterthwaite, Anna Savage, Ted A. Scambos, Jacob Schaperow, Nirdesh Kumar Sharma, Christine A. Shields, Debjani Sihi, Elizabeth A. Silber, Terry Sohl, Sarath Suresh, James H. Swift, Zoltan Szantoi, Joao Teixeira, Glen Thackray, Anne Tillery, Mike Timmons, Marie Katrine Traun, Martin Vallée, Sara M. Vallejo-Bernal, José Manuel Vaquero, Voltaire A. Velazco, Isabel Wargowsky, Dominique Weis, Nina Welti, Thomas Westerhold, John W. Williams, Ann Windnagel, Ryan J. Woosley, Debra Wunch, Jingfeng Xiao, Ben Zaitchik, Enze Zhang, Xiaoyi Zhao, Lin Zhiheng, Steven C. Bergman, Daniel Minisini

Writing – review & editing: Joseph Gum, Graziella Caprarelli, Alberto Montanari, Brian Sedora, Shelley Stall

Canberra, ACT, Australia, [125]MARUM-Center for Marine Environmental Sciences at the University of Bremen, Bremen, Germany, [126]Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Center for Sustainability Science and Strategy, Cambridge, MA, USA, [127]Earth Systems Research Center, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, Durham, NH, USA, [128]Johns Hopkins University, Baltimore, MD, USA, [129]Hong Kong University of Science and Technology, Hong Kong, Hong Kong, [130]Environment and Climate Change Canada, Toronto, ON, Canada, [131]The Institute of Statistical Mathematics Center for Data Assimilation Research and Applications, Tokyo, Japan, [132]SCB Geosciences, Vashon, WA, USA, [133]Department of Earth Environmental and Planetary Sciences, Rice University, Houston, TX, USA

Abstract The American Geophysical Union (AGU) announces the new living collection "Impactful Datasets in Earth, Space, and Environmental Sciences" which recognizes the creation and curation of datasets enabling research, analysis, and decision making beyond what is captured by traditional academic impact metrics. The collection highlights datasets through the dimensions of People, Planet, and Prosperity, and includes a curated set of nominated datasets and accompanying special collection of data papers. Developed with the Earth Science Information Partners (ESIP) community, the nomination and review process initially invites contributors from across research, operations, and public service, to nominate datasets important to their work, and then submit a data paper that expands upon the nomination text for inclusion in the special collection. This commentary highlights the rationale for the living collection, and the process of nomination. The collection serves as a living reference that strengthens data culture, supports reproducible geoscience, and provides enduring access to critical information for science and society.

Plain Language Summary The American Geophysical Union is launching a new living collection called "Impactful Datasets in Earth, Space, and Environmental Sciences." The goal is to celebrate datasets that have had a significant impact on science and society by supporting research, analysis, and informed decisions. Many important datasets do not receive recognition through traditional academic metrics, so this collection provides a way to highlight their contributions. This commentary describes the purpose of the collection and explains how to nominate a dataset.

1. Introduction

The "Impactful Datasets in Earth, Space, and Environmental Sciences" collection comprises two complimentary components: a publicly available collection of nominated datasets (Sedora & Stall, 2026) and a special collection of data papers that expand upon the nomination text submitted for each dataset. Together, these components recognize the creation, stewardship, and use of impactful datasets, that is, of those datasets that demonstrably support a broad spectrum of research work, analysis, and decision making. Well-curated data underpin geoscience research, inform responses to global challenges, and enable transparent, reproducible science beyond traditional bibliometrics. The special collection is hosted by the journal *Earth and Space Science,* and comprises papers that highlight the impact of datasets in the Earth, space, and environmental science domains.

The dataset nomination form and vetting process were developed by members of the Earth Science Information Partners (ESIP) community. Researchers from the Earth, space and environmental science communities were invited to nominate datasets that are impactful in their work. It was important to the participants that the value of the data be measured by actual and potential impact, and not by usage metrics and citations, which are limited in collection and commonly inaccurate compared to actual use. The term "data" does not have limitations, allowing submitters to freely interpret the term based on their needs. The essential criterion is that the data are shared according to the FAIR principles: findable, accessible, interoperable, and reusable (Wilkinson et al., 2016).

