

Curriculum Vitae Edward D. Young

Distinguished Professor of Geochemistry & Cosmochemistry
Department of Earth, Planetary, and Space Sciences
University of California Los Angeles
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Education:

M.A. (by decree) University of Oxford (1994)
Ph.D. University of Southern California (1990)
M.S. Vanderbilt University (1988)
B.A. The College of Wooster (1981)

Academic Positions held:

2025- present Distinguished Professor of Geochemistry and Cosmochemistry, UCLA
2001- 2025 Professor of Geochemistry and Cosmochemistry, UCLA
2003-2009 Director, Center for Astrobiology, Institute of Geophysics and Planetary Physics, UCLA
1994-2001 Lecturer (Assist. Prof., then Assoc. Prof.) in Geochemistry, Oxford University
1994-2001 Fellow of Linacre College, Oxford University
1991-1994 Postdoctoral Fellow, Geophysical Laboratory, Carnegie Institution of Washington
1990-1991 Visiting Assistant Professor of Geochemistry, Purdue University
1989-1990 Research Associate in stable isotope geochemistry, University of Southern California

Professional Activities (partial list of activities since year 2000):

Co-chair, Deep Carbon Science Gordon Conference, 2020
Convener, Deep Carbon Observatory Deep Energy Meeting, La Clusaz, France, January 2019
Convener, Deep Carbon Observatory Deep Energy Meeting, Los Angeles, January, 2017
Convener, iPLEX workshop, “The Asteroid-Meteorite Connection”, April, 2016
PI and co-chair, Deep Carbon Observatory Deep Energy Community, 2015-2019
Member of EAG Urey Award Committee (two years)
Geochemical Society Board of Directors, 2014-2015
Proposal Review Panels for NASA Astrobiology Institute
Proposal Review Panels for NASA LARS
Proposal Review Panels for NSF EAR Instrumentation and Facilities
Proposal Review Panels for NASA Emerging Worlds
Chair of Origins of Solar Systems Gordon Conference, 2011-2013
Vice-chair of Origins of Solar Systems Gordon Conference, 2009-2011
Associated Editor for Reviews in Mineralogy & Geochemistry v. 68, Oxygen in the Solar System, 2008
Co-convener of Goldschmidt Conference Session 01c: “Processes and timescales in the solar nebula”, with A. Davis, 2008
Co-convener of Origin of Water Workshop, Molokai Hawai’I, 2008
Co-chair of NASA Astrobiology Institute Planetary System Formation Focus Group, with A. Boss, 2008 to 2010
Co-Investigator and Science Team member on the 2006 Mars Scout proposal entitled: “Sampling Ancient Mars Mission”, D. Britt PI, submitted to Mars Scout 2006 Opportunity, 2006

Convener of First NASA Astrobiology Institute disk chemistry workshop, Waikoloa Hawaii, 2005
 Member of NASA Astrobiology Institute Executive Council (2003-2009)
 Science team member and Sample Acquisition Scientist for the “Gulliver” proposal
 to the NASA Discovery Program (D. Britt PI, M. Lysek JPL manager) (2004)
 Co-convenor, Goldschmidt Conference Symposium, “Stars, Disks, and Planetary Growth”, with B.
 Zanda, C.M.O’D Alexander, H. Palme (2002)
 Co-convenor, Goldschmidt Conference Symposium, “Recent Advances in Stable Isotope Analysis
 and Interpretation” with J. Eiler (2001).
 Co-convenor, Goldschmidt Conference Symposium, “Terrestrial Planets and Meteorites” with A.
 Halliday (2000).

Professional Society Memberships:

American Geophysical Union
 Geochemical Society
 Meteoritical Societys

Honors:

J. Lawrence Smith Medal, National Academy of Sciences (2024)
 Fellow of the American Geophysical Union (2021)
 Fellow of the Geochemical Society (2016)
 Fellow of the European Association of Geochemistry (2016)
 Fellow of the Meteoritical Society (2012)
 Carnegie Fellow (1991-1994)

Invited Lectures (since 2011):

