

DR. CINDY L. YOUNG
NASA Langley Research Center, Hampton, VA

Dr. Cindy L. Young was born in rural Appalachia. At age 16, she became the first in her parents' direct lineage to attend college classes, earning an Associate of Science degree at Young Harris College while completing her high school diploma. Dr. Young credits the family generations before her and many amazing teachers for opening doors to opportunities that would have otherwise been unlikely. Dr. Young is planetary science lead in LaRC's Science Directorate and works on both Earth and Planetary Science research and instrument/mission concepts. Overall, she has participated in conceiving, maturing, and/or proposing 9 concepts (6 for Planetary Science and 3 for Earth Science). She is Principal Investigator of *Trutinor* (a small satellite concept for measuring Earth's radiation budget), lead scientist for ARCSTONE (technology demonstration for high-accuracy lunar disk measurements), Deputy PI of CHARISMA (a space telescope concept for planetary science), Co-Investigator on NICEcube (nitric oxide cooling emissions cubesat), and has received a new investigator award in Earth Science for extending the spectral range of the RObotic Lunar Observatory (ROLO) model to climate science-relevant wavelengths. Before LaRC, she worked as a postdoc analyzing surface spectra from Cassini and developing analogs for airless bodies in the Ocean Worlds Lab at JPL. She also served as Atmospheric Science Lead for the OCEANUS Uranus orbiter and probe concept study as part of JPL's Planetary Science Summer Seminar (PSSS). Dr. Young holds both a PhD (in atmospheric science and volcanology) and a master's degree (in chemical oceanography) from the Georgia Institute of Technology.

Education

- Ph.D., Radiative Transfer, Remote Sensing, Aerosols & Volcanology, GA Tech, Atlanta, 2014
- M.S., Geochemistry, Georgia Institute of Technology, Atlanta, GA, 2009

Professional Employment History

2017 – Present, Physical Scientist, NASA Langley Research Center, Hampton, VA

2014 – 2016, Postdoctoral Researcher, GA Tech & Emory University

Professional Service

- Session Chair at American Geophysical Union (AGU) Fall meeting
- Japan Geophysical Union (JpGU) member
- Outer Planets Assessment Group (OPAG) member
- NASA ROSES Proposal reviewer
- Journal article reviewer for *Icarus*

Awards

- NASA ROSES New Investigator (Early Career) Proposal (NIP) in Earth Science: “Extending the spectral range of the RObotic Lunar Observatory (ROLO) model to climate science-relevant wavelengths.”
- LaRC Internal Research & Development (IRAD):
 - *Trutinor*: FY2020, 2021, 2022
 - *Shadow-Chaser*: FY2022
 - Machine Learning (for planetary science datasets): FY2020

Planetary Science Decadal Survey Participation

Young, C.L., M.H. Wong, K.M. Sayanagi, S. Curry, K.L. Jessup, T. Becker, A. Hendrix, N. Chanover, S. Milam, B.J. Holler, G. Holsclaw, J. Peralta, J. Clarke, J. Spencer, M.S.P. Kelley, J. Luhmann, D. MacDonnell, R.J. Vervack Jr., K. Rutherford, L. Fletcher, I. de Pater, F. Vilas, L. Feaga, A. Simon, O. Siegmund, J. Bell, G. Delory, J. Pitman, T. Greathouse, E. Wishnow, N. Schneider, R. Lillis, J. Colwell, L. Bowman, R.M.C. Lopes, M. McGrath, (2020), The science enabled by a dedicated solar system space telescope, Planetary Science Decadal Survey Whitepaper. [\[2008.08069\] The science enabled by a dedicated solar system space telescope \(arxiv.org\)](#)

K.M. Sayanagi, **C.L. Young**, L. Bowman, M.H. Wong, J. Pitman, B. Naasz, and team (same as previous reference), (2020), Architectures and Technologies for a Space Telescope for Solar System Science, Planetary Science Decadal Survey Whitepaper. [\[2008.06816\] Architectures and Technologies for a Space Telescope for Solar System Science \(arxiv.org\)](#)

Young, C.L., and Sayanagi, K.M., Space Telescope for Solar System Science, *An Invited Presentation to the Small Bodies Decadal Panel*, November 18, 2020. [PowerPoint Presentation \(nasa.gov\)](#)

Selected Publications:

Saunders, W.R., Person, M.J., Withers, P., Sayanagi, K.M., **Young, C.L.**, Randall, C., and Valle, T., Assessment of the Feasibility of Space-Based Stellar Occultation Observations of Uranus and Neptune, in Review at Planetary and Space Science as of January 2022.