To ensure inclusiveness across all relevant fields, AGU invites nominations of an impactful dataset most valuable to the work of the nominator. This is not limited to researchers, but includes anyone who uses or manages publicly available datasets. As part of the nomination process, the nominators describe why the datasets are impactful using the dimensions of people, planet, or prosperity. Details about the dataset are provided at the time of nomination, including the names of the dataset creators, name of the data repository where it is hosted, a brief description of the dataset, names of the dataset curator team, and a persistent identifier to the dataset (e.g., a Digital Object Identifier) or URL. In addition to the description of the impact that data have, the nominators also

25776044, 2026, 6, Downloaded from https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2026AV002623 by Politecnico Di Torino Sist. Bibl Del Polit Di Torino, Wiley Online Library on [21/09/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Acknowledgments
The authors thank all people and organizations that created, developed and curated the datasets featured in this special collection. Brian Sedora and Shelley Stall report grant support from William and Flora Hewlett Foundation. Disclosures from contributing authors, in most instances, refer to the nominated datasets or efforts outside the submitted work. Matthew Jones reports grants from National Science Foundation during the conduct of the study and grants from Google.org outside the submitted work. Andrea Thomer reports grants from NSF outside the submitted work. Ebrahim Ahmadisharaf reports grants from National Science Foundation, grants from National Academy of Sciences, Engineering, and Medicine, and grants from Danfoss during the conduct of the study. Weston Anderson reports grants from NASA during the conduct of the study. Tobias Braun reports grants from European Space Agency during the conduct of the study. Patrick Broxton reports grants from Salt River Project, grants from US Bureau of Reclamation, and grants from NASA outside the submitted work. Rob Casey reports personal fees from AGU outside the submitted work. Kerry Cawse-Nicholson reports grants from National Aeronautics and Space Administration (80NM0018D0004) during the conduct of the study; grants from National Aeronautics and Space Administration (80NM0018D0004) outside the submitted work. Daniel Cayan reports grants from California Energy Commission during the conduct of the study; grants from Lawrence Berkeley Laboratory, grants from University of California Davis, grants from U.S. Office of Naval Research, grants from National Science Foundation, grants from Stanford University, grants from San Diego Gas and Electric Co, grants from National Oceanic and Atmospheric Administration (NOAA), and grants from Jacobs Engineering Inc. outside the submitted work. Ernest Cisneros reports a contractual agreement with NASA to operate the LRO/LROC instruments during the conduct of the study. Robert Daniell reports personal fees from Computational Physics, Inc., personal fees from LASP, U of Colorado, and personal fees from NASA during the conduct of the study. Ankur Desai reports grants from Dept. of Energy during the conduct of the study. Kelsey Druken reports grants from Australian federal government during the conduct of the study. Shane Elipot reports grants from National Science Foundation and grants from NOAA during the conduct of the study. Sarah Gille reports grants from National Science Foundation during the conduct of the study; grants from National Oceanic and Atmospheric Administration and grants from NASA outside the submitted work. Tracey Holloway reports grants from NASA during the conduct of the study. Julie

provide a more personal understanding of how they interact with the dataset. These first-hand stories are critical when we consider the value of a dataset.

The project pilot, and first nomination window, was July–October 2025. Each dataset submission was reviewed for their compliance with FAIR and nomination requirements. The total number of submissions was 164. As some were duplicates, there were 133 total datasets. The accepted nominations are included in the dataset titled *Impactful Datasets in the Earth, Space, and Environmental Sciences* (Sedora & Stall, 2026). The nominators are included as co-authors of this commentary.

