

Kenneth M. Getzandanner

FLIGHT DYNAMICS LEAD · NASA GODDARD SPACE FLIGHT CENTER

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Education

University of Maryland

GRADUATE STUDENT, PHD PROGRAM, AEROSPACE ENGINEERING

- Machine Learning for Dynamical Systems Laboratory
- Advisor: Dr. John Martin

College Park, MD

November 2024 - Pres.

University of Maryland

MASTER OF SCIENCE, AEROSPACE ENGINEERING

College Park, MD

January 2011 - December 2014

Pennsylvania State University

BACHELOR OF SCIENCE, AEROSPACE ENGINEERING

University Park, PA

August 2007 - May 2010

Professional Experience

- 2009-2016 **Flight Dynamics Analyst**, Navigation & Mission Design Branch, NASA/GSFC
- 2016-2019 **Deputy Flight Dynamics Lead: OSIRIS-REx**, Navigation & Mission Design Branch, NASA/GSFC
- 2019-Pres. **Flight Dynamics Lead: OSIRIS-REx/APEX**, Navigation & Mission Design Branch, NASA/GSFC
- 2019-Pres. **Flight Dynamics Lead: Space Science Mission Operations**, Navigation & Mission Design Branch, NASA/GSFC

Research Interests

Precision orbit determination, geophysical parameter estimation, optical navigation image processing, terrain-relative navigation and mapping, onboard and autonomous navigation technology, entry, descent, & landing modeling & analysis, navigation operations, interplanetary and small-body mission design.

Select Publications

- K. Getzandanner**, P. Antreasian, M. Shoemaker, J. Leonard, D. Wibben, K. Williams, A. Levine, J. McAdams, S. Rieger, C. VeNard, M. Myers, J. Russell, A. Montgomery, K. Pipich, E. Queen, R. A. Williams, S. Dutta, M. Johnson, S. Francis, A. Martinez, D. Highsmith, M. Moreau, R. Mink, and B. Williams, "OSIRIS-REx Earth Return & Entry: Navigation Operations & Lessons-Learned," 46th Guidance and Control Conference, American Astronautical Society, 2024.
- J. Leonard, M. Myers, B. Page, K. Pipich, C. VeNard, P. Antreasian, A. Liounis, and **K. Getzandanner**, "OSIRIS-REx Earth Return Orbit Determination Analysis and Performance," 46th Guidance and Control Conference, American Astronautical Society, 2024.
- D. Wibben, A. Levine, J. McAdams, J. Russell, A. Montgomery, S. Rieger, **K. Getzandanner**, and P. Antreasian, "OSIRIS-REx Earth Return & Entry: Targeting Strategy and Maneuver Performance," 46th Guidance and Control Conference, American Astronautical Society, 2024.
- D. DellaGiustina, M. Nolan, A. Polit, M. Moreau, D. Golish, A. Simon, C. Adam, P. Antreasian, R. Ballouz, O. Barnouin, K. Becker, C. Bennett, R. Binzel, B. Bos, R. Burns, N. Castro, S. Chesley, P. Christensen, M. K. Crombie, M. Daly, R. T. Daly, H. Enos, D. Farnocchia, S. Freund Kasper, R. Garcia, **K. Getzandanner**, S. Guzewich, C. Haberle, T. Haltigin, V. Hamilton, K. Harshman, N. Hatten, K. Hughes, E. Jawin, H. Kaplan, D. Lauretta, J. Leonard, A. Levine, A. Liounis, C. May, L. Mayorga, L. Nguyen, L. Quick, D. Reuter, B. Rizk, H. Roper, A. Ryan, B. Sutter, M. Westermann, D. Wibben, B. Williams, K. Williams, and C. W. V. Wolner, "Stereophotoclinometry for OSIRIS-REx Spacecraft Navigation." *The Planetary Science Journal*, Vol. 4, No. 10, 2023, pg. 198.
- C. Adam, L. McCarthy, J. Leonard, R. Gaskell, P. Antreasian, A. Liounis, **K. Getzandanner**, M. Moreau, E. Palmer, J. Weirich, O. Barnouin, J. Geeraert, E. Sahr, B. Ashman, D. Nelson, J. Pelgrift, E. Lessac-Chenen, D. Wibben, B. Williams, M. Daly,