Abigail Rymer and **Team**; Neptune-Odyssey: A Flagship Concept for the Exploration of the Neptune-Triton System (2021), Planetary Science Journal. [Neptune Odyssey: A Flagship Concept for the Exploration of the Neptune–Triton System - IOPscience](#)

Young, C.L., C. Lukashin, P. Taylor, R. Swanson, W.S. Kirk, M. Cooney, W.H. Swartz, A. Goldberg, T. Stone, T. Jackson, D. Doelling, J.A. Shaw, C. Buleri (2020), Trutinor: A conceptual Study for the Next-Generation Earth's Radiant Energy Instrument, Remote Sensing. [Remote Sensing | Free Full-Text | Trutinor: A Conceptual Study for a Next-Generation Earth Radiant Energy Instrument \(mdpi.com\)](#)

Young, C.L., Poston, M.J., Wray, J.J, Hand, K.P., Carlson, R.W. (2019), The mid-IR spectral effects of darkening agents and porosity on the silicate surface features of airless bodies, Icarus. [The mid-IR spectral effects of darkening agents and porosity on the silicate surface features of airless bodies - ScienceDirect](#)

Elder, C.M., Bramson, A.M., Blum, L.W., Chilton, H.T., Chopra, A., Chu, C., Das, A., Davis, A., Delgado, A., Fulton, J., Jozwiak, L., Khayat, A., Landis, M.E., Molaro, J.L., Slipski, M., Valencia, S., Watkins, J., **Young, C.L.**, Budney, C.J., Mitchell, K.L. (2018), OCEANUS: A high science return Uranus orbiter with a low-cost instrument suite, Acta Astronautica. [OCEANUS: A high science return Uranus orbiter with a low-cost instrument suite - ScienceDirect](#)

Mlynczak, M.G., Knipp, D.J., Hunt, L.A., Gaebler, J., Matsuo, T., Kilcommons, L.M., **Young, C.L.** (2018), Space-Based Sentinels for Measurement of Infrared Cooling in the Thermosphere for Space Weather Nowcasting. Space weather. [Space-Based Sentinels for Measurement of Infrared Cooling in the Thermosphere for Space Weather Nowcasting and Forecasting \(nasa.gov\)](#)

