

Rachel L. Smith

Curriculum Vitae

(Updated, 12/29/20)

CURRENT EMPLOYMENT

2011-Present:

Head, Astronomy & Astrophysics Research Laboratory

Curator of Meteorites (since 2013)

North Carolina Museum of Natural Sciences
121 West Jones Street, Rm. 3802B
Raleigh, NC 27603

Associate Professor (since 2018 as Associate)

Department of Physics and Astronomy
Appalachian State University
Boone, NC 28608
Email: rachel.smith@naturalsciences.org; smithrl2@appstate.edu
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Adjunct Professor (since 2017)

Department of Physics and Astronomy, University of North Carolina at Chapel Hill

Previous Academic/Research Appointments:

(2011-2018) Assistant Professor, Dept. of Physics & Astronomy, Appalachian State University
(2013-2016) Visiting Scholar, Dept. of Physics & Astronomy, UNC at Chapel Hill
(2011) Postdoctoral Scholar, California Institute of Technology, Pasadena California
Blake Research Group, Astronomy & Astrochemistry, Planetary Science
(2005-2011) Graduate Student Researcher, UCLA
(2008-2009) Teaching Fellow, Evolution of the Cosmos and Life, freshman cluster course, UCLA
(2005-2007) Teaching Assistant, Solar System and Planets; Oceanography
(2004-2005) Research Associate, VA Greater Los Angeles Healthcare System, Wadsworth Anaerobe Laboratory
(2000-2002) Visiting Scientist, USGS, Astrogeology Team, Flagstaff, AZ
(1996) Field Researcher, The Bellairs Research Institute, McGill University, St. James, Barbados
(1993) Field Researcher, The School for Field Studies, Ecology of Endangered Sea Turtles, Costa Rica
(1991-1993) Research Assistant, Cornell University, College of Veterinary Medicine, Ithaca, NY

Previous Non-Academic Positions:

(2004-2005) Freelance Exhibit Evaluator, Randi Korn & Associates, Inc., Alexandria, VA
(2004) Freelance Exhibit Researcher/Concept Developer, BRC Imagination Arts, Burbank, CA
(2003-2004) Associate Producer, Chedd-Angier Production Company, Inc., Watertown, MA
(2002-2003) Exhibit Developer, Jeff Kennedy Associates, Inc., Somerville, MA
(1999-2002) Museum Educator, Museum of Life and Science, Durham, NC

EDUCATION

University of California, Los Angeles, Los Angeles, CA

(2011) Doctor of Philosophy, Astrochemistry/Cosmochemistry (officially, Geochemistry)
Advisors: Prof. Edward D. Young (Geochemistry/Cosmochemistry, UCLA); Dr. Klaus M. Pontoppidan (Space Telescope Science Institute); and Prof. Mark Morris (Astronomy, UCLA); **Thesis:** *High-resolution near-infrared observations toward protostellar objects as proxies for solar system chemical evolution.*

University of California, Los Angeles, Los Angeles, CA

(2009) Master of Science, Cosmochemistry/Astrochemistry (officially, Geochemistry)

Cornell University, New York State College of Veterinary Medicine, Ithaca, NY

(1998) Doctor of Veterinary Medicine

Cornell University, College of Agriculture and Life Sciences, Ithaca, NY

(1995) Bachelor of Science

AWARDS & HONORS

(2010) *Gordon A. McKay Award*, The Meteoritical Society

(2009) *Chambliss Astronomy Achievement Student Award*, American Astronomical Society

(2009) *Career Development Award*, Lunar and Planetary Institute

(2007) *Best Poster Award*, Kobe International School of Planetary Sciences 2007, Hyogo, Japan

UNIVERSITY COURSES

Current; Appalachian State University, undergraduate courses that I developed and teach:

Astrobiology: Searching for Life in the Universe (2013-present, Gen Ed since 2016), spring semesters.

Star Formation, 2014-present, fall semesters.

PUBLICATIONS (Peer-reviewed)

Dungee, R., Boogert, A., de Witt, C., Monteil, C., Richter, M. J., Barr, A. G., Charnley, S., Indriolo, N., Karska, A., Neufeld, D. A., **Smith, R. L.**, Tielens, A. G. G. M. (2018) High Resolution SOFIA/EXES Spectroscopy of SO₂ Gas in the Massive Young Stellar Object MonR2 IRS3: Implications for the Sulfur Budget. *The Astrophysical Journal Letters* (SOFIA Special Focus issue), 868, L10.

Tillett A., Dermigny J., Emamian M., Tonin Y., Bucay I., **Smith R. L.**, Darken M., Dearing C., Orbon M., Iliadis C. (2017). A low-background $\Upsilon\Upsilon$ -coincidence spectrometer for radioisotope studies. *Nuclear Inst. and Methods in Physics Research, A* 871, 66.

Smith R. L., Pontoppidan K. M., Young E. D. and Morris M. R. (2015) Heterogeneity in ¹²CO/¹³CO abundance ratios toward solar-type young stellar objects. *The Astrophysical Journal* 813, 120.

Young E. D., Gounelle M., **Smith R. L.**, Pontoppidan K. M., and Morris M. R., (2011). Astronomical oxygen isotopic evidence for supernova enrichment of the solar system birth environment by propagating star formation. *The Astrophysical Journal* 729, 43.

Smith R. L., Pontoppidan K. M., Young E. D., Morris M. R. and van Dishoeck E. F. (2009) High-precision C¹⁷O, C¹⁸O and C¹⁶O measurements in young stellar objects: analogues for CO self-shielding in the early solar system. *The Astrophysical Journal* 701, 163-175.

Pumbwe L., Chang A., **Smith R. L.** and Wexler H. M. (2007) BmeRABC5 is a multidrug efflux system that can confer metronidazole resistance in *Bacteroides fragilis*. *Microb Drug Resist.* Summer;13(2):96-101.

Pumbwe L., Chang A., **Smith R. L.** and Wexler H. M. (2006) Clinical significance of overexpression of multiple RND-family efflux pumps in *Bacteroides fragilis* isolates. *J Antimicrob Chemother.* Sep;58(3):543-8.

Pumbwe L., Ueda O., Yoshimura F., Chang A., **Smith R. L.**, Wexler H.M. (2006) *Bacteroides fragilis* BmeABC efflux systems additively confer intrinsic antimicrobial resistance. *J Antimicrob Chemother.* Jul;58(1):37-46.

White Papers

Fayolle, Edith C. et al. (2020) Critical Laboratory Studies to Advance Planetary Science and Support Missions. *Decadal Survey for Planetary Science and Astrobiology 2023-2032.*

Gudipati, M. S. (principal author); co-authors: Milam, S. N., Hendrix, A. R., Henderson, B. L., Linnartz, H. V. J., Majumdar, L., Nuevo, M., Paardekooper, D. M., Sciamma-O'Brien, E. M., **Smith, R. L.**, Turner, N. J., Willacy,

K. (2019) From Interstellar Ice Grains to Evolved Planetary Systems: the Role of Laboratory Studies. *Astro2020 Decadal Survey on Astronomy and Astrophysics*.

Papers near submission

Smith, L. R. (graduate student), Gudipati, M. S., **Smith, R. L.**, Lewis, R. D. Isotope Effect on the Sublimation Curves and Binding Energies of ^{12}CO and ^{13}CO Interstellar Ice Analogues.

Smith, L. R. (graduate student), Gudipati, M. S., **Smith, R. L.**, Lewis, R. D. Carbon Monoxide Isotopic Fractionation from Interstellar CO Ice Photodesorption.

AWARDED GRANTS

Current:

(2021-2026) \$6.3M, Co-I and NCMNS PI for subaward, NASA Science Mission Directorate Science Education Cooperative Agreement, Renewal for *OpenSpace: An Engine for Dynamic Visualization of Earth and Space Science for Informal Education and Beyond*. PI, Rosamond Kinzler, American Museum of Natural History.

(2017-2020) \$462K, PI. NASA Emerging Worlds Research Program (#16-EW16_2-0185). Smith, R.L. (PI), Gudipati, M., Willacy, K., Blake, G., Boogert, A., Pontoppidan, K. *Investigating Carbon Inheritance in the Early Solar Nebula: An Interdisciplinary Approach*.

(2016-2020) \$6.3M, Co-I and NCMNS PI for subaward, NASA Science Mission Directorate Science Education Cooperative Agreement Notice (#15-SE CAN15-0047). *OpenSpace: An Engine for Dynamic Visualization of Earth and Space Science for Informal Education and Beyond*. PI, Rosamond Kinzler, American Museum of Natural History.

Past:

(2018-2020) \$726K, Senior Personnel [broader impacts] (PI, Matthew Green, NC State University). National Science Foundation. *Neutrinoless Double-Beta Decay with Germanium Detectors: The Majorana Demonstrator and LEGEND*.

(2020) \$1000, NC Space Grant. Astronomy Days 2020 speaker, Murthy Gudipati, JPL

(2019) \$6,000, PI. NASA North Carolina Space Grant Consortium. Astrophysics Lab Internship.

(2019) \$1000, NC Space Grant. Astronomy Days 2019 speaker, Allan Treiman, Lunar & Planetary Institute.

(2018) \$6,000, PI. NASA North Carolina Space Grant Consortium. Astrophysics Lab Internship.