- D. Lauretta, "Stereophotoclinometry for OSIRIS-REx Spacecraft Navigation." *Planetary Science Journal*, Vol. 4, No. 9, 2023, pg. 167.
- J. Weirich, E. Palmer, M. Daly, O. Barnouin, **K. Getzandanner**, J. Kidd, C. Adam, R. Gaskell, and D. Lauretta, "Quality Assessment of Stereophotoclinometry as a Shape Modeling Method Using a Synthetic Asteroid." *Planetary Science Journal*, Vol. 3, No. 5, 2022, pg. 103.
- K. M. Getzandanner**, Berry, K. E., Antreasian, P. G., Leonard, J. M., Adam, C. D., Wibben, D. R., Moreau, M. C., Highsmith, D. E., and Lauretta, D. S., "Small-Body Proximity Operations & TAG: Navigation Experiences & Lessons Learned from the OSIRIS-REx Mission," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Berry, K., **Getzandanner, K.**, Moreau, M., Rieger, S., Antreasian, P., Adam, C., Wibben, D., Leonard, J., Levine, A., Geeraert, J., et al., "Contact with Bennu! Flight Performance Versus Prediction of OSIRIS-REx "TAG" Sample Collection," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Antreasian, P., Adam, C., Leonard, J., Lessac-Chenen, E., Levine, A., McAdams, J., McCarthy, L., Nelson, D., Page, B., Pelgrift, J., Sahr, E., Wibben, D., Williams, B., Williams, K., Berry, **K. Getzandanner**, K., Moreau, M., Rieger, S., Ashman, B., Highsmith, D., and Lauretta, D., "OSIRIS-REx Proximity Operations and Navigation Performance at Bennu," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Wibben, D. R., Levine, A., McAdams, J. V., Antreasian, P. G., Rieger, S., **Getzandanner, K. M.**, Moreau, M. C., and Lauretta, D. S., "OSIRIS-REx Orbit Trim Strategy," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Leonard, J. M., Geeraert, J. L., Pelgrift, J. Y., Antreasian, P. G., Adam, C. D., Wibben, D. R., **Getzandanner, K. M.**, Ashman, B. W., and Lauretta, D. S., "Navigation Prediction Performance During OSIRIS-REx Proximity Operations at (101955) Bennu," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Sutter, B., Hatten, N., Hughes, K., **Getzandanner, K. M.**, Englander, J., Mudek, A., Wibben, D., Williams, K., Penas, M. B., Moreau, M., and Lauretta, D. S., "OSIRIS-REx Extended Mission Trajectory Design & Target Search," The 32nd AIAA/AAS Space Flight Mechanics Meeting, San Diego, CA, 2022.
- Leonard, J., Moreau, M., Antreasian, P., **Getzandanner, K.**, Church, E., Miller, C., and Lauretta, D., "OSIRIS-REx GNC-OLA LIDAR Cross-Calibration," AAS Guidance and Control Conference, Breckenridge, CO, 2022.
- Goossens, S., Rowlands, D. D., Mazarico, E., Liounis, A. J., Small, J. L., Highsmith, D. E., Swenson, J. C., Lyzhoft, J. R., Ashman, B. W., **Getzandanner, K. M.**, Leonard, J. M., Geeraert, J. L., Adam, C. D., Antreasian, P. G., Barnouin, O. S., Daly, M. G., Seabrook, J. A., and Lauretta, D. S., "Mass and Shape Determination of (101955) Bennu Using Differenced Data from Multiple OSIRIS-REx Mission Phases." *The Planetary Science Journal*, Vol. 2, No. 6, 2021, p. 219.
- Swenson, J., Ashman, B., Small, J., Ellison, D., Liounis, A., Highsmith, D., **Getzandanner, K.**, Rowlands, D., Mazarico, E., Donaldson, J., Lyzhoft, J., Gnam, C., Moreau, M., and Lauretta, D., "Architecture and Operations of the OSIRIS-REx Independent Navigation Team," The 16th International Conference on Space Operations, Virtual, 2021.
- Liounis, A. J., Small, J. L., Swenson, J. C., Lyzhoft, J. R., Ashman, B. W., **Getzandanner, K. M.**, Moreau, M. C., Adam, C. D., Leonard, J. M., Nelson, D. S., Pelgrift, J. Y., Bos, B. J., Chesley, S. R., Hergenrother, C. W., and Lauretta, D. S., "Autonomous Detection of Particles and Tracks in Optical Images," *Earth and Space Science*, Vol. 7, No. 8, 2020.
- Wibben, D. R., Levine, A., Rieger, S., McAdams, J. V., **Getzandanner, K. M.**, Antreasian, P. G., Leonard, J. M., Moreau, M. C., and Lauretta, D. S., "Trajectory Design and Maneuver Performance of the OSIRIS-REx Detailed Survey of Bennu," 43rd Annual AAS Guidance and Control Conference, Breckenridge, CO, 2020, AAS 20-151.
- Berry, K., **Getzandanner, K.**, Moreau, M., Antreasian, P., Polit, A., