

# Nicholas A Lombardo

PhD Candidate

Department of Earth and Planetary Sciences

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## Education

Ph.D.	Earth and Planetary Sciences	Yale University	2025
M.Phil.	Earth and Planetary Sciences	Yale University	2021
B.S.	Physics & Mathematics	Central Connecticut State University	2017
	Minor: Earth Science		

## Professional Experience

Lecturer	Central CT State Univ. Dept. of Physics	2023-present
Graduate Research Fellow	Yale University Dept. of Earth and Planetary Sciences	2019-present
Faculty Research Assistant	UMBC at NASA Goddard Space Flight Center	2017-2019
Tutor	Central CT State Univ. TRiO Office	2013-2016

## Additional Affiliations

Collaborator	JWST Titan GTO Team	2022 – present
Student Associate	<i>Dragonfly</i>	2019 – present
Collaborator	NAI Habitability of Hydrocarbon Worlds Group	2018 – present
Research Assistant	<i>Cassini</i> CIRS Instrument Team	2016 – 2019

## Peer Reviewed Publications

1. **Lombardo, N. A.** & Lora, J. M. “Interaction of Trace Species with Titan’s General Circulation”, *in prep*
2. Light, S., Gurwell, M., Thelen, A., **Lombardo, N. A.**, Nixon, C. A., “Measurements of Titan’s Stratospheric Winds During Equinox with the eSMA”, *under review in PSJ*
3. **Lombardo, N. A.** & Lora, J. M., “The Heat and Momentum Budgets of Titan’s Middle Atmosphere”, *Journal of Geophysical Research: Planets*, **128**, e2023JE00806 (2023)
4. Lewis, N. T., **Lombardo, N. A.**, Read, P. T., Lora, J. M., “Equatorial Waves and Superrotation in the Stratosphere of a Titan General Circulation Model”, *The Planetary Science Journal*, **4**, 149 (2023)
5. Coy, B. P., Nixon, C. A., Rowe-Gurney, N., Achterberg, R. K., **Lombardo, N. A.**, Fletcher, L. N., Irwin, P. G. J. “Spitzer IRS Observations of Titan as a Precursor to JWST MIRI Observations”, *The Planetary Science Journal*, **4**, 114 (2023)
6. **Lombardo, N. A.** & Lora, J. M., “Influence of Observed Seasonally Varying Composition on Titan’s Stratospheric Circulation”, *Icarus*, **390**, 115291 (2023)
7. Steffans, B.L., Nixon, C.A, Sung, K., Irwin, P.G.J., **Lombardo, N.A.**, Pereira, E. “New Constraints on Titan’s Stratospheric n-Butane Abundance,” *The Planetary Science Journal*, **3**, 59 (2022)
8. Hewett, D., Bernath, P. F., Wong, A., Billingham, B. E., Zhao, J., **Lombardo, N. A.**, Nixon, C. A., Jennings, D. E. “N<sub>2</sub> and H<sub>2</sub> Broadened Isobutane Infrared Absorption Cross Sections and Butane Upper Limits on Titan,” *Icarus*, **344**, 113460 (2020)
9. Nixon, C. A., Ansty, T. M., **Lombardo, N. A.**, Bjoraker, G. L., Achterberg, R. K., Annex, A. M., Rice, M., Romani, P. N., Jennings, D. E., Coustenis, A., Bézard, B., Vinatier, S., Lellouch, E., Teanby, N. A., Cottini, V., Flasar, F. M. “*Cassini* Composite Infrared Spectrometer Observations of Titan 2004-2017,” *The Astrophysical Journal Supplement Series*, **244**, 14 (2019)

10. **\*Lombardo, N A.**, Nixon, C. A., Greathouse, T. K., Bézard, B., Jolly, A., Vinatier, S., Teanby, N. A., Richter, M. J., Irwin, P. J. G., Coustenis, A., Flasar, F. M. “Detection of Propadiene on Titan,” *The Astrophysical Journal Letters*, **881**, L33 (2019) - *\*featured on Sci-News and NASA Astrobiology Institute homepage*
11. **Lombardo, N. A.**, Nixon, C. A., Sylvestre, M., Jennings, D. E., Teanby, N., Irwin, P. G. J., and Flasar, F. M. “Ethane in Titan’s Stratosphere from *Cassini* CIRS Far- and Mid-Infrared Spectra,” *The Astronomical Journal*, **157**, 160-170 (2019)
12. **Lombardo, N. A.**, Nixon, C. A., Achterberg, R. K., Sung, K., Jolly, A., Irwin, P. G. J., and Flasar, F. M. “Spatial and Seasonal Variations in C<sub>3</sub>H<sub>x</sub> Hydrocarbon Abundance in Titan’s Stratosphere with *Cassini* CIRS Observations,” *Icarus*, **317**, 454 – 469 (2019)

## Observing Experience

2023	Collab.	12 hr	Hale Telescope, Palomar Observatory	<i>P13-5255: Characterizing Titan’s stratospheric wind profile via adaptive optics imaging of a stellar occultation</i>
2022	PI	3 hr	Faulkes Telescope North, Las Cumbres Observatory	<i>DDT2022A-009: Constraining Titan's Stratospheric Winds near Equinox via a Stellar Occultation</i>
2022	Co-I	12 hr	NASA Infrared Telescope Facility	<i>2022B020: Investigating Nitrile Chemistry on Titan</i>
2018	Guest	1 wk	NASA Infrared Telescope Facility	<i>Student Assistant Instrument Operator</i>

## Professional Service

2021 – present	Atm./Ocean/Climate student representative on Yale EPS Colloquium Committee
2019 – ongoing	Peer reviewer for <i>The Astronomical Journal</i> , <i>The Astrophysical Journal</i> , <i>Yale Undergraduate Research Journal</i>
2018 – ongoing	Panelist (1x), secretary (1x), and external reviewer (2x) NASA ROSES review panels
2017	Poster Session Lead for the Titan Through Time IV Workshop
2014 – 2016	President of the Central CT State Univ. Society of Physics Students

## Invited Colloquia and Seminars

2023	Department of Mathematics Colloquium,	Central CT State Univ.
2022	Department of Geological Sciences Seminar,	Central CT State Univ.
2021	Department of Physics and Engineering Physics Seminar,	Central CT State Univ.
2019	Space Physics Research Group Seminar,	University of Leicester
2018	Center for Research in Exploration in Space Science and Tech. Seminar,	NASA GSFC
2018	Department of Geological Sciences Seminar,	Central CT State Univ.

## University Teaching Experience

### *Instructor of Record*

Spring 2024	17 students	Central CT State Univ. Phys 126 University Physics II Lab
Spring 2023	17 students	Central CT State Univ. Phys 122 General Physics II Lab

### *Graduate Teaching Fellow*

Fall 2023	120 students	Yale EPS 274 Fossil Fuels and World Energy
Fall 2019	27 students	Yale G&G 140 Introduction to Atmospheric, Ocean, and Climate Change

## Conference and Workshop Talks

- 1 - **Lombardo, N. A.**, et al., “Measurement of Hydrogen Isocyanide in Titan’s Lower Stratosphere”, American Geophysical Union (2023)
- 2 - **Lombardo, N. A.** & Lora, J.M. “Simulating the Production of Stratospheric Ice Clouds over Titan’s Winter Pole with the Titan Atmospheric Model”, Titan Northeast Workshop (2023)
- 3 - **Lombardo, N. A.** & Lora, J.M. “Simulating the Production of Stratospheric Ice Clouds over Titan’s Winter Pole with the Titan Atmospheric Model”, 54<sup>th</sup> Division of Planetary Sciences Meeting (2023)
- 4 - **Lombardo, N. A.** & Lora, J. M. “Titan’s Stratospheric Heat and Momentum Budgets”, Titan Through Time VI (2023)
- 5 - **Lombardo, N. A.** & Lora, J.M. “Interaction of Chemical Tracers with Titan’s General Circulation”, American Geophysical Union (2022)
- 6 - **Lombardo, N. A.** & Lora, J. M., “The Energy and Momentum Budgets of Titan’s Stratospheric Polar Vortex”, 53<sup>rd</sup> Division of Planetary Sciences Meeting (2022)
- 7 - Bézard, B., et al., including **Lombardo, N. A.**, “The D/H ratio in Titan's acetylene from high spectral resolution IRTF/Texas observations”, European Planetary Science Congress Meeting (2022)
- 8 - **Lombardo, N. A.** & Lora, J. M., “The Energy and Momentum Balance of Titan’s Stratospheric Polar Vortex as Simulated in a General Circulation Model”, Europlanet Science Congress Meeting (2022)
- 9 - **Lombardo, N. A.**, et al., “Detection of Allene on Titan,” Europlanet Science Congress – Division of Planetary Sciences Joint Meeting (2019)
- 10 - **Lombardo, N. A.**, et al., “Detection of Allene on Titan,” Hydrocarbon Worlds NAI Workshop (2019)
- 11 - **Lombardo, N. A.**, et al., “Using Far-Infrared Observations to Probe Ethane Abundance in Titan's Lower Stratosphere,” 50<sup>th</sup> Division of Planetary Sciences Meeting (2018)
- 12 - **Lombardo, N. A.**, et al. “C<sub>3</sub>H<sub>X</sub> Hydrocarbon Abundance in Titan's Atmosphere from *Cassini* Infrared Spectra,” 49<sup>th</sup> Lunar and Planetary Science Conference (2018)
- 13 - **Lombardo, N. A.**, et al. “Abundance Profiles for C<sub>3</sub> Hydrocarbons in Titan's Atmosphere,” 49<sup>th</sup> Division of Planetary Sciences Meeting (2017)
- 14 - **Lombardo, N. A.**, et al., “Controllably Inducing and Modeling Optical Response from Graphene Oxide,” APS March Meeting (2016)