The nominators for each accepted dataset have an open invitation to form an author team to submit a data paper featuring the dataset to the new special collection. The author team should include the nominator, other dataset users, curators of the dataset, and/or individuals and organizations responsible for the creation and maintenance of the dataset. As this is a living collection, additional impactful dataset nominations are welcome. AGU will host and maintain the nomination form here (https://docs.google.com/forms/d/e/1FAIpQLSf0Tlb1a29C2I-lNyl8qf_1oG1tFBosYW5qGBBj70D42Nhn_w/viewform). Newly accepted nominators are then welcome to submit a data paper to the special collection.

In this commentary we explain the rationale behind the initiative, provide a working definition of "impactful dataset" and outline the required attributes, introduce the initial classification by grouping of the datasets, and highlight the significance and impact of the special collection.

2. Rationale and Background

"Preserving open data as a world heritage to secure our future" is the preamble to the AGU Position Statement of Data (Elger et al., 2024). The AGU community has asserted a position on Earth, space, and environmental science data since 1997. The cornerstones to this statement include: **equitable access** to data and infrastructure, promoting **a culture that values data contributions**, and encouraging **adoption of standards** around describing and documenting data across disciplines and domains. This position statement helps us to move together toward a more global vision where data are an asset and the infrastructure that supports discovery, access, and interoperability is sustainable and enduring. Global challenges such as natural hazards and climate change require us to ensure long-term preservation and analysis-ready data formats.

In recent months, specifically in the US, but also globally, research infrastructure has been defunded (de Sherbinin, 2026) with particular impact to the personnel that understand complex earth observing data and data systems (AAAS, 2026). The community is working to mitigate the situation, and in doing so, AGU was asked to highlight the value of our global research data. The response to the nomination request was heartening. The personal stories about how datasets impact the lives, research, and decision making globally reinforce the importance of long-term preservation.

Sharing and reviewing data are core aspects of the process of interpretation and understanding that forms the foundation of the work of geoscientists. Thus, the preservation of datasets in public and permanent repositories, accessible to scientists and to the organizations and professionals who need them, is vital. In this context, the impact of well-curated datasets goes beyond established academic metrics based on bibliometric indicators (Belter, 2014): data curation is a fundamental part of science, enabling knowledge creation from the observation of nature, the quantification of physical processes, and the transparent communication of investigation results.

3. Impactful Datasets

To define "impactful" we refer to the report "Geoscience in Action: Advancing Sustainable Development" (Capello et al., 2023) (https://geoscienceinaction.org/) developed under the leadership of UNESCO and AGU. Three sustainability dimensions highlight the positive impact of the geosciences. We re-interpreted the three dimensions specific to data as an inspiration for the nominators.

1. People Dimension—Positive impact on Individuals: education, training, disaster response, and prediction
2. Planet Dimension—Positive impact on physical systems: geophysical phenomena, conservation, climate, environmental indicators
3. Prosperity Dimension—Positive impact on socioeconomic systems: economic good, social equity, humanitarian relief, community resilience