Keynote Lecture, Goldschmidt Conference 2023, Multiply-substituted isotopologues as tracers of
 geochemical cycles (6gO2), Lyon, France, July, 2023
Invited Lecture, Deep Carbon Observatory Meeting, National Academies, Washington DC, CH₄
 isotopic bond ordering in two dimensions, October 30, 2019 (<https://youtu.be/urkFNhhcqXc>).
Invited Lecture, UC Riverside, A two-dimensional perspective on CH₄ isotope clumping:
 distinguishing process from source, April 23, 2019.
Invited Lecture, Dartmouth College, The birth environment of the solar system, Hanover, NH, USA,
 April 5, 2019.
Invited Lecture, Paris Museum of Natural History, Stable isotope evidence for planetesimal
 evaporation, June, 2018.
Invited Lecture, Paris-Saclay University, The origin of the solar radionuclides, Orsay, France, June,
 2018.
Invited Lecture, Institut de Physique du Globe de Paris, Evaporating planetesimals, Paris, France,
 June 2018.
Invited Lecture, Goldschmidt Conference 2017, Origin of solar system first solids (01d), Paris,
 France, August, 2017
Invited Lecture, Symposium “Molecular Evolution in Space”, Hokkaido University, Hokkaido,
 Japan, June, 2017
Invited Lecture, Deep Carbon Observatory workshop on continuity of DCO beyond 2020, Florence,
 Italy, April, 2017
Invited Lecture, Geophysical Laboratory, Carnegie Institution of Washington, Washington DC,
 March, 2017

Invited Lecture, Department of Earth and Planetary Sciences, University of New Mexico, March, 2017

Invited Lecture, Data Workshop, Sloan Foundation Headquarters, New York, New York, January, 2017

Invited Lecture, American Geophysical Union 2016 Fall Meeting, A large-radius high-mass-resolution multiple-collector isotope ratio mass spectrometer for analysis of isotopologues of CH₄ and other gases, San Francisco, CA, December, 2016

Invited Lecture, Carnegie Institution of Washington, DCO meeting, Washington DC, March, 2016.

Invited Lecture, American Museum of Natural History, May, 2016

Keynote Lecture, Goldschmidt Conference 2016, Progress in Calibrating Isotope Fractionation Factors: Laboratory Experiments and Field Observations (17c), Yokohama, Japan, June, 2016

Invited Lecture, Carbonaceous Chondrites: Their Parent Bodies and Their Link with Primitive Asteroids workshop, Villefranche sur mer, France, June 3, 2014

Invited Lecture, Accretion and Early Differentiation of the Terrestrial Planets workshop (ACCRETE), Nice, France, May 30, 2014

Invited Lecture, Total, Paris, France, Presentation of new Panorama instrument to research group, January 30, 2014

Invited Lecture, DCO New Generation Technology in Deep Carbon Science workshop, Rice University, January 15, 2014

Invited Lecture, American Geophysical Union 2013 Fall Meeting, Developments and Applications of Non-Traditional Stable Isotope Geochemistry II, San Francisco, CA, December 2013

Invited Lecture, American Geophysical Union 2013 Fall Meeting, Rosetta, Comets, and the Origins of the Solar System, San Francisco, CA, December 2013

Keynote Lecture, Deep Carbon Observatory International Science Meeting, National Academy of Sciences, Washington DC, March 4, 2013

Invited Lecture, Conference on Chronology of the Solar System, École de physique des Houches, France, February 12, 2013

Invited Lecture, Deep Carbon Observatory Deep Energy workshop, University of Manchester, U.K., January 30, 2013

Public Lecture, “From past to present, how rare is Earth?”, Mindshare, Santa Monica, CA, November 15, 2012

Invited Lecture, Bayerisches Geoinstitut, University of Bayreuth, September 2012

Invited Lecture, Lowell Observatory, Flagstaff, AZ, January 26, 2012

Invited Lecture, Lorentz Center, Universiteit Leiden, Netherlands, Isotopes in Astrochemistry meeting, December 11, 2011

Students Graduated (advised and co-advised)

Alison Jones (DPhil, University of Oxford, currently at Oxford University Press)

Justin Simon (PhD, UCLA, currently staff scientist at Johnson Space Center)

Kathryn Dyl (PhD, UCLA, currently at the Department of Energy)

Anat Shahar (PhD, UCLA, currently staff scientist at the Carnegie Institution for Science)

Rachel Smith (PhD, UCLA, currently at the North Carolina Museum of Natural Sciences)

Samantha Ingalls (MS, UCLA, senior criminalist, chemist, LA County)
 Catherine Macris (PhD, UCLA, with Manning, currently on the faculty at Indiana Univ. Indianapolis)
 Daniel Petrizzo (PhD, UCLA, with Runnegar, currently at the Jet Propulsion Laboratory)
 Ellen Harju (PhD, UCLA, with McKeegan, currently at Pasadena City College)
 Michelle Joran (PhD, UCLA, currently at the Carnegie Institution for Science)
 Jeanine Ash (PhD, UCLA, researcher at Rice University, now at Capture6, Seattle)
 Nathaniel Monson (PhD, UCLA, currently at Northrop Grumman, CO)
 Kaitlyn McCain (PhD, UCLA, with McKeegan, NASA Johnson Space Center)
 Sebastian Krause (PhD, UCLA, with Treude, now at Univ. of California Santa Barbara)
 Alexandra Doyle (PhD, UCLA)
 Isabella Trierweiler (PhD, UCLA)

Postdoctoral Scholars Advised

Issaku Kohl (currently at Thermo Fisher Scientific)
 Laurence Yeung (Associate professor at Rice University, now Atomo Coffee)
 Jabrane Labidi (currently CNRS researcher, IPGP, Paris)
 Haolan Tang (Professor, School of Earth and Space Sciences, USTC)
 Alexandra Doyle (UCLA)
 Quinn Shollenberger (currently at Lawrence Livermore National Laboratory)
 Laetitia Guibourdenche (UCLA)
 Jiarui Liu (UCLA, UCSB)

Published Scholarly Works:

(* = Student or postdoc advisee during project)

- Young E.D., Werlen A., Marcum S.P., Stixrude L., and Dullemond C.P. (2025). Differentiation, the exception not the rule – Evidence for full miscibility in sub-Neptune Interiors. (in press) *The Planetary Science Journal*. <https://doi.org/10.48550/arXiv.2507.00947>.
- Kohl I.E., Killingsworth B., Ziegler K., Young E.D., and Coleman M.L. (2025). Triple-oxygen isotopic evidence of prolonged direct bioleaching of pyrite with O₂. *Earth and Planetary Science Letters*, 119639, <https://doi.org/10.1016/j.epsl.2025.119639>.
- Werlen A., Dorn Caroline, Burn R., Schlichting H.E., Grimm S.L., and Young E.D. (2025) Sub-Neptunes are drier than they seem: Rethinking the origins of water-rich worlds. *The Astrophysical Journal* **991**, L16, <https://doi.org/10.3847/2041-8213/adff73>
- Werlen A., Dorn C., Schlichting H.E., Grimm S.L., and Young E.D. (2025). Atmospheric C/O ratios of sub-neptunes with magma oceans: homemade rather than inherited. *The Astrophysical Journal Letters* , **988** , L55. <https://doi.org/10.3847/2041-8213/adf185>
- Liu J., Young E.D., Pellerin A., Ash J.L., Barrett G.T., Feng X., Girguis P.R., Krause S.J.E., Leavitt W.D., Murphy K., Qin Q., Teske A., Valentine D.L., Walter Anthony K., Treude T. (2025). Clumped isotopes of methane trace bioenergetics in the environment. *Science Advances* , **11** , ead1401. <https://doi.org/10.1126/sciadv.adu1401>