## Select Conference and Workshop Posters

- 1 - **Lombardo, N. A.**, et al., “Measurement of Hydrogen Isocyanide (HNC) in Titan’s Lower Stratosphere”, Titan Through Time VI (2023)
- 2 - **Lombardo, N. A.**, et al., “Variability and Trends in Beaufort Gyre Near-Inertial Wave Activity inferred from Bottom Pressure Measurements, 2003—2021”, Ocean Sciences Meeting (2022)
- 3 - **Lombardo, N.A.** & Lora, J.M., “Dynamical Simulations of Titan’s Stratosphere using Observationally Derived Molecular Abundance and Aerosol Opacity,” Titan Through Time V (2021)
- 4 - Steffens, B.S., et al. including **Lombardo, N.A.**, “The Search for n-Butane in Titan's Atmosphere Using IRTF/TEXES Data,” Lunar and Planetary Science Conference (2021)
- 5 - **Lombardo, N. A.**, et al., “Detection of Allene in Titan’s Atmosphere,” Astrobiology Science Conference (2019)
- 6 - Hewett, D., et al., including **Lombardo, N. A.**, “Absorption Cross Sections of Isobutane and its Potential Presence in Titan's Atmosphere,” 74<sup>th</sup> International Symposium on Molecular Spectroscopy (2019)
- 7 - **Lombardo, N. A.**, et al., “The Search for Allene in Titan's Stratosphere using Mid-IR Spectra from the TEXES Instrument on IRTF,” American Geophysical Union, Fall Meeting (2018)

- 8 - **Lombardo, N. A.**, et al., "Comparison of Modeled Alkane Abundances in Titan's Atmosphere using Different Spectral Windows with *Cassini* CIRS spectra," Cassini Science Symposium (2018)
- 9 - **Lombardo, N. A.**, et al., "C3 Hydrocarbon Abundance in Titan's Atmosphere with *Cassini* Infrared Spectra," American Astronomical Society, AAS Meeting #231 (2018)
- 10 - **Lombardo, N. A.**, et al., "A Sensitive Search for Allene in Titan's Atmosphere," Titan Through Time IV (2017)
- 11 - **Lombardo, N. A.**, et al., "Synthesis and Characterization of  $\text{CoFe}_{2-x}\text{Ni}_x\text{O}_4$  Magnetic Nanoparticles," APS NES Spring (2016)
- 12 - **Lombardo, N. A.**, et al., "Origin of Photoluminescence in Graphene Oxide," APS NES Fall (2015)

### Invited Public Panels

2014                      22<sup>nd</sup> Annual Science and Technology Brain Trust, US News STEM Solutions Conference

### Honors and Awards (bold indicates financial awards)

**2022    EPSC Student Travel Grant**  
**2021    Titan Through Time V Student Travel Grant**  
**2019    Yale Geology and Geophysics Bateman Fellowship**  
**2019    DPS Hartmann Student Travel Grant**  
 2018    NASA Group Achievement Award – Cassini CIRS Investigation Team  
 2017    CCSU Physics and Engineering Physics Departmental Honors  
 2016    CCSU John Bulman Award for Service to the Department of Physics and Engineering Physics  
**2016    CCSU Faculty Student Research Grant**  
**2016    CCSU Alumni Travel Grant**  
**2013    CCSU-NSF Computer Science, Math, and Physics Scholarship (4 years)**

### Selected Outreach

**Judge** at the Westchester Junior Science and Humanities Symposium (2024)

**Invited Public Speaker** to discuss the cultural importance of astronomy and lead star gazing activities at the Trailside Nature Museum in Ward Pound Ridge Reservation, Westchester, NY (2022, 2023)

**Overnight Near-to-Peer Mentor** to group of 5 high school students at the GSFC *Boys Night In* (2019)

**Volunteer and Exhibitor** representing the Cassini CIRS instrument team and Lunar Reconnaissance Orbiter (LRO); *International Observe the Moon Night* at GSFC (2018-2019); *Awesome-Con* at Washington, DC (2018-2019); *Celebrating Earth Day with NASA at Union Station* (2017-2019); *Space Night* with the Bowie Baysox minor league baseball team in Bowie, MD (2018); *US Science and Technology Expo* in Washington, DC (2019); *Science Jamboree* at GSFC (2017-2018); *Outer Space in the President's Place* in the Eisenhower Executive Office Building in Washington, DC (2017)

**Volunteer Lead Organizer** of the CCSU Physics Open House for local high school students (2015, 2016)