2576604x, 2026, 6, Downloaded from https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2026AV002623 by Politecnico Di Torino Sist. Bibl Del Polit Di Torino, Wiley Online Library on [21/09/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Kalansky reports grants from California Energy Commission during the conduct of the study. Leander Kallas reports grants from German Science Foundation (DFG) during the conduct of the study. Marthe Klöcking reports grants from German Research Foundation (DFG) during the conduct of the study. Mark Koenig reports grants from California Energy Commission during the conduct of the study. Greg Kopp reports grants and other from NASA during the conduct of the study. Nicholas Kruskamp reports grants from U.S. Environmental Protection Agency during the conduct of the study; grants from Centers for Disease Control (CDC), grants from National Institutes of Health (NIH), grants from National Institute on Alcohol Abuse and Alcoholism (NIAAA), grants from National Science Foundation (NSF), and grants from National Aeronautics and Space Administration (NASA) outside the submitted work. Matthias Lankhorst reports grants from NASA JPL during the conduct of the study; grants from National Oceanographic Partnership Program (NOPP) outside the submitted work. Josh Laughner reports grants from National Aeronautics and Space Administration during the conduct of the study; work outside the scope of this submitted manuscript was funded through JPL. Scott Marshall reports being a developer of the SCEC Community Fault Model which is mentioned in the manuscript and has been funded by SCEC to develop the model, but this manuscript was not part of this funding. Nicholas Marzolf reports personal fees from Duke University and personal fees from Ichauway Inc. outside the submitted work. Sanchit Minocha reports grants from NASA during the conduct of the study. Laurent Montési reports grants from SCEC during the conduct of the study; grants from NSF, grants from NASA, and grants from Fulbright-Norway foundation outside the submitted work. Angus Nixon reports Dr. Angus Nixon is a postdoctoral fellow working with the EarthBank project who host this dataset. Ceri Nunn reports grants from NASA during the conduct of the study. Martha Cary Eppes reports service on the Council of the Geological Society of America. Gerard Gallardo i Peres reports grants from European Space Agency and personal fees from isardSAT during the conduct of the study. Claire Porter reports grants from National Science Foundation and grants from National Geospatial-Information Agency during the conduct of the study; grants from National Science Foundation, grants from National Geospatial-Information Agency, grants from National Oceanic and Atmospheric Administration, grants from Geoscience Australia, and grants from National Aeronautics and Space Administration outside the submitted work. Ricardo Sanchez-Murillo reports grants from National Academy of Sciences-Gulf Research Program during

Nominations could range from the smallest dataset used for a thesis to foundational data products that support world-affecting decisions, from identifying fruitful pathways for research to helping people make informed decisions on protecting their families and neighbors from the effects of a changing climate.

4. Datasets: Groupings

To facilitate navigation of the impactful datasets, they are organized in broad disciplinary groups:

1. Space and Planetary Science
2. Atmospheric Science, Space Weather
3. Earth's Interior, Geodesy
4. Ocean Science, Hydrology, Cryosphere
5. Earth Surface, Natural Hazards, Geology, Near Surface Geophysics
6. Global Environmental Change, Paleoceanography and Paleoclimatology, Biogeoscience
7. Nonlinear Geophysics, Machine Learning, Informatics
8. Geohealth, Society, Education
9. Earth and Planetary Materials

It is understood that there are wide overlaps among the disciplines, not only within each group, but also across the groups. This is not only acknowledged, but also desirable, as the impact of each dataset increases with their utilization in multidisciplinary projects. Given the main emphasis on the utilization of datasets for broad impact across all scientific, educational, environmental, and societal fields, datasets encompassing climate and global environmental changes, biogeoscience, society and geohealth, form the core of the initial set of nominations. For example, “Climate” appears in over 70% of the entries—the single dominant cross-cutting theme of the whole nomination pool—though additional submissions are welcome for all groups in the list.

The nominated datasets are included in *Impactful Datasets in the Earth, Space, and Environmental Sciences* (Sedora & Stall, 2026). For each nominated dataset the database includes the name or names of the nominators, the name or names of the dataset creators and/or curators (if different from the nominators), and the disciplinary grouping. A brief narration of the reasons for nominations, that is, how the dataset is impactful, is summarized in the long form of the spreadsheet. The spreadsheet will be regularly updated to reflect new entries. The link should be checked regularly to follow any revisions and upgrades to the list and to the information contained therein.

5. Significance and Impact

Impactful datasets support the work of geoscientists in identifying the dynamic interconnections underpinning the transfer of energy and matter across the lithosphere, the atmosphere, the hydrosphere, the cryosphere and the biosphere. This inherent complexity cannot be studied without a systems-thinking approach that relies on solid and verifiable evidence. In linking together datasets with the dimensions of People, Planet, Prosperity, we hope the submissions provide examples of how scientific data personally affects researchers and non-researchers on a daily basis, even if the linkages may not be clear at first glance. This AGU initiative is timely, and we believe its value goes well beyond the information stored in the datasets: it is a small but effective contribution to affirming the collaborative and selfless nature of scientific work done in pursuit of human health and of the welfare of our entire planet.