- Li J., Ash J.L., Cobban A., Kubik B.C., Rizzo G., Thompson M., Guibourdenche L., Berger S., Morra K., Lin Y., Mueller E.P., Masterson A.L., Stein R., Fogel M., Torres M.A., Feng X., Holden J.F., Martini A., Welte C.U., Jetten M.S.M., Young E.D., Leavitt W.D. (2025). The clumped isotope signatures of multiple methanogenic metabolisms. *Environmental Science & Technology*, **59**, 13798-13810. <https://doi.org/10.1021/acs.est.5c03255>
- Broadley M.W., Barry P.H., Tyne R.L., Bekaert D.V., Karolyte R., Hudak M.R., McPaul K., Ramirez C.J., Curtice J., Lloyd K.G., Ballentine C. J., Marty B., Young E.D., and Seltzer A.M. (2025). Noble gas isotopes and nitrogen isotopologues reveal deep sources and subsurface fractionation in yellowstone gases. *ACS Earth Space Chem.*, **9**, 1310-1321. <https://doi.org/10.1021/acsearthspacechem.4c00349>
- Rogers J. G., Dorn C., Raj V. A., Schlichting H. E., and Young E. D. (2025). Most super-Earths have less than 3% water. *The Astrophysical Journal*, **979:79**, 12 pp. <https://doi.org/10.3847/1538-4357/ad9f61>
- Swindle T. D., Pack A., Schwenzer S. P., and Young E. D. (2025). The value of returning a sample of the Martian atmosphere. *PNAS (Proceedings of the National Academy of Sciences of the United States of America)*, **122**, 2, e2404258121. <https://doi.org/10.1073/pnas.2404258121>
- Barry P. H., de Moor J. M., Broadley M. W., Seltzer A. M., Bekaert D. V., Patil K., Bartels C. G. E., Young E. D., Longworth B. E., Barosa B., Bastianoni A., Bastoni D., Cascone M., Turner S. J., tyne R. L., Anderson M., Li K., Curtice J., Kumar N., Jessen G. L., Blamey J. M., Ramírez C. J., Chiodi A., Aguilera F., Layana S., González C., Aguilera M., Masías Alvarez G. P. J., Marty B., Lloyd K. G., and Giovannelli D. (2025). Carbon, nitrogen, and noble gas isotopes reveal deep volatile signatures in thermal springs in the Central Volcanic Zone (CVZ) of the Andes. *Earth and Planetary Science letters*, **651**, 119169. <https://doi.org/10.1016/j.epsl.2024.119169>
- Marty B., Contamine D., Bakaert D. V., Lastes A., Pik R., Labidi J., Young E. D., Broadley M. W., Barry P. H., Byrne D. J., and Seltzer A. M. (2025). Uncovering the xenon isotope composition of continental rift magmas: Insight from analysis of geothermal gases at Homa Hills, Kenya. *Earth and Planetary Science letters*, **653**, 119224. <https://doi.org/10.1016/j.epsl.2025.119224>
- Young E.D., Labidi J., and Kohl I.E. (2025). Advances in measuring multiply-substituted isotopologues of gas molecules with geochemical applications. *Treatise on Geochemistry (Third Edition)*, **8**, pp. 645-670. <https://iopscience.iop.org/article/10.3847/PSJ/ad8c40>
- Hinkel N. R. and Young E. D. (2025). Abundances of elements in solar systems. *Treatise on Geochemistry (Third Edition)*, **7**, pp. 1-18. <https://doi.org/10.1016/B978-0-323-99762-1.00119-4>
- Harrison T. M., Lithgow-Bertelloni C., and Young E. D. (2025). Origin and evolution of Earth's water inventory. *Treatise on Geochemistry (Third Edition)*, **3**, pp. 1-9. <https://doi.org/10.1016/B978-0-323-99762-1.00038-3>
- Young E.D., Stixrude L., Rogers J. G., Schlichting H. E. (2024). Phase equilibria of sub-Neptunes and super-Earths *The Planetary Science Journal*, **5:268**, 16 pp. <https://doi.org/10.3847/PSJ/ad8c40>
- Rogers J.G., Schlichting H.E., and Young E.D. (2024). Feeling but not forgotten: the imprint of escaping hydrogen atmospheres on super-Earth interiors. *The Astrophysical Journal*, **970:47**, 11 pp. <https://doi.org/10.3847/1538-4357/ad5287>