(2018) \$3,500, PI. NASA North Carolina Space Grant Consortium, Astronomy Days 2018 program/speaker support for speakers: Murthy Gudipati, JPL; Klaus Pontoppidan, STScI, and development of a new rocket-building activity (\$2500 awarded grant funds; \$1000 supplement).

(2017) \$1000, PI. Office of Student Research. Undergraduate Research Assistantship, Fall 2017. Student: Nicholas Wright. *Analysis of Protoplanetary Carbon Monoxide in Young Stellar Systems Using High-Resolution Spectroscopy*.

(2017) \$6,000, PI. NASA North Carolina Space Grant Consortium. Astrophysics Lab Internship.

(2017) \$1000, PI. NC Space Grant Consortium. Astronomy Days speaker honorarium (David Jewitt, UCLA).

(2016) \$1,000, PI. Office of Student Research/Undergraduate Research Award, Appalachian State University. Spring 2016, Student: Sarah Harvey. Project: *Detailed CO analyses of young stellar binaries and isolated cores using high-resolution spectroscopy*.

(2016) \$3,300, PI. Youth Advocacy Internship Office/Department of Environment and Natural Resources. Summer Intern 2016, 3D Modeling of Museum Meteorites. Co-supervisor w/Eric Knisley.

(2016) \$6,000, PI. NASA North Carolina Space Grant Consortium. Summer 2016 Astrophysics Lab Internship.

(2015) \$5,000, PI. NASA NC Space Grant Consortium, Education/Public Outreach Program. *From Local Sky to Deep Space: Connecting Museum Visitors to Astronomy & Astrophysics*.

(2015) \$3,300, PI. Youth Advocacy Internship Office/Department of Environment and Natural Resources. Summer 2015 Intern, Meteorite Curation and Astrophysics.

(2015) \$5,000, PI. NASA North Carolina Space Grant Consortium. Summer 2015 Astrophysics Lab Internship.

(2014) \$6,000, PI. NASA North Carolina Space Grant Consortium. Summer 2014 Astrophysics Lab Internship.

- (2014) \$3,300, PI. Youth Advocacy Internship Office/Department of Environment and Natural Resources. Summer 2014 Internship, Astrophysics Lab.
- (2014) \$4,750, PI. Research lab grant, Research and Collections, NC Museum of Natural Sciences.
- (2013) \$4,500, PI. Research lab grant, Research and Collections, NC Museum of Natural Sciences.
- (2012) \$22,493, PI. NASA NC Space Grant Consortium, New Investigator Program. *Investigating solar system evolution using high-resolution spectroscopy and radiative transfer modeling* (Award#: NNX10AI68H).

AWARDED OBSERVING PROPOSALS

- (2020) **Smith, R.L.** (PI) and Boogert, A.C.A. Investigations of Carbon and Oxygen Toward Massive YSOs Across the Galaxy. NASA Infrared Telescope Facility, #2020B129, 12.5 hrs.
- (2020) **Smith, R.L.** (PI) and Boogert, A.C.A. Using iSHELL to Explore Carbon Monoxide Reservoirs and Variability in Massive Young Stellar Objects. NASA Infrared Telescope Facility, #2020A113, 15 hrs.
- (2019) **Smith, R.L.** (PI) and Boogert, A.C.A. Using iSHELL at High Resolution to Explore Carbon and Oxygen in Massive Young Stellar Objects. NASA Infrared Telescope Facility, #2019B110, 14 hrs.
- (2016) Blake, G. A. and **Smith, R. L.** (PI) *Investigating Carbon Reservoirs in Protoplanetary Systems: A Study of Carbon Chemistry Across the Galaxy*. Keck Observing Program, Caltech Allocation Committee. 2017A, C295. 2 nights, May 12 and July 2, 2017.
- (2015) Co-I. PI, Adwin Boogert. Other Co-Is: Richter, M., Indriolo, N., DeWitt, C., Neufield, D., Karska, A., Bergin, T. *The Mystery of Sulfur in Dense Environments: EXES Spectroscopy of Sulfur Dioxide toward Massive Protostars*. SOFIA. **Flew on March 21-22, 2016, and January 23, 2017 flights as "guest investigator."**
- (2014) Blake, G., **Smith, R.** (co-I), Iopollo, S. *Observing Carbon Reservoirs Toward Massive Protostars: A Continuing Investigation of Protoplanetary Prebiotic Chemistry*. Keck Observing Program, Caltech Time Allocation. Award (2014, Semester B, Award#: 2014B_C238NS, 1 night, ~ \$100K in telescope time).
- (2013) Blake, G., **Smith, R.** (co-I), Iopollo, S., *Carbon Reservoirs in High-UV Protostellar Environments: A Continuing Investigation of Solar System Chemistry*. Keck Observing Program, Caltech Time Allocation Award. (2014, Semester A, Award#: NIRSPEC 2014A_C237NS, 1.5 nights, ~ \$150K in telescope time).
- (2011) **Smith, R.** (PI), Blake, G. *Carbon chemistry in high-UV protostellar environments: an investigation of Solar System evolution*. Keck Observing Program, Caltech Time Allocation Award, (2012, Semester A, Award#: NIRSPEC 2012A_C214NS, 1 night, ~ 100K in telescope time).
- Role: PI, Led proposal writing and submission, planned and led observing.

PUBLISHED CONFERENCE PROCEEDINGS

(**Smith's undergraduate students at the time of the project are underlined**)

- Smith, R. L.**, M. S. Gudipati, Boogert, A. C. A., Blake, G. A., Smith, L. R. (2020) ^{12}CO and ^{13}CO Binding Energies as Drivers for Temperature Variations in Cold Protoplanetary CO Reservoirs. 236th Meeting of the American Astronomical Society, Virtual ("iPoster Plus" oral presentation).
- Smith, R. L.**, M. S. Gudipati, Boogert, A. C. A., Blake, G. A., Smith, L. R. (2020) New ^{12}CO and ^{13}CO Binding Energy Measurements: An Explanation for Systematic Temperature Differences Observed in Cold Protoplanetary Reservoirs. 51st Lunar and Planetary Science Conference, LPI 2326, 1104 (*oral presentation; meeting canceled due to COVID*).
- Smith, L. R., M. S. Gudipati, **Smith, R. L.**, Lewis, R. D. (2020) Exploration of CO Photodesorption Using Interstellar Ice Analogues. 51st Lunar and Planetary Science Conference, LPI 2326, 1239 (*poster presentation; meeting canceled due to COVID*).
- Gemma, M. E., Roe, C., Emmart, C., Trakinski, V., **Smith, R. L.**, Acinapura, M., Aboott, B., Ebel, D. S., Kinzler, R. (2020) 51st Lunar and Planetary Science Conference, LPI 2326, 2392 (*poster presentation; meeting canceled due to COVID*).

- Smith, R. L.**, Blake, G. A., Pontoppidan, K. M., Boogert, A. C. A. (2019) Temporal Variability in Carbon Monoxide Abundances in Young Stellar Objects and Implications for the Early Solar System. 82nd Annual Meeting of the Meteoritical Society, Sapporo, Japan, LPI 2157, 6486 (oral contribution).
- Smith, L. R. (undergraduate), Lewis, R. D. (undergraduate), Gudipati, M. S., **Smith, R. L.** (2019) Fractionation Through Photodesorption of ¹²CO-¹³CO Interstellar Ice Analogues, 50th Lunar and Planetary Science Conference, The Woodlands, TX, LPI 2132, 2935 (poster contribution).
- Gemma, M. E., Emmart, C., Trakinski, V., **Smith, R. L.**, Acinapura, M., Aboott, B., Ebel, D. S., Kinzler, R. (2019) Data Exploration Using OpenSpace, 50th Lunar and Planetary Science Conference, The Woodlands, TX, LPI 2132, 3178 (poster contribution).
- Smith, L. R. (undergraduate), Lewis, R. D. (undergraduate), Panto, E. M. (undergraduate), Gudipati, M. S., **Smith, R. L.** (2018) A Laboratory Study of ¹²CO/¹³CO Ice-Gas Fractionation in Interstellar Ice Analogues, 50th Annual Meeting of the Division for Planetary Sciences of the American Astronomical Society, Knoxville, TN, id. 113.01 (poster contribution).
- Smith, R. L.**, Blake, G. A., Boogert, A. C. A., Pontoppidan, K. M., Tucker, M. A. (undergraduate) (2018) Carbon Reservoirs in Protoplanetary Systems Surveyed Across the Galaxy. 81st Annual Meeting of the Meteoritical Society, Moscow, Russia, LPI 2067, 6362 (oral contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, Tucker, M. A. (undergraduate) (2018) An Observational Study of Protoplanetary Carbon from the Galactic Center to the Local Solar Neighborhood, 49th Lunar and Planetary Science Conference, The Woodlands, TX, LPI 2083, 2985 (poster contribution).
- Smith, L. R. (undergraduate), Panto, E. M. (undergraduate), Gudipati, M. S., **Smith, R. L.** (2018) Exploring ¹²CO/¹³CO Ice-Gas Fractionation Through Interstellar Ice-Analogue Experiments, 49th Lunar and Planetary Science Conference, The Woodlands, TX, LPI 2083, 1187 (poster contribution).
- Crapster-Pregont, E. J., Gemma, M. E., Emmart, C., Trakinski, V., **Smith, R. L.**, Ebel, D. S., Kinzler, R. (2018) Setting the Universe Free, 49th Lunar and Planetary Science Conference, The Woodlands, TX, LPI 2083, 2111 (poster contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan (2017) An Observational Survey of Protoplanetary Carbon in Young Stellar Systems Across the Galaxy, 80th Annual Meeting of the Meteoritical Society, Santa Fe, New Mexico, LPI 1987, 6174 (oral contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan (2017) New Observations of Carbon Monoxide in Complex Solar-type and Massive Young Stellar Systems: Investigations of Protoplanetary Carbon Reservoirs, 48th Lunar and Planetary Science Conference, The Woodlands, TX, LPI, No. 1964, 2998 (poster contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, K. M., Lockwood, A. C. (2016) High-Resolution Observations of CO Toward Massive Young Stellar Objects: Investigations of Protoplanetary Carbon and Oxygen in the Galaxy, 47th Lunar and Planetary Science Conference, The Woodlands, TX, LPI, No. 1903, 3028 (oral contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, K. M., Lockwood, A. C. (2015) Investigating Protoplanetary Carbon Reservoirs and Molecular Inheritance along a Galactic Gradient, 78th Meteoritical Society Meeting, Berkeley, CA, LPI, No. 1856, 5385 (oral contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, K. M., Lockwood, A. C. (2015) Investigating Molecular Inheritance of Carbon in Star-forming Regions along a Galactic Gradient, International Astronomical Union General Assembly, Honolulu, Hawaii, id. 2257444 (poster contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, K. M., Lockwood, A. C. (2014) Investigating Protostellar Carbon Reservoirs with High-Resolution Spectroscopy Toward Massive Young Stellar Objects. 77th Meteoritical Society Meeting, Casablanca, Morocco, LPI, No. 1800, 5435 (oral contribution).
- Smith, R.L.**, Blake, G. A., Boogert, A.C.A., Pontoppidan, K. M., Lockwood, A. C. (2014) New observations of CO isotopologues toward massive protostars: an expanded view of molecular reservoirs in the galaxy. 45th Lunar and Planetary Science Conference, The Woodlands, TX, LPI, No. 1777, 2563 (oral contribution).

- Smith, R.L.**, Pontoppidan, K. M., Blake, G. A., Lockwood, A. C. (2013) Observations of carbon and oxygen isotopic heterogeneity toward protostars ranging in morphology and parent cloud. 44th Lunar and Planetary Science Conference, The Woodlands, TX, LPI, No.1719, 2698 (oral contribution).
- Smith, R.L.**, Pontoppidan, K. M., Blake, G. A., Boogert, A.C.A., Lockwood, A. C. (2013) Observations of isotopic heterogeneities toward embedded cores and binary systems: potential tracers of varying chemical evolutionary pathways in protostellar gas. Protostars and Planets VI, Heidelberg, July 15-20, 2013, #1S027 (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2011) Observational signatures of carbon isotope ice-gas fractionation towards solar-type protostars. 42nd Lunar and Planetary Science Conference, The Woodlands, TX, LPI, No. 1608, 1281 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2011) Observations of ^{12}CO - ^{13}CO partitioning toward solar-type protostars as proxies for solar system chemical evolution. 74th Meteoritical Society Meeting, London, England, *Meteoritics & Planetary Science (Supplement)*, id. 5406 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Herczeg, G. J., and Young, E. D (2010) Observations Of Unusual Carbon Isotope Fractionation In Protostars Using VLT/CRIRES, American Astronomical Society, AAS Meeting #215, Washington, D.C., #369.06; Bulletin of the American Astronomical Society, Vol. 42, 560 (oral contribution).
- Young, E. D., **Smith, R. L.**, Gounelle, M., Morris, M. R., and Pontoppidan, K. M. (2010) Astronomical Oxygen Isotopic Evidence for Supernova Enrichment of the Solar System Birth Environment, American Astronomical Society, AAS Meeting #215, #334.01; Bulletin of the American Astronomical Society, Vol. 42, 433.
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2010) Observations of high $^{12}\text{C}/^{13}\text{C}$ toward protostars and implications for the origin of the $^{12}\text{C}/^{13}\text{C}$ ratio in the solar system, 41st Lunar & Planetary Science Conference, The Woodlands, TX, LPI Contribution No. 1533, 2254 (oral contribution).
- Young, E. D., **Smith, R. L.**, Gounelle, M., Morris, M. R., and Pontoppidan, K. M. (2010) The oxygen isotopic case for supernova enrichment of the solar system birth environment, 41st Lunar and Planetary Science Conference, The Woodlands, Texas. LPI Contribution No. 1533, 1550.
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2010) Observations of high $^{12}\text{CO}/^{13}\text{CO}$ toward protostars and implications for the origin of the $^{12}\text{C}/^{13}\text{C}$ ratio in the solar system, 41st Lunar & Planetary Science Conference, The Woodlands, TX, LPI Contribution No. 1533, 2254 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R (2010) New Insights on the Origin of the solar system $^{12}\text{C}/^{13}\text{C}$ ratio using protostellar observations and radiative transfer modeling, Disks, Meteorites, Planetesimals Workshop, American Museum of Natural History, New York City, NY, 07/2010 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2010) New $^{12}\text{CO}/^{13}\text{CO}$ observations in young stellar objects and molecular clouds: implications for $^{12}\text{C}/^{13}\text{C}$ in the early solar nebula. 73rd Meteoritical Society Meeting, New York City, NY, *Meteoritics & Planetary Science (Supplement)*, id. 5381 (oral contribution). **This presentation won the Gordon A. McKay Award** (https://en.wikipedia.org/wiki/Gordon_A._McKay_Award)
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2010) Observations of high $^{12}\text{CO}/^{13}\text{CO}$ toward protostars and implications for the origin of the $^{12}\text{C}/^{13}\text{C}$ ratio in the solar system, 40th Lunar & Planetary Science Conference, The Woodlands, TX, id.1471 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., and Herczeg, G. J. (2009) Observations of $^{12}\text{C}/^{13}\text{C}$ fractionation in embedded protostars using VLT-CRIRES. American Astronomical Society, AAS Meeting #214, #422.05; Bulletin of the American Astronomical Society, Vol. 41, p.691 (poster contribution). **This presentation won the Chambliss Astronomy Achievement Student Award** (<http://aas.org/grants-and-prizes/chambliss-astronomy-achievement-student-awards>)
- Young, E. D., **Smith, R. L.**, Gounelle, M., Morris, M. R., and Pontoppidan, K. M. (2008) Solar system oxygen isotope ratios: a consequence of Type II supernovae pollution, 39th Lunar and Planetary Science Conference, League City, Texas. LPI Contribution No. 1391., 1329 (oral contribution).

- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., Morris, M. R., van Dishoeck, E. F. (2007) Detection of rare CO isotopologues in protostellar disks: an infrared investigation of molecular self-shielding, The Chronology of Meteorites and the Early Solar System workshop, Kauai, Hawaii (poster contribution).
- Smith, R. L.**, Young, E. D., and Morris, M. R., and Pontoppidan, K. M. (2007) Detection of rare CO isotopologues in a protostellar disk: towards an astronomical approach to understanding oxygen isotopes in the solar system, 38th Lunar & Planetary Science Conference, League City, TX, LPI Contribution No. 1338, 2293 (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., Morris, M. R., van Dishoeck, E. F. (2007) Detection of Rare CO Isotopologues in Protostellar Disks Using CRIRES and NIRSPEC. American Astronomical Society, AAS Meeting #211, #50.01; Bulletin of the American Astronomical Society, Vol. 39, 811 (poster contribution).

NON-PUBLISHED CONFERENCE PROCEEDINGS

(Smith's undergraduate students at the time of the project are underlined)

- Richardson, K., Bock, A., Acinapura, M., White, T., Smith, R.L. (2019) Visualizing Spacecraft Missions with OpenSpace Software. SPACE symposium. Talk/panel and poster.
- Richardson, K., Bock, A., Acinapura, M., White, T., Smith, R.L. (2018) Visualizing Spacecraft Missions with OpenSpace Software. Sigma Xi Student Research Conference, San Francisco, CA.
- Won the Math and Computer Science, undergraduate division award**
(<https://www.sigmaxi.org/news/news-archive/2018/10/29/top-presenters-announced-at-the-student-research-conference>)
- Smith, L. R. (undergraduate), Panto, E. (undergraduate), Gudipati, M. S., **Smith, R.L.** (2017) Exploring Carbon Isotope Chemistry through Experiments at the Jet Propulsion Laboratory. State of NC Undergraduate Research and Creativity Symposium (oral contribution).
- Mabe, D. (undergraduate) and **Smith, R. L.** (2017) A Survey of CO Isotopologues of Young Stellar Objects using High-Resolution Spectra from VLT-CRIRES. State of NC Undergraduate Research and Creativity Symposium (poster contribution).
- Smith, R. L.** (2017) A Survey of Protoplanetary Carbon in Young Stellar Systems Using Keck-NIRSPEC. Keck Science Meeting, Santa Cruz, CA (oral contribution)
- Matchunis, K. (undergraduate) and **Smith, R. L.** (2016) Analysis of $^{12}\text{C}^{18}\text{O}/^{12}\text{C}^{17}\text{O}$ Abundance Ratios of Young Stellar Objects in the Local Solar Neighborhood. State of NC Undergraduate Research and Creativity Symposium, and NC Space Grant Undergraduate Student Symposium, NC Central University, Nov. 5 (poster contribution).
- Boogert, A., Richter, M., DeWitt, C., Indriolo, N., Neufeld, D., Karska, A., Bergin, T., and **Smith, R.** (2016) EXES Observations of CH₄ and SO₂ Toward Massive Young Stellar Objects. *The Local Truth: Star-Formation and Feedback in the SOFIA Era – Celebrating 50 Years of Airborne Astronomy*. Pacific Grove, CA (oral contribution).
- Harvey, S. (undergraduate) and **Smith, R. L.** (2016) Detailed Analysis of Carbon Monoxide Isotopologues Toward Young Stellar Objects using High-Resolution Spectroscopy. Annual Celebration of Student Research and Creative Endeavors, Appalachian State University (poster contribution).
- Finalist for the Undergraduate Student Poster Competition.**
- Harvey, S. (undergraduate) and **Smith, R. L.** (2015) Identifying CO Isotopologues Toward Young Stellar Binaries and Isolated YSOs using High-Resolution Spectroscopy. State of NC Undergraduate Research and Creativity Symposium, and North Carolina Space Grant Board of Directors and Advisory Council, High Point University (poster contribution).
- Smith, R. L.** (2014) Exploring the solar system: Voyage to the Sun, Asteroid Belt, and Beyond. North Carolina Academy of Science, 111th Annual Meeting, North Carolina Museum of Natural Sciences (oral contribution).
- Smith, R.L.**, Pontoppidan, K. M., Blake, G. A., Boogert, A.C.A., Lockwood, A. C. (2013) Observations of isotopic heterogeneities toward embedded cores and binary systems: potential tracers of varying chemical evolutionary pathways in protostellar gas. Gordon Research Conferences, Origins of Solar Systems, Mt. Holyoke, MA (poster contribution).

- Smith, R.L.**, Pontoppidan, K. M., Blake, G. A., Boogert, A.C.A., Lockwood, A. C. (2013) Observations of spatial dispersion in C and O isotopic heterogeneity toward protostellar cores and binaries. ALMA Workshop, Hawaii (poster contribution).
- Smith, R.L.**, Pontoppidan, K. M., Blake, G. A., Boogert, A.C.A., Lockwood, A. C. (2013) Observations of unusual CO isotopologue abundances toward protostars. Workshop on Ice and Planet Formation, Lund Observatory, Lund, Sweden (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., Morris, M. R., Herczeg, G. J., and van Dishoeck, E. F. (2011) Observations of CO isotopologues in young stellar objects and molecular clouds: implications for early solar system chemistry. Hawaii NASA Astrobiology Winter School (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2011) Observational signatures of ^{12}CO - ^{13}CO partitioning in ice and gas toward local young stellar objects and molecular clouds. Gordon Research Conferences, Origins of Solar Systems, Mt. Holyoke, MA (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2011) Signatures of ^{12}CO - ^{13}CO partitioning in ice and gas toward local young stellar objects and molecular clouds. International Astronomical Union symposium, The Molecular Universe, Toledo, Spain (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., and Morris, M. R. (2010) Observational signatures of ^{12}CO - ^{13}CO partitioning in ice and gas toward local young stellar objects and molecular clouds. Student Symposium, UCLA (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Herczeg, G. J., and Young, E. D (2009) Observations of unusually high $^{12}\text{C}/^{13}\text{C}$ fractionation in protostars using VLT-CRIRES. From Circumstellar Disks to Planetary Systems Workshop, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., Herczeg, G. J., and Young, E. D (2009) VLT-CRIRES observations of $^{12}\text{C}/^{13}\text{C}$ fractionation in protostellar envelopes, Goldschmidt conference, Davos, Switzerland (oral contribution).
- Smith, R. L.**, Pontoppidan, K. M., Young, E. D., Morris, M. R., van Dishoeck, E. F., and Herczeg, G. J. (2009) Observations of rare CO isotopologues in young stellar objects using VLT-CRIRES: evidence of self-shielding in early solar system analogues, Gordon Research Conference, Origins of Solar Systems, Mt. Holyoke, MA (poster contribution).
- Smith, R. L.**, Pontoppidan, K. M., van Dishoeck, E. F., Young, E. D., and Morris, M. R. (2007) Detection of rare CO isotopologues in protostellar disks: an infrared investigation of molecular self-shielding, Kobe International School of Planetary Sciences: The Origin and Evolution of Planetary Materials, Hyogo Japan. **Won Best Poster Award.**
- Smith, R. L.**, et al., Shell Repair in a Loggerhead Sea Turtle, American Association of Zoo Veterinarians, Omaha, NE, 1998 (oral contribution).

Travel Grants and Fellowships:

- (2015) Travel grant, American Astronomical Society, for attending the IAU General Assembly 2015. \$1500
- (2014) Travel grant for Dr. Harold Connolly to present at Astronomy Days, NC Museum of Natural Sciences \$400
- (2010) NSF travel grant, 73rd annual meeting of the Meteoritical Society, New York City, NY
- (2009) Travel grant, From Circumstellar Disks to Planetary Systems workshop, European Southern Observatory/Max-Planck-Institut für extraterrestrische Physik, Garching, Germany
- (2009) Travel grant, Geochemical Society of America, Goldschmidt Conference, Davos, Switzerland
- (2009) Travel grant, Gordon Research Conference, Origins of Solar Systems, Mt. Holyoke College, MA
- (2009) Faculty Mini-Grant, Office of Instructional Development, UCLA
- (2007) Travel grant, Kobe International School of Planetary Sciences, Hyogo, Japan
- (2007) Travel grant, University of Hawaii, The Chronology of Meteorites and the Early Solar System workshop, Kauai, Hawaii
- (2006) Inter-departmental Cross-Training Fellowship, Dept. of Earth and Space Sciences, UCLA. Mark R. Morris, Dept. of Physics & Astronomy, project co-advisor. Project title: *Photochemistry and isotope fractionation in circumstellar disks: an astronomical approach to cosmochemical phenomena in early solar nebulae.*

INVITED SCIENTIFIC PRESENTATIONS

- (2019) Arizona State University, Lunar and Planetary Laboratory Colloquium (11/19) [link to talk: <https://arizona.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=75438753-2546-4b28-aba2-ab0400f92eb0>]
- (2019) University of Hawaii, HIGP Seminar Series (11/5)
- (2018) Center for Exoplanets and Habitable Worlds seminar, Penn State (10/19)
- (2017) Contributed; student science talk on JPL experiments, ASU Physics & Astronomy colloquium (9/29)
- (2016) Wake Forest University physics colloquium (11/30)
- (2015) COSMS retreat, UNC-CH (5/7): "Elevator Pitch" on current research
- (2014) North Carolina Academy of Science, 111th Annual Meeting, NC Museum of Natural Sciences
- (2014) Science Lunch, NCMNS, for R&C staff
- (2013) Science Lunch, NCMNS, for R&C staff
- (2012) A Physics & Astronomy Colloquium (Sept.)
- (2012) North Carolina State University, Physics & Astronomy Journal Club (April)
- (2012) American Museum of Natural History, New York City. Astrophysics Colloquium (Feb.)
- (2012) University of North Carolina at Chapel Hill. Astrophysics Colloquium (Feb.)
- (2010) Carnegie Institute of Washington, Astronomy Group seminar (Jan.)
- (2010) Institute for Geophysics and Planetary Physics colloquium, UCLA
- (2009) California Institute of Technology, Journal Club seminar
- (2009) Presentation of latest CRIRES results, CRIRES team meeting, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany (Oct.)
- (2009) Star and Planet Formation Group seminar, ETH, Zurich, Switzerland
- (2008) Presentation of latest CRIRES results, SPITZER-IRS/CRIRES joint team meeting, Caltech (Nov.)
- (2008) Presentation of latest CRIRES results, CRIRES team meeting, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany (May)
- (2007) Presentation of latest CRIRES results, CRIRES team meeting, Caltech (Sept.)

FILM

2017-2018: *The Most Unknown* (documentary)

May-July 2017 (filming on location): Featured scientist in VICE/Motherboard documentary, *The Most Unknown* (Ian Cheney, Director). Costa Rica: Atlantis ship (Woods Hole Oceanographic Institute, and the ALVIN deep sea submersible; and Keck Observatory: Waimea (Keck HQ) and Mauna Kea, HI (summit and telescope).

Selected Screening Highlights:

- ★ 3/16/18: Opening film in the Science program of the Copenhagen International Film Festival, CPH-DOX; US premier at the Metrograph theater, New York City
- ★ 4/18/18: Screening guest and featured panelist with director Ian Cheney, filmmaker and film advisor, Werner Herzog, and 3 other scientists, moderated by Tabitha Jackson (Sundance). Metrograph Theater, NYC. Sponsors, VICE/The Simons Foundation.
- ★ 8/10/18: Screening guest and featured panelist at the Theater at the Ace Hotel, downtown Los Angeles, with Jad Abumrad (RadioLab), moderated by Joseph Gordon-Levitt. (<https://theatre.acehotel.com/events/vice-presents-most-unknown/>)
- ★ 10/1/18: Screening guest and panelist with featured film scientist, Prof. Jun Ye at CU Boulder.
- ★ 10/18/18: Screening guest and panelist with featured film scientist, Prof. Jenn Macalady at Penn State.
- ★ 1/10/19: Local host and panelist for screening event at the NC Museum of Natural Sciences, with film director Ian Cheney.
- ★ 3/22/19: Invited screening guest and panelist for the Environmental Film Festival in the Nations Capital, Washington, D.C.; <https://dceff.org/film/most-unknown/>

Film Websites:

Film site: <https://www.themostunknown.com>

Netflix: <https://www.netflix.com/title/80222042>

VICE: https://motherboard.vice.com/en_us/article/wj44gz/watch-the-trailer-for-the-most-unknown-motherboards-first-feature-documentary

Official trailer: <https://vimeo.com/258144049>

Selected Press:

Variety: <http://variety.com/2018/digital/news/netflix-vice-motherboard-most-unknown-documentary-theatrical-1202764193/>

The New Yorker: <https://www.newyorker.com/recommends/watch/the-most-unknown>

Los Angeles Times:

<http://www.latimes.com/entertainment/movies/la-et-mn-capsule-the-most-unknown-review-20180524-story.html>

Movie Nation: <https://rogersmovienation.com/2018/05/10/movie-review-scientists-learn-the-most-unknown-in-each-others-disciplines-in-new-documentary/>

Universe Today: <https://www.universetoday.com/140140/review-the-most-unknown/>

Science Sandbox: <https://www.simonsfoundation.org/2018/02/23/the-most-unknown-selected-to-open-major-film-festival/>

Appalachian State University: <https://today.appstate.edu/2018/06/08/the-most-unknown>

TV/RADIO/WEB

2019

(4/10) Universe Today article, David Dickenson: "SOFIA Follows Sulfur for Clues on Stellar Evolution"
<https://www.universetoday.com/140802/sofia-follows-the-sulfur-for-clues-on-stellar-evolution/>

(2/21) Streaming of "RTP 180" talk at The Frontier, "Observing Forming Stars Across the Galaxy".
<https://video.unctv.org/video/rtp-180-outer-space-dr-rachel-smith-nlt1zi/>

(2/11) Interview for WRAL article, NC Astrophysicist shares her experiences on 747's anniversary.
<https://www.wral.com/nc-astrophysicist-shares-her-experiences-on-747-s-anniversary/18181729/>

2018

(11/26) Interview on the Mars InSight landing, Spectrum TV

(11/9) *The State of Things*. "Scientists Venture into The Most Unknown". Live radio interview with Frank Stasio.
<http://www.wunc.org/post/scientists-venture-most-unknown>

(9/20) VICE Motherboard YouTube episode: <https://www.youtube.com/watch?v=eooAdNDQeWc>

(9/20) Interview w/Becky Ferreira, VICE Motherboard: https://motherboard.vice.com/en_us/article/59a3w5/what-baby-stars-and-meteorites-can-tell-us-about-our-solar-systems-past

(7/30) On-location TV interview on Chelyabinsk meteor fall for local news in Miass, Russia.

(1/17) *News & Observer* phone interview with reporter Corbie Hill for Astronomy Days article.

(1/11) *The State of Things*. "At 'Astronomy Days' Young Stars and Comets Hold Secret to Planetary Life". Live radio interview with Frank Stasio.
<http://wunc.org/post/astronomy-days-young-stars-and-comets-hold-secrets-planetary-life>

2017

(8/20) WRAL live in-studio interview on total solar eclipse (eclipse safety):
<http://www.wral.com/weather/video/16893219>

(8/14) Interview with the News & Observer for article on total solar eclipse
<http://www.newsobserver.com/news/local/education/article167065292.html>

(6/15) *The State of Things*. "There goes the Sun". Live radio interview (~ 12 minutes) with Frank Stasio.
<http://wunc.org/post/there-goes-sun>

(5/26) Phone interview with DaShawn Brown (WSOC TV in Charlotte), for 5 pm news segment on suspected "meteorite" fall, WSOC TV: <https://www.wsocv.com/news/local/familys-truck-damaged-after-mysterious-object-fell-from-the-sky/527004858/>; ABC News: <http://abc11.com/news/mystery-object-falls-from-sky-onto-nc-pastors-car/2043568/>; Fox News: <http://myfox8.com/2017/05/27/north-carolina-pastors-truck-damaged-after-mysterious-object-falls-from-the-sky/>

(4/11) *Women in Astronomy* Blog, Career Profile (invited interview, print)

(4/4) University of North Carolina interview for "A Living Exhibit" (print)
<https://www.northcarolina.edu/news/2017/04/Living-Exhibit>

(1/23) NASA/SOFIA Outreach for “Snapchat” in-flight video, Jan 23 flight. Interviewed by Cassandra Bell. Video received 1.54 million views within 24 hours, the most of any NASA “Snapchat.”

2016

(11/15) North Carolina Symphony promotional video for Holst’s *The Planets, LIVE!*

<https://www.youtube.com/watch?v=au6EdrQi2OA>

(3/9) Time Warner Cable interview, taped. Topic: Transit of Mercury (during event)

(3/7) WRAL Studio. Live. Topic: Transit of Mercury

2015

(6/6) WRAL Studio. Live. Topic: International SUNDAY.

(1/21) WNCN- NC Today. Live. Topic: meteorites and Astronomy Days.

(1/21) Sci-Works Radio. Topic: my research and related topics. Two online interview postings.

2014

(12/4) WRAL Weather segment. Live (and on WRAL Facebook page) w/Elizabeth Gardner. Topic: Orion launch.

(6/7) WRAL Studio. Live. Topic: International SUNDAY.

(1/23) WRAL Weather segment. Live w/Elizabeth Gardner. Topic: meteorites, Chelyabinsk.

(1/17) News & Observer. Recorded. Topic: My research at museum.

2013

(10/5) WRAL Studio. Live. Topic: International Observe the Moon Night.

(9/5) WRAL Weather Segment w/Mike Maze. Topic: LADEE launch.

(2/5) WRAL Weather Segment. Live. Topic: International Space Station.

(5/18) WRAL Weather Segment. Live w/Mike Maze. Topic: Astronomy Days.

POPULAR PUBLICATIONS

(2016) NC Symphony, 2016-2017 Program, *The Planets: LIVE! An Out-of-this-World Partnership*. provided images and captions, interviewed for article, and made significant contributions to article text

<http://ncsymphony.org/mediacenter/The%20Planets.pdf>.

(2016) **Smith, R. L.** Lab intern highlight: Elisabeth Panto, The Intern: State of North Carolina Internship Program. July 8 issue.

(2016) **Smith, R. L.** Stratopsheric Adventure. *Naturalist*, Spring.

(2016) **Smith, R. L.** Researcher gets a closer look at the stars. *News & Observer/Charlotte Observer*, April 16.

(2015) **Smith, R. L.** July brings close peek at Pluto. *News & Observer; Charlotte Observer*, May 31.

(2015) **Smith, R. L.** On the origin of the solar system: comet landing makes history. *Naturalist*, Winter.

(2015) **Smith, R. L.** On the origin of the solar system: shedding new light on planet formation. *Naturalist*, Winter.

(2015) **Smith, R. L.** Image of protostar suggests planets form earlier. *News & Observer; Charlotte Observer*, Jan 4.

(2014) **Smith, R. L.** Scientists search for new Earths. *News & Observer; Charlotte Observer*, Aug 3.

(2012) **Smith, R. L.** Chemical clues to solar system origins. *Naturalist*, Winter.

(2013) **Smith, R. L.** Meet the Museum Scientists (biography). *Naturesearch* Newsletter. Issue 03.

(2012) **Smith, R. L.** The Chemistry of forming solar systems, Current Research Briefs. Issue 02.

(2011) Pontoppidan, K. M., van Dishoeck, E. F., Blake, G. A., **Smith, R.**, et al. 2011. Planet-forming regions at the highest spectral and spatial resolution with VLT–CRIRES. *The Messenger*, 143, 32-36.

Blogs:

(2012-2016) **Smith, R. L.** 2012- present. Numerous astronomy-related blogs

<http://naturalsciencesresearch.wordpress.com/author/rachel1010/>

INVITED OUTREACH (EXTERNAL)

2020

- (12/21) CBS 17 News interview on Jupiter-Saturn conjunction
- (12/18) Spacepod guest interview on young stellar objects research
- (9/30) *Cosmic Conversations*, Morrison Planetarium, California Academy of Sciences: Virtual public presentation using OpenSpace. <https://www.youtube.com/watch?v=-jWFDtplUx8&t=2778s>

2019

- (11/21) Panelist for "Science in the Movies" series, *Space on the Silver Screen* (<https://www.dukechronicle.com/article/2019/11/from-a-trip-to-the-moon-to-interstellar-space-on-the-silver-screen-explores-it-all>)
- (10/11) Osher Lifelong Learning Institute (NCSU), class: *New Investigations on Forming Stars and Meteorites*.
- (8/30) Panelist for the ISS downlink with astronaut Christina Koch, NC School for Science and Mathematics
- (6/10) American Museum of Natural History, *OpenSpace* team meeting, overview presentation of latest NCMNS projects with *OpenSpace* software.
- (2/21) Invited speaker, "RTP 180" at The Frontier, "Observing Forming Stars Across the Galaxy" <https://video.unctv.org/video/rtp-180-outer-space-dr-rachel-smith-nlt1zi/>

2018

- (11/12) Guest lecture for ASU Freshman seminar, Inspired Engineers (taught by Carla Ramsdell). Topic: *Interstellar Travel*.
- (11/1) Cornelius Elementary Robotics class, human space travel
- (9/6) Asheville Astronomy Club guest speaker. Topic: *Star formation Across the Galaxy*
- (6/22) Invited panelist for careers for UNC-CH graduate students. Greensboro Science Museum, organized by Antonio Baines, UNC-Central.
- (6/19) Invited speaker for Tar Heel Mineral Club. Topic: *Interstellar Travel*.
- (5/21) Invited speaker and panelist for the NC Dept. of Natural and Cultural Resources staff development day for the "Authenticity: Engaging Your Audiences with Real Experiences" session.
- (4/13) "Lean In: Women in Stem" panelist, NC Science Festival, NC School of Science and Mathematics
- (3/3) American Museum of Natural History, *OpenSpace* team meeting, overview presentation of NCMNS projects with *OpenSpace* software.
- (2/22) Presentation on stars and planets, third grade class, JW Seabrook Elementary School (via Skype)

2017

- (12/5) Speaker, "Astronomy on Tap". Topic: *Search for Life Beyond Earth*, location: Fullsteam, Durham, NC.
- (10/4) Guest lecture for ASU Freshman seminar, Inspired Engineers (taught by Carla Ramsdell). Topic: *Interstellar Travel*.
- (8/20) Eclipse Science Panelist, Southwest Community College
- (6/20) Tar Heel Gem and Mineral Club, Raleigh. Topic: *Meteorites and the Origin of Life on Earth and Beyond*.
- (4/21) Earth Day interactive program with AMNH: *Open Space and Climate Change, The Dynamic Earth*.
- (2/8) Osher Lifelong Learning Institute (NCSU). Instructor, short course, *Space Travelers: Human endeavors to reach the stars*.

2016

- (12/1) Guest speaker, Space Explorers Club, Cardinal Gibbons High School
- (11/18-19) *The Planets Live!* Pre-concert program, NC Symphony, interview with Catherine Brand (host, NPR) for Symphony patrons, Duke Energy Performing Arts Center
- (7/11) American Museum of Natural History. *OpenSpace* team meeting, overview presentation of NCMNS projects with *OpenSpace* software.
- (5/12) Raleigh Astronomy Club. *Astronomy from the Stratosphere: Observing with EXES on SOFIA*.
- (4/25) Panelist: *The Future of Space*. Cary Academy
- (3/6) Bayport educational series lecture (Longboat Key, FL), *Exploring planetary systems & life beyond Earth*.

(1/20) Osher Lifelong Learning Institute (NCSU). Instructor, short course, *Exploring planetary systems and life beyond Earth*.

2015

(7/11) Host for inaugural Neutrino Day event. Includes guest scientists in physics and live-feeds to the Sanford Lab, South Dakota.

(5/7) COSMS retreat, UNC-CH. Discussions with scientists and educators on important questions at the cutting-edge of physics, astrophysics, and outreach.

(4/13) Celebrate Women in STEM Dinner, NCSU. Includes student mentoring.

(3/4) Cleveland High School, Clayton, NC. Topic: Ethics of space exploration and planetary protection.

(12/13) Dark Sky Observatory, ASU, Public Observing night. Guest astronomer for evening program.

2014

(8/1) High school careers in math contributor (Print. contact, Trey Ferguson).

(4/24) Siemens "Bring your child to work day." Presentation on research at museum, w/P. Treuthardt.

(4/9) STEM EXPO, ASU. Meteorites and impact cratering presentation and activity, w/Anthony Love.

(1/14) CHAOS, Chapel Hill astronomy club. Presentation of research.

2013

(6/17) REU workshop, UNC: How to present to museum audiences.

(6/14) Central NC Mineral Club presentation on research.

(2/28) STEM conference, ASU. Short presentation on Astronomy & Astrophysics Lab.

(1/16) Croasdaile Village, Topic: solar system exploration.

CREATIVE ENDEAVORS & MENTORING

As Head of the Astronomy & Astrophysics Research Laboratory & Curator of Meteorites at the North Carolina Museum of Natural Sciences, highlights:

- ★ Developing ongoing vision for visitor engagement via glass-wall interface of the lab.
- ★ Mentoring students working and volunteering in the lab Astronomy & Astrophysics Lab.
- ★ Expanding the meteorite collection.
- ★ Acquiring new equipment for research and outreach, i.e.:
 - Nikon polarizing light microscope for viewing meteorite thin sections (25 K, Museum Director's fund).
 - H-alpha solar telescope for outreach programs and student projects (5 K, from ASU).
 - Celestron night-viewing scope w/filters (1.5 K, from Museum Director's fund).
 - Two 10-inch Meade night scopes for outreach programs (donations).
 - 4 LEED-grade desk lamps for lab (Exhibits fund).
 - Sony Camera 70 mm digital camera + accessories (for meteorite archiving and lab use)
 - 10 new HD screens for two new wall tiles, new Mac Pro for running *OpenSpace* software, NASA grant.
- ★ Initiated and led new astronomy-themed special events:
 - Transit of Mercury (5/9/16) – observing and talks
 - Rosetta landing on comet (11/12/14) – presentation and live stream.
 - International Sun-Day at the museum - presentation and observing (2014-present).
 - International Observe the Moon Night at the museum – presentation and observing (10/12/13).
 - Venus Transit event – observing, presentations and live-streaming (June 2012).
- ★ Facilitating ongoing connections with ASU and Dark Sky Observatory via live observing w/Dan Caton; new proposal development to set up.
- ★ Working with exhibits team on development of new astronomy-themed and meteorite exhibits.
- ★ Label writing (Chelyabinsk meteorite display; meteorite label re-write).
- ★ Image acquisition: Chelyabinsk meteorite display case; meteorite label.
- ★ Astronomy Exhibit Cases: Glass Eagle Nebula (located artist, Alyssa Joy, and chose piece).
- ★ Astronomy Exhibit Cases: Glass Planet display (located artist, Alyssa Joy, selected pieces, assisted installation)

- ★ Regular “meet the scientist” presentations to museum public in Daily Planet Theater and Science Cafes on topics ranging from space missions, new discoveries, and personal research projects; invited presentations for community outreach.
- ★ Enabled connections with local REU groups at UNC and NC State, providing workshops on presenting science to the public.

As Associate Professor at Appalachian State University, highlights:

- ★ Creating and teaching two undergraduate courses for the Department of Astronomy & Astrophysics:
Astrobiology: Searching for Life in the Universe, Spring 2013-present; *Star Formation*, Fall 2014-present.
- ★ Reconfiguring the Astrobiology course as an Honors College Freshman Seminar, taught in Fall, 2014.
- ★ As of January, 2015, *Astrobiology: Searching for Life in the Universe* was approved by the University as a General Education course.
- ★ Established numerous grant-funded summer internships for ASU undergraduates, including at JPL.

Undergraduate Student Interns:

Present

Alex Etgen (Oberlin College, OpenSpace intern summer 2020, winter 2021, OpenSpace intern; meteorite image processing project during 6-week winter break, 2019)
Meghana Sankaren (UNC-Chapel Hill, meteorite CT scan project, summer and fall 2020, spring 2021 [virtual])
Caleb Keaveney (NCSU, OpenSpace intern, fall 2020 and winter 2021 [virtual])
Zach Shaffer (ASU, OpenSpace intern, fall 2020 [virtual])

Past

Alexis Harris (University of Virginia, summer 2020, OpenSpace intern [virtual])
Lucas Smith (ASU, 2017-2020, lab and JPL summer intern w/ collaborator M. Gudipati)
Robert Lewis (ASU 2018 (fall) graduate, 2020 OpenSpace intern at NCMNS)
Stewart Fasolak (ASU graduate 2020, JPL Summer intern w/collaborator M. Gudipati)
Robert Lewis (ASU, 2019, JPL summer intern w/collaborator M. Gudipati)
Kara Snow (ASU, 2019 Summer NC Space Grant intern)
Tierra White (NCSU, College of Design, 2018 *OpenSpace* summer intern, and 2018-2019 part-time)
Collin Sweeney (ASU, 2017-present, Keck data intern, based at ASU + summer 2018 at museum)
Kate Richardson (UNC-CH, 2018 NC Space Grant summer intern)
Colin Keiper (ASU 2018 graduate, part-time *OpenSpace* summer intern)
Nicholas Wright (ASU, 2017-2018, CRIRES data intern, based at ASU)
Daniel Mabe (ASU, 2017, NC Space Grant summer intern)
Christopher Allen (ASU, 2017, *OpenSpace* summer intern)
Michael Tucker (ASU, 2016: Astrovisualization Summer intern, AMNH grant, *OpenSpace*; 2017: Keck intern)
Elisabeth Panto (ASU, 2016, Meteorite 3D Visualization/Curation intern; 2017, lab and JPL summer intern w/ collaborator M. Gudipati)
Katherine Matchunis (ASU, 2015, research intern, stipend from ASU; 2016: NC Space Grant Astrophysics Summer intern; 2017: research for credit)
Sarah Harvey (ASU, 2015, Astrophysics intern, NC Space Grant)
Justin Garrett (NCSU, 2015 DENR-YAIO Summer intern, Meteorite Curation)
Graham Henry (ASU, course credit)
Robert Buhrman (NC State, undergraduate, 2014 ASTC and 2015 Astronomy Days volunteer; summer 2015)
Megan Kim (High school, 2015-present)
Margie Bruff (Enlo High school, as of 2014- NC School for Science and Mathematics, 2012-present)
Tara Miller (ASU, undergraduate, 2015 Astronomy Days volunteer)
Timothy Stone (ASU, undergraduate, 2015 Astronomy Days volunteer)
Lucas James (ASU, undergraduate, 2015 Astronomy Days volunteer)
Quinlin Riggs (ASU, undergraduate, 2014 ASTC volunteer)

Charles Kurgatt (ASU, MS student paid intern, 2014, NC Space Grant)
Frank Luca (ASU, MS student paid intern, 2014, DENR-YAIO/NC Space Grant)
Mithi de los Rayes (NC State, undergraduate, 2014)
Benjamin Beaumont (NC State, undergraduate, 2013-2014)
Christal Chowthin (NC State, undergraduate, 2013)
Ryan Beauchemin (UNC, undergraduate, 2013)
Sandra Blevins (visiting grad student, Catholic University/Space Telescope Science Institute, Summer 2012)
Zachary deGraffenreid (NCCU, undergraduate, pursued MS, 2012-2013)
Travis Berger (UNC, undergraduate)

Adult Volunteers in Lab:

Current

Ken McAdams

Past

Ian Hewitt

Margaret Gaines

Anna Morris

Karen Warmbein

Other service:

2020

(11-12/2020) Astronomy Days 2021, NCMNS task force for programming and invited speakers
(4/28) Invited video contribution honoring 2020 College of Arts & Sciences Seniors (App State)

2019

(11/1-12/15) Astronomy Days, NCMNS task force for programming, "Earth and Ocean Worlds" theme and speaker selection
(1/10-11) Astronomy Days, NCMNS: "From Apollo to the Future", task force and speakers (Allan Treiman, Lunar and Planetary Institute; Carter Emmart, AMNH)
1/2019 Apollo Science Café series planner/lead/host. Invited 2019 speakers: Edward Young (UCLA); Clive Neal (Notre Dame); Brett Denevi (Johns Hopkins University, Lunar and Planetary Lab).

2018

(5/15) Apollo 11 Anniversary task force, invited Gerry Griffin, Apollo Flight Director, to be our VIP speaker for the opening of the One Giant Leap exhibit on April 4, 2019, at the NC Museum of History.
(5/2) Interview on research and interstellar travel w/Michael Caldwell, Sophomore at Cardinal Gibbons High School.
(2/15) Space Grant Scholar interview on research w/Johnnie Mae Boutwell, Craven Community College
(1/27-28) Astronomy Days, NCMNS. Proposed the selected topic, "Space Telescopes and Missions"; invited guest speakers, Klaus Pontoppidan (StSci) and Murthy Gudipati (Jet Propulsion Lab)

2017

(10/2) Toria Davenport (ASU), freshman undergraduate, research scientist profile interview
(1/28-29) Astronomy Days, NCMNS. Proposed the selected topic, "Sun and Stars"; invited guest speakers David Jewitt (UCLA) and Jay Pasachoff (Williams College)

2016

(10/6) Interview for Teen Newsroom (NCMNS). Topic: Microbes in space.
(6/14) Interview with Miranda Broussard for *AppTV* (ASU student) on NASA research
(4/11) Kayla Gomez, Nash Community College, interview for Women in Science student project
(2/19) Space Grant Scholar student interview on STEM research, Olivia Paschell
(2/17) Masters thesis (Museology) interview on visible labs in museums: Justine Lopez, University of Washington
(2/4) Space Grant Scholar student interview on STEM research, Kayla Gomez

(1/30-31) Astronomy Days, NCMNS. Proposed selected topic, "Search for Life Beyond Earth." Invited and hosted guest speakers, Dr. Seth Shostak (SETI) and Dr. Klaus Pontoppidan (STScI).

INVITED/CONTRIBUTED OUTREACH (NCMNS)

2020

- (9/23) "Virtually Friday" film expert for *Plan 9*
- (8/13) Virtual Science Café: *Space Rocks! Asteroids, Comets and Their Neighboring Planets*
(https://www.youtube.com/watch?v=7-5-pKdZl2o&feature=youtu.be&fbclid=IwAR0Ve0u6oTKQRT0Us_S83kR1SD2nonNgg7s2Dv1KKVmm8JH1mHvrahivZeg)
- (8/11) Science Snippet: New observations of massive young stars using NASA's Infrared Telescope Facility
(https://ncsu.zoom.us/rec/play/uJAvf7_8_Do3H9OQ5ASDVvAtW9Trk6isgCZM_voEmRy9ACZXZgGhbrQWYrZNe-GP0VKJxfZTp5OXagec?startTime=1597168279000&x_zm_rtaid=L58YB44VQiyf6xwk5WCLGg.1598575844193.82b60c85ff3dac49a3456cc79d14caeb&x_zm_rtaid=916)
- (4/24) Virtual program: *Stars, Planets, and Moons: Highlights of the Hubble Space Telescope*
(<https://www.youtube.com/watch?v=PuOMNx6QnUI&t=1164s>)
- (4/22) Earth Day Stream-a-Thon virtual program using OpenSpace: *The Dynamic Habitable Zone*
(https://www.youtube.com/watch?v=f70tMcyOmX8&feature=youtu.be&fbclid=IwAR3QWQ_4FvZSzn_uU9grNg6di6Js7oeRsp0iz3PU-kRsSo3Lko5Nh5b_6_JM)
- (4/2) Virtual Science Café: *Earth and Beyond – The Search for Life in the Universe*
(<https://www.youtube.com/watch?v=gmNRx79-kw8>)
- (1/25) Astronomy Days.
- (1/17) Invited Q&A expert after "E.T. the Extra-Terrestrial" screening, *Finally Friday*

2019

- (12/7) Host and co-presenter: Dr. Andrew Johnston (Adler Planetarium), Science Saturday: *Changing Landforms on Earth and Mars*
- (8/7) Daily Planet talk w/OpenSpace, *From Earth to Space: The Search for Life Beyond our Planet*
- (7/20) Invited Daily Planet talk for "Women in STEM" series, *Studying the Origin of Stars and Planets*
- (7/20) Lab Open House, Apollo surface tours of the Moon w/OpenSpace, connected to Science Café
- (7/18) Lab Open House, Apollo surface tours of the Moon w/OpenSpace.
- (4/13) Sci-Tech Expo, Daily Planet talk: *Tools for studying Meteorites and Forming Stars*
- (3/13) Citizen Science conference reception, lab open house
- (2/22) *Speakeasy* Adult Night, lab open house
- (2/15) Invited guest for Q&A after the film, *Alien* (1979), "Finally Friday" NCMNS event held at Alamo Drafthouse, Raleigh
- (1/26) Astronomy Days. *Life and the Moon*. Daily Planet talk

2018

- (11/26) Mars InSight viewing party, including pre-landing presentations, Daily Planet theater
- (11/19) Annual appeal video (featured scientist), NC Museum of Natural Sciences
- (10/5) *Exoplanets and Beyond the Solar System Tour using OpenSpace*, Daily Planet theater
- (9/21) *Astrobiology Tour using OpenSpace*, Daily Planet Theater
- (8/31) Invited guest for Q&A after the film, *Total Recall* (1990), "Finally Friday" NCMNS event held at Alamo Drafthouse, Raleigh
- (6/24) International SunDay talk, *The Sun, Stars, and Exoplanets*
- (6/8) Science Chat in Daily Planet Theater (interview w/Chris Smith, slide presentation, Q&A)
- (5/4) *May the 4th* Star Wars-themed adult night; lab open for visitors with special presentations
- (4/20-21) Members' tours of astronomy lab
- (3/15) Featured scientist, "Beyond Curie" exhibition
- (1/27) Astronomy Days. *Exciting Astronomy from Earth: Using the Keck Telescope to Study Young Stars*. Daily Planet talk

2017

- (12/13) Member Holiday Party, lab open house
- (10/26) "Halloween at Hogwarts" Adult Night, lab open house
- (8/21) Total solar eclipse live stream from Southwestern Community College campus (recording, <https://livestream.com/naturalsciences/eclipse>)
- (8/10) Science Café: *Day to Night and Back Again: The Solar Eclipse of 2017*. Included poetry by local writers, composed in real time (<https://www.youtube.com/watch?v=LUHAv8ul2DY>; <https://www.youtube.com/watch?v=uacq-cUYB6A&feature=youtu.be>)
- (7/19-20) *OpenSpace* Daily Planet showcase, evaluation for NASA project (Astrobiology theme)
- (6/22) *Superhero Science*, special event, hosted lab tours and discussed research and space travel innovations
- (6/18) *Day to Night and Back Again: The Solar Eclipse of 2017*. International Sun-Day special event.
- (4/28-29) Members' tours of astronomy lab (5 groups)
- (1/28-29) Astronomy Days. *How the Sun and other stars affect planets and (potential) life*, Daily Planet talk
- (1/14) Science Olympiad presentation, *Star formation in the Milky Way Galaxy*