- Saikawa, E., Trail, M., Zhong, Wu, Q., **Young, C.L.**, Janssens-Maenhout, G., Klimont, Z., Wagner, F., Kurokawa, J., Nagpure, A., Bhola, G. (2017), Uncertainties in emissions estimates of greenhouse gases and air pollutants in India and their impacts on regional air quality, Environmental Research Letters. [Uncertainties in emissions estimates of greenhouse gases and air pollutants in India and their impacts on regional air quality - IOPscience](#)
- Young, C.L.** and Telling, J.W. (2016), The radiative impacts of volcanic aerosol in the Arctic, in Updates in Volcanology from volcano modelling to volcano geology, Ed. K. Nemeth. [Updates in Volcanology: From Volcano Modelling to Volcano Geology - Google Books](#)
- Young, C.L.**, Wray, J.J., Clark, R.N., Spencer, J.R., Jennings, D.E., Hand, K.P., Poston, M.J. and Carlson, R.W. (2015), Silicates on Iapetus from Cassini's Composite Infrared Spectrometer. The Astrophysical Journal Letters, 811(2), p.L27. [SILICATES ON IAPETUS FROM CASSINI'S COMPOSITE INFRARED SPECTROMETER - IOPscience](#)
- Young, C.L.**, Sokolik, I.N., Flanner, M., and Dufek, J. (2014), Surface radiative impacts of ash deposits from the 2009 eruption of Redoubt Volcano, JGR- Atmospheres. [Surface radiative impacts of ash deposits from the 2009 eruption of Redoubt volcano - Young - 2014 - Journal of Geophysical Research: Atmospheres - Wiley Online Library](#)
- Young, C.L.**, J. Dufek, and Sokolik, I.N. (2014), Assessment of depositional ash loading from the 2009 eruption of Mt. Redoubt, J. of Volcanology and Geothermal Research, 274, 122-138. [Assessment of depositional ash loadings from the 2009 eruption of Mt. Redoubt - ScienceDirect](#)
- Young, C.L.**, Sokolik, I.N., and Dufek, J. (2012), Regional radiative impact of volcanic aerosol from the 2009 eruption of Mt. Redoubt, Atmospheric Chemistry and Physics. [ACP - Regional radiative impact of volcanic aerosol from the 2009 eruption of Mt. Redoubt \(copernicus.org\)](#)
- Young, C.L.**, and Ingall, E.D. (2010), Marine Dissolved Organic Phosphorus Composition: Insights from Samples Recovered Using Combined Electrodialysis/Reverse Osmosis, Aquatic Geochemistry. [Marine Dissolved Organic Phosphorus Composition: Insights from Samples Recovered Using Combined Electrodialysis/Reverse Osmosis | SpringerLink](#)

Selected Presentations:

- Young, C.L.**, and Sayanagi, K.M., CHARISMA: A Concept for in-Space Assembled Telescope Dedicated to Solar System Science. Future In-Space Operations (FISO) *invited talk* September 8, 2021. [FISO Presentation 9 8 2021 1050.pptx \(nasa.gov\)](#)
- Young, C.L.**, Trutinor: A next-generation Earth radiant energy instrument, Hampton University *invited talk* March 24, 2021.
- Hayes, T., Nixon, C.A., **Young, C.L.**, Grant, M.S., Li, S., Glotch, T.D., An Investigation of Space Weathering on the Moon with Mineralogy and Hydroxyl, LPSC 2021.
- Young, C.L.**, Grant, M.S., Nixon, C.A., Scipioni, F., Nordheim, T.A., Electron bombardment on Dione: surface compositional effects and temperature anomalies. AAS DPS October 2020.
- Young, C.L.**, C. Lukashin, T.C. Stone, G. Kopp, T. Jackson, R. Swanson, et al., ARCSTONE: Calibration of Lunar Spectral Reflectance from Space. Virtual Calcon 2020.
- Young, C.L.**, Sayanagi, K.M., Wong, M., et al., CHARISMA: A space telescope for solar system science. Japan Geophysical Union virtual July 2020 meeting.
- Sayanagi, K.M., **Young, C.L.**, et al., Extending SIMPLEx-Class Mission Opportunities to the Outer Solar System. OPAG February 2020, Houston, TX.
- Grant, M.S., **Young, C.L.**, Rogers, D., A Machine Learning Approach to the MGS TES dataset. AGU 2019.