- Labidi J., McCollom T.M., Giunta T., Sherwood Lollar B., Leavitt W.D., and Young E.D. (2024). Clumped isotope signatures of abiotic methane: the role of the combinatorial isotope effect. *Journal of Geophysical Research Solid Earth*, 129, e2023JB028194. <https://doi.org/10.1029/2023JB028194>
- Kita N. T., Kitajima K., Nagashima K., ..., Young E.D., ..., Yurimoto H. (2024) Disequilibrium oxygen isotope distribution among aqueously altered minerals in Ryugu asteroid returned samples. *Meteoritics & Planetary Science*, 1-20, doi: 10.1111/maps.14163.
- Liu J. *, Treude T., Abbasov O.R., Baloglanov E.E., Aliyev A.A., Harris C.M., Leavitt W.D., and Young E.D. (2024). Clumped isotope evidence for microbial alteration of thermogenic methane in terrestrial mud volcanoes. *Geology*, **52**, 22-26 <https://doi.org/10.1130/G51667.1>.
- Desch S.J., Young E.D., Dunham E.T., Fujimoto Y., and Dunlap D.R. (2023). Short-lived radionuclides in meteorites and the Sun's birth environment. In *Protostars and Planets VII* (S. Inutsuka, Y. Aikawa, T. Muto, K. Tomida, and M. Tamura eds.), Astronomical Society of the Pacific, <https://doi.org/10.26624/SXJY1095>
- Nguyen A.N., Mane P., Keller L.P., Piani L., Abe YI, Aleon J, ... , Young E.D., ... , Yurimoto H. (2023). Abundant presolar grains and primordial organics preserved in carbon-rich exogenous clasts in asteroid Ryugu. *Science Advances* **9**, 11 pp. <https://www.science.org/doi/10.1126/sciadv.adh1003>
- Lin Y-T., Rumble D., Young E.D., Labidi J., Tu T-H., Chen J-N., Paper T., Bohrmann G., Lin S., Lin L-H., and Wang P-L. (2023). Diverse origins of gases from mud volcanoes and seeps in tectonically fragmented terrane. *Geochemistry, Geophysics, Geosystems*, 21 pp. <https://doi.org/10.1029/2022GC010791>
- Trierweiler I.L. *, Doyle A.E., and Young E.D. (2023). A chondritic solar neighborhood. *The Planetary Science Journal* **4**, 136, 13 pp. <https://doi.org/10.3847/PSJ/acdef3>
- Tang H. *, Young E.D., Tafla L., Pack A., et al. (2023). The oxygen isotopic composition of samples returned from asteroid Ryugu with implications for the nature of the parent planetesimal. *The Planetary Science Journal* **4**144, 15 pp. <https://doi.org/10.3847/PSJ/acea62>
- Bojanova D.P., De Anda V.Y., Haghnegahdar M.A., Teske A.P., Ash J.L., Young E.D., Baker B.J., LaRowe D.E., and Amend J.P. (2023). Well-hidden methanogenesis in deep, organic-rich sediments of Guaymas Basin. *The ISME Journal*, 11 pp. <https://doi.org/10.1038/s41396-023-01485-y>
- Krestianiov E., Amelin Y., Yin Q-Z., Cary P., Huyskens M.H., Miller A., Dey S., Hibiya Y., Tang H., Young E.D., Pack A., Di Rocco T. (2023). Igneous meteorites suggest aluminum-26 heterogeneity in the early solar nebula. *Nature Communications* **14**, 4940, 11 pp. <https://doi.org/10.1038/s41467-023-40026-1>
- Misener W., Schlichting H.E., and Young E.D. (2023). Atmospheres as windows into sub-Neptune interiors: coupled chemistry and structure of hydrogen-silane-water envelopes. *Monthly Notices of the Royal Astronomical Society* **524**, 981-992. <https://academic.oup.com/mnras/article/524/1/981/7207406>
- Doyle A.E. *, Klein B.L., Dufour P., Melis C., Zuckerman B., Xu S., Weinberger A.J., Trierweiler I.L., Monson N.N., Jura M.A., and Young E.D. (2023). New chondritic bodies identified in eight

- oxygen-bearing white dwarfs. *The Astrophysical Journal*, **950:93**, 17pp. <https://iopscience.iop.org/article/10.3847/1538-4357/acbd44>
- Young E.D., Shahar A., and Schlichting H.E. (2023). Earth shaped by primordial H₂ atmospheres. *Nature* **616**, 306-311. <https://www.nature.com/articles/s41586-023-05823-0>
- Liu J. *, Harris R.L., Ash J.L., Ferry J.G., Kruse S.J.E., Labidi J., Prakash D., Sherwood Lollar B., Treude T., Warr O., and Young E.D. (2023). Reversibility controls on extreme methane clumped isotope signatures from anaerobic oxidation of methane. *Geochimica et Cosmochimica Acta* **348**, 165-186. <https://doi.org/10.1016/j.gca.2023.02.022>
- Trierweiler I.L. *, Doyle A.E., Melis C., Walsh K.J., and Young E.D. (2022). Exomoons as sources of white dwarf pollution. *The Astrophysical Journal* **936:30**, 14pp. doi.org/10.3847/1538-4357/ac86d5
- Kawasaki N. et al. (2022). Oxygen isotopes of anhydrous primary minerals show kinship between asteroid Ryugu and comet 81P/Wild2. *Science Advances* **8**, 34-53. [doi:10.1126/sciadv.ade2067](https://doi.org/10.1126/sciadv.ade2067)
- Giunta T., Young E.D., Labidi J., Sansjofre Pl, Jezequel D., Donval J-P., Brandily C., and Ruffine L. (2022). Extreme methane clumped isotopologue bio-signatures of aerobic and anaerobic methanotrophy: Insights from the Lake Pavin and Black Sea sediments. *Geochimica et Cosmochimica Acta* **338**, 34-53. doi.org/10.1016/j.gca.2022.09.034
- Barosch J., Nittler L.R., Wang J., ..., Young E.D., et al. (2022). Presolar stardust in asteroid Ryugu. *The Astrophysical Journal Letters* **943:L3**, 12 pp. doi.org/10.3847/2041-8213/ac83bd
- Yokoyama T., Nagashima K., Nakai I., Young E.D., et. al. (2022). Samples returned from the asteroid Ryugu are similar to Ivuna-type carbonaceous meteorites. *Science* **10.116**. doi.org/10.1126/science.abn7850
- Krause S.J.E. *, Liu J. *, Young E.D., and Treude T. (2022). $\Delta^{13}\text{CH}_3\text{D}$ and $\Delta^{12}\text{CH}_2\text{D}_2$ signatures of methane aerobically oxidized by *Methylosinus trichosporium* with implications for deciphering the provenance of methane gases. *Earth and Planetary Science Letters* **593**, 117681. doi.org/10.1016/j.epsl.2022.117681
- Schlichting H.E. and Young E.D. (2022). Chemical equilibrium between cores, mantles, and atmospheres of super-Earths and sub-Neptunes and implications for their compositions, interiors, and evolution. *The Planetary Science Journal* **3**, 19 pp. doi.org/10.3847/PSJ/ac68e6
- Young E.D., Macris C.A., Tang H., Hogan A.A., and Shollenberger Q.R. (2022). Isotope velocimetry: Experimental and theoretical demonstration of the potential importance of gas flow for isotope fractionation during evaporation of protoplanetary material. *Earth and Planetary Science letters* **589**, 117575. doi.org/10.1016/j.epsl.2022.11757
- Shollenberger Q.R. *, Render J., Jordan M.K., McCain K.A., Ebert S., Bischoff A., Kleine T., and Young E.D. (2022). Titanium isotope systematics of refractory inclusions: Echoes of molecular cloud heterogeneity. *Geochimica et Cosmochimica Acta* **324**, 44-65. doi.org/10.1016/j.gca.2022.03.001
- Labidi J. and Young E. D. (2022) The origin and dynamics of nitrogen in the Earth's mantle constrained by $^{15}\text{N}^{15}\text{N}$ in hydrothermal gases. *Chemical Geology* **591**, 120709. doi.org/10.1016/j.chemgeo.2022.120709
- Tang H. * and Young E.D. (2021). Planetary Evaporation. *Elements* **17**, 401-406. [doi: 10.2138/gselements.17.6.401](https://doi.org/10.2138/gselements.17.6.401)