6. Conclusions

At time of this writing there are 133 datasets from 164 nominators in the linked database. We hope and expect that this number will grow progressively in all groupings, and in contributions to the special collection, as a testament to the work of researchers, technicians, scholars, decision makers, and end-users, for the benefit of all and to address humanity's “big issues” in the broadest possible sense. Our aim is for this living collection to become a reliable compilation of reference for scientists, and the place where concerned citizens, leaders and policy makers, are sure to find critical and unbiased information. The work of AGU and ESIP staff and volunteers will continue to fulfill this aim, and we hope that this initiative will prompt similar efforts in other domains, to generate a veritable intersection of useful and impactful information created, curated and preserved for the benefit of present and future generations.

25776044, 2026, 6, Downloaded from https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2026AV002623 by Politecnico Di Torino Sist. Bibl Del Polit Di Torino, Wiley Online Library on [21/09/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

the conduct of the study. Christine Shields reports financial compensation as an editor for a Springer journal outside the submitted work. James Swift reports grants from US National Science Foundation and grants from US National Oceanic and Atmospheric Administration during the conduct of the study. Nina Welti reports grants from Australian Research Data Commons during the conduct of the study. Thomas Westerhold reports grants from Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) during the conduct of the study. John Williams reports grants from National Science Foundation and grants from Belmont Foundation during the conduct of the study. Debra Wunch reports grants from NSERC, grants from Canadian Space Agency, grants from Canada Foundation for Innovation, and grants from Ontario Research Fund outside the submitted work. Benjamin Zaitchik reports grants from US Department of Energy, grants from NIH, grants from NASA, grants from NOAA, and grants from NSF outside the submitted work. Steven Bergman reports that the bulk of the core and data acquisition was funded by the Mudrock Research Program at Shell, Houston, TX in 2010–2013.

Conflict of Interest

The authors declare no conflicts of interest relevant to this study.

Availability Statement

The *Impactful datasets in the Earth, space, and environmental sciences* (Sedora & Stall, 2026) is openly available in Zenodo.

References

AAAS. (2026). U.S. government has lost more than 10,000 STEM Ph.D.s since Trump took office [Dataset]. *AAAS Articles DO Group. American Association for the Advancement of Science (AAAS)*. https://doi.org/10.1126/science.zw5s0b4

Belter, C. W. (2014). Measuring the value of research data: A citation analysis of oceanographic datasets. *PLoS One*, *9*(3), e92590. https://doi.org/10.1371/journal.pone.0092590

Capello, M., Caslin, E., Stewart, I., Cox, D., Shaughnessy, A., Atekwana, E., et al. (2023). Geoscience in action: Advancing sustainable development. https://unesdoc.unesco.org/ark:/48223/pf0000384826

de Sherbinin, A. (2026). Things fall apart: Lessons from a defunded data repository. *Data Science Journal*, *25*(1), 9. https://doi.org/10.5334/dsj-2026-009

Elger, K., Kingsley, D., Inadomi, B., Raia, N., Rao, Y., Rolf, E., et al. (2024). *Preserving open data as a world heritage to secure our future*. ESS Open Archive. https://doi.org/10.22541/essoar.172788649.90106607/v1

Sedora, B., & Stall, S. (2026). Impactful datasets in the Earth, space, and environmental sciences (Version 1) [Dataset]. *Zenodo*. https://doi.org/10.5281/zenodo.20722710

Wilkinson, M., Dumontier, M., Aalbersberg, I., Appleton, G., Axton, M., Baak, A., et al. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data*, *3*(1), 160018. https://doi.org/10.1038/sdata.2016.18

25776044, 2026, 6, Downloaded from https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2026AV002623 by Politecnico Di Torino Sist. Bibl Del Polit Di Torino, Wiley Online Library on [21/09/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License