2016

- (12/16) Member Holiday Party, lab tour and evening observing.
- (12/14) Lab tour, Mountain Sun School group.
- (6/26) The Living Sun: How Stars Affect Potential Life on Planets (Daily Planet talk for International SunDay)
- (5/9) Transit of Mercury: "Planet One: A Brief Tour of History and Discovery on Mercury"
- (4/23) Science-Technology Festival, NCMNS. Topic: Astronomy from the Stratosphere: High-Tech Observing on SOFIA
- (1/31) Astronomy Days. *Interstellar Travel*, Daily Planet talk
- (1/30) Astronomy Days. The science of "The Martian", panelist

2015

- (12/2) BASF corp. evening event and lab tour
- (6/21) Extreme Space Weather (Daily Planet talk for International SunDay)
- (5/14) Court of Appeals, Lab tour
- (5/6) Capstone event for Museums Connect grant; lab tour for students
- (3/27) Interview for Teen TV. Topic: Space Exploration
- (4/16) NC School for Science and Mathematics, class lab tour and discussion
- (4/11) Science-Technology Festival, NCMNS. Topic: Technology of Keck telescope mirrors and data processing
- (3/2) Citizen Science Association – Lab tour and project discussion
- (3/2) DH Conley High School – Astronomy class lab tours
- (3/25) Interview with high school students for their Carl Sagan Legacy documentary
- (3/18) Introduction to Paul Bogard, author of "The End of Night", NCMNS
- (1/24-25) Astronomy Days, NCMNS. Topic: Comets and why Pluto is not a planet; introduced visiting astronaut, Andrew Feustel

2014

- (12/4) NCMNS, Orion launch special presentation
- (10/20) ASTC conference, NCMNS. Organized and led lab tours and programs, and solar observing
- (8/1) Organizer and host: NC State REU presentations in Daily Planet (contact, John Blondin)
- (6/25) Intern communications workshop, "How to give a talk", w/Brian Malow
- (6/22) Journey to the Center of the Solar System (Daily Planet talk for International SunDay)
- (5/3) Science Saturday, NCMNS. Topic: Astronomy on the Edge: Latest discoveries from our Solar System to the beginning of the Universe
- (4/17) Inaugural Astronomy member event, NCMNS, Tour of meteorite exhibit, lab, and observing program
- (4/16) Cathedral school group, 1st grade, hosted visit to lab
- (4/7) St. Mary's High School visit to NCMNS, tour of lab, discussion of research
- (1/25-26) Astronomy Days, NCMNS, presentation, tour of meteorite exhibit and lab; introduction of Russian Cosmonaut

(1/16) Science Café, NCMNS. Invited panelist, 2014 Year-in-review

2013

(12/5) Comet ISON, NCMNS, special presentation

(11/8) MAVEN launch, NCMNS, special presentation

(11/18) Harwood Montessori School visit to lab

(9/6) LADEE special presentation, NCMNS

(7/6) Organizer and host: UNC REU presentations in Daily Planet

(6/17) REU workshop, UNC: How to present to museum audiences

(4/2) Lab tour and discussion of research for Susan McCracken, Director of External Affairs, ASU

(3/27) Lab tour and discussion of research for Origin of Life course, Prof. Jonathan Lindsay, NCSU

(3/2) Science Saturday, NCMNS. Topic: Search for life in the Universe

(2/28) STEM conference, ASU. Short presentation on Astronomy & Astrophysics Lab

(2/5) ISS downlink w/astronaut John Marshburn. Provided introduction prior to downlink, NCMNS

(1/27) Tour of lab and brief discussion of research with Dr. Jim Green, NASA HQ

(1/27) Astronomy Days presentation, NCMNS, Searching for life beyond Earth

2012

(12/12) Science Café, NCMNS. Searching for life in the Universe

(11/12) Teen Science Café, NCMNS

(9/13) Citizen Science Board, brief overview of research

(5/1) Hosted Astronaut Bill McArthur visit to lab; introduced presentation in theater

2011

(5/19-20) Astronomy Days presentation, NCMNS

MUSEUM AND OUTREACH CONFERENCES

Trakinski, V., Emmart, C., **Smith, R. L.**, Subbarao, M. (2019) How to Present a Universe of Data Through OpenSpace. Association of Science Technology Conference, Toronto, Canada (oral contribution/workshop)

Smith, R. L. (Presenter and Session Leader), Horvath, J., Trautwein, M., Kwiek, N., Huffman, K. (2013). Integrating scientists and their research into the science museum matrix. Association of Science Technology Conference, Albuquerque, NM (oral contribution)

Smith, R. L. (2012). The astronomy & space observation research laboratory: A new platform for communicating science to museum audiences. Astronomical Society of the Pacific, Tucson, AZ (poster contribution)

Participant:

(2017) Scientists Center for Animal Welfare (SCAW), Meeting the Challenges of IACUC Oversight in Fish and Wildlife Research, San Diego, CA

(2017) Association of Science-Technology Conference, presented overview of progress at *OpenSpace* team meeting (w/American Museum of Natural History), San Diego, CA

(2014-2016) Association of Science-Technology Conference. Raleigh, NC; Columbus OH; Tampa, Florida, CA

(2015) Supernova Fifty-One Erg Conference, NC State (invited participant)

(2012) Origins of Planetary Systems workshop, Weizmann Institute, Rehovot, Israel

(2010) Extrasolar Planets and Habitability Summer School, UIMP, Santander, Spain

INVITED EXTERNAL OUTREACH PARTNERSHIPS

(2016) w/Roy Campbell, Chief of Exhibits and Digital Media at the NCMNS, partnership with the NC Symphony on providing imagery and video (created with our new *OpenSpace* project software) for the live performance of Holst's, *The Planets* (performances on 11/18 and 11/19)

(2015 – present) Institute for Cosmology, Subatomic Matter & Symmetries, with UNC at Chapel Hill, NC State University, Duke University, and Oak Ridge National Laboratory

MUSEUM COMMITTEES

- (2019-present) Research & Collections Policy Review Task Force
- (2017-2018) Institutional Animal Care and Use Committee (IACUC)
- (2016-2019) 50th Anniversary Apollo 11 Moon Landing Commemoration Steering Committee (with historians from the NC Department of Cultural Resources)
- (2017-2018) Wayfinding Task Force
- (2014-2018) Museum-University Partnership Council
- (2016) Impact Planning Workshop (museum evaluation project with Randi Korn & Associates)
- (2013-2016) Meteorite Exhibit renovation team
- (2015) Hiring committee for Science Historian joint appointment with NCSU
- (2014) Core Values Task Force
- (2012) Hiring committee for Astrophysics Lab Assistant Director

UNIVERSITY COMMITTEES

- (2020-present) Undergraduate Curriculum Committee
- (2016) Morgan Lecture Speaker Series (speaker for 2017, Mike Brown, Caltech)

PROFESSIONAL SERVICE

- (2019-2022) Secretary (elected), Laboratory Astrophysics Division (LAD), American Astronomical Society
- (2021) Session Chair, LAD *New Explorations of the Moon* oral session, AAS virtual winter meeting
- (2020) Session Chair, LAD *Cosmochemistry and Dust* oral session, AAS virtual summer meeting
- (2020) Session Co-chair for *Protoplanetary Disk Evolution* oral session, 51st Lunar and Planetary Science Conference, The Woodlands, TX (*canceled due to COVID-19*)
- (2020) Session moderator, NC Space Grant "Space" Symposium, Earth Analogues
- (2019-2020) NC Space Grant SPACE Symposium organizing committee (invited)
- (2019-2020) NC Space Grant proposal reviewer
- (2019) Invited participant, American Astronomical Society Leadership Meeting (Oct 17-18), Washington, DC
- (2019) Session Co-chair for *Dynamical Evolution and Processes in the Solar Nebula* oral session, 82nd Annual Meeting of the Meteoritical Society, Sapporo, Japan
- (2019) Invited member of the Prebiotic Chemistry and Early Earth Environments (PCE3) steering committee (<http://prebioticchem.net>)
- (2019) NC Space Grant Central Regional Focus Group
- (2018) Judge of student papers for the Gordon A. McKay Award, 81st Annual Conference of the Meteoritical Society, Moscow, Russia
- (2018, 2017, 2012-2015) NASA review panel and chair service (federal grant programs, confidential)
- (2017) Session Co-chair for *Volatiles, Carbon and Organics – The Universal Cycle* oral session, 80th Annual Meeting of the Meteoritical Society
- (2016) Referee, *ACS Omega*
- (2016) NC Space Grant proposal reviewer
- (2016) Consultant on Earth's cycles and habitability for *Earth Moves* exhibit planning, Museum of Life & Science.
- (2015) Moderator, State of NC Undergraduate Research and Creativity Symposium, High Point University
- (2015) Judge of student papers for the Gordon A. McKay Award, 78th Annual Conference of the Meteoritical Society, UC Berkeley, Berkeley, CA
- (2013) Judge of student papers for the Dwornik Award, Lunar and Planetary Science Conference
- (2010) Session Co-chair for *Solar Systems Before and During Planet Formation* oral session, 73rd Annual Meeting of the Meteoritical Society, New York City, NY
- (2009) Session Co-chair for *Early Nebula Processes and Models* oral session, 40th Lunar and Planetary Science Conference, The Woodlands, TX

PROFESSIONAL MEMBERSHIPS

Meteoritical Society

American Astronomical Society and Laboratory Astrophysics Division (LAD)