- Young E. D. (2021) Revisiting the Wasson fractional crystallization model for IIIAB iron meteorites with implications for the interpretation of their Fe isotope ratios. *Meteoritics & Planetary Science* **56**, 10 pp., doi: 10.111/maps.13752
- Nothhaft D. B., Templeton A.S., Rhim J. H., Wang D.T., Labidi J., Miller H. M., Boyd E. S., Matter J.M., Ono S., Young E. D., Kopf S. H., Kelemen P. B., Conrad M. E., The Oman Drilling Project Science Team (2021) Geochemical, biological, and clumped isotopologue evidence for substantial microbial methane production under carbon limitation in serpentinites of the Samail Ophiolite, Oman. *JGR Biogeosciences* **126**, 30 pp., doi: 10.1029/2020JG006025
- Goodrich C. A., Sanborn M. E., Yin Q.Z., Kohl I., Frank D., Daly R.T., Walsh K.J., Zolensky M. E., Young E.D., Jenniskens P., Shaddad M.H. (2021) Chromium isotopic evidence for mixing of NC and CC reservoirs in polymict ureilites: Implications for dynamical models of the early Solar System. *The Planetary Science Journal* **2**, 15 pp., doi.org/10.3847/PSJ/abd258
- Labidi J.*, Young E. D., Fischer T. P., Barry P. H., Ballentine C. J., and de Moor J. M. (2021) Recycling of nitrogen and light noble gases in the Central American subduction zone: Constraints from $^{15}\text{N}/^{14}\text{N}$. *Earth and Planetary Science Letters* **571**, doi.org/10.1016/j.epsl.2021.117112
- Klein B.L., Doyle A.E. *, Zuckerman B., Dufour P., Blouin S., Melis C., Weinberger A.J., and Young E.D. (2021) Discovery of Beryllium in white dwarfs polluted by planetary accretion. *The Astrophysical Journal* **914:61**, 17 pp., doi: doi.org/10.3847/1538-4357/abe40b
- Doyle A.E. *, Desch S.J., and Young E.D. (2021) Icy Exomoons Evidenced by Spallogenic Nuclides in Polluted White Dwarfs. *The Astrophysical Journal Letters*, **907:L35**, 9pp, doi: doi.org/10.3847/2041-8213/abd9ba
- Tang H. *, Szumila I., Trail D., and Young E.D. (2021) Experimental determination of the effect of Cr on Mg isotope fractionation between spinel and forsterite. *Geochimica et Cosmochimica Acta*, **296**, 152-169, doi.org/10.1016/j.gca.2020.12.028
- Warr O., Young E.D., Giunta T., Kohl I.E., Ash J.L., Sherwood Lollar B. (2021) High-resolution, long-term isotopic and isotopologue variation identifies the sources and sinks of methane in a deep subsurface carbon cycle. *Geochimica et Cosmochimica Acta*, **294**, 315-334, doi.org/10.1016/j.gca.2020.12.002
- Giunta T., Labidi J. *, Kohl E., Ruffine L., Donval J.P., Geli L., Cagatay M.N., Lu H., and Young E.D. (2021) Evidence for methane isotopic bond re-ordering in gas reservoirs sourcing cold seeps from the Sea of Marmara. *Earth and Planetary Science Letters* **553**, 12 pp, doi.org/10.1016/j.epsl.2020.116619
- Schauble E.A. and Young E.D. (2021) Mass Dependence of Equilibrium Oxygen Isotope Fractionation in Carbonate, Nitrate, Perchlorate, Phosphate, Silicate, and Sulfate Minerals. *Reviews in Mineralogy and Geochemistry* **86** (I.N. Bindeman and A. Pack eds.), Mineralogical Society of America, Washington DC, 137-178.
- Tang H. * and Young E.D. (2020) Evaporation from the lunar magma ocean was not the mechanism for fractionation of the Moon's moderately volatile elements. *The Planetary Science Journal* **1:49**, 21 pp., doi.org/10.3847/PSJ/abb23c
- Doyle A.E. *, Klein B., Schlichting H.E., and Young E.D. (2020) Where are the extrasolar Mercuries? *The Astrophysical Journal* **901:10**, 15 pp., doi.org/10.3847/1538-4357/abad9a.
- Labidi J. *, Young E.D., Giunta T., Kohl I.E., Seewald J., Tang H., Lilley M.D., Fruh-Green G.L. (2020) Methane thermometry in deep-sea hydrothermal systems: Evidence for re-ordering of doubly-substituted isotopologues during fluid cooling. *Geochimica et Cosmochimica Acta* **288**, 248-261, doi.org/10.1016/j.gca.2020.08.013

- Shahar A. and Young E.D. (2020) An assessment of iron isotope fractionation during core formation. *Chemical Geology* **554**, 119800, doi: 10.1016/j.chemgeo.2020.119800
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