- Young, C.L.**, Way, M., Izenburg, N. Comparative Planetology and Biosignatures from the Solar System to the Exoplanets, *Session chaired* at the AGU Fall Meeting 2018, Washington DC.
- Young, C.L.**, Poston, M.J., Wray, J.J., Hand, K.P., Carlson, R.W. The mid-IR spectral effects of darkening agents and porosity on the silicate surface features of airless bodies, AOGS, June 2018, Honolulu, HI.
- Williams, Y.Z., Mohan Shankar, Loren Woody, Richard Hertel, Joe Predina, Hyung R. Lee, Georgi T. Georgiev, **Cindy L. Young**, Christopher R. Randall, Kory J. Priestley (2018) Radiometric Calibration Discrepancy and Root Cause Analysis for Radiation Budget Instrument (RBI), SPIE.
- Young, C.L.**, Poston, M.J., Wray, J.J., Hand, K.P., Carlson, R.W. The “hole” story: Porosity and the detectability of silicates in the mid-IR, Feb. 2018 OPAG Science Nugget, Hampton, VA
- Young, C.L.**, Poston, M.J., Wray, J.J., Hand, K.P., Carlson, R.W. Constraining airless body surface composition with mid-IR spectroscopy, Hampton University Atmospheric and Planetary Sciences Seminar *Invited Talk*, February 2018.
- Wray, J.J, **Young, C.L. (presenter)**, Poston, M.J., Hand, K.P., Carlson, R.W. The mid-IR spectral effects of darkening agents and porosity on the silicate surface features of airless bodies, AGU Fall Meeting 2017, New Orleans, LA.
- Young, C.L.**, C. Lukashin, T. Jackson, M. Cooney, N. Ryan, J. Beverly, W. Davis, T. Nguyen, G. Rutherford, R. Swanson, M. Kehoe, G. Kopp, P. Smith, J. Woodward, J. Carvo, T. Stone, ARCSTONE: Accurate Calibration of Lunar Spectral Reflectance from space, AGU Fall Meeting 2017, New Orleans, LA.
- Young, C.L.**, Wray, J.J., Hand, K.P., Poston, M.J., Carlson, R.W., Clark, R.N., Spencer, J.R., and Jennings, D.E. Mid-infrared spectroscopy to better characterize icy moon surface compositions, 48th Division for Planetary Sciences Annual Meeting, Pasadena, CA, 16 – 21 Oct., 2016.
- Young, C.L.**, Wray, J.J., Hand, K.P., Poston, M.J., Carlson, R.W., Clark, R.N., Spencer, J.R., and Jennings, D.E. Discovering new compounds on icy moon surfaces with mid-infrared spectroscopy. EOS Trans. AGU, Fall Meet. Suppl. 2015.
- Young, C.L.**, Wray, J.J., Hand, K.P., Poston, M.J., Carlson, R.W., Clark, R.N., Spencer, J.R., and Jennings, D.E. Identifying new surface constituents of icy moons using mid-infrared spectroscopy, 47th Division for Planetary Sciences Annual Meeting, Washington, DC, 8 – 13 Nov., 2015.
- Young, C.L.**, Wray, J.J., Clark, R.N., Hand, K.P., and Spencer, J.R. Icy satellite surface compositions from thermal infrared spectroscopy, Workshop on habitability of icy worlds, Pasadena, CA, 5 – 7 Feb., 2014.
- Young, C.L.**, Wray, J.J., Spencer, J.R., Clark, R.N., and Hand, K.P. Cassini CIRS characterization of icy moon surface composition, 45th Division for Planetary Sciences Annual Meeting, Denver, CO, 6 – 11 Oct., 2013.
- Young, C.L.**, Sokolik, I.N., and Dufek, J. A satellite and ash transport model aided approach to assess the radiative impacts of volcanic aerosol in the Arctic. Chapman Conference on Volcanism and the Atmosphere, American Geophysical Union, Selfoss, Iceland, 11 June – 15 June, 2012.
- Young, C.L.**, Sokolik, I.N., and Dufek, J. Assessing the direct aerosol radiative forcing in the Arctic region produced by the recent eruption of Redoubt Volcano. 13th Conference on Atmospheric Radiation, American Meteorological Society, Portland, OR, 28 Jun. 2 Jul., 2010.
- Young, C.L.**, Sokolik, I.N., and Dufek, J. A satellite multisensory view of the Mount Redoubt eruption to aid in assessments of volcanic aerosol radiative forcing. 2nd Symposium on Aerosol-cloud climate interactions, 90th American Meteorological Society Annual Meeting, Atlanta, GA, 1721 Jan., 2010.
- Young, C.L.**, Sokolik, I.N., and Dufek, J. A satellite multisensory approach to investigate radiative forcing of aerosol from the eruption of Redoubt Volcano. EOS Trans. AGU, 90(52), Fall Meet. Suppl. 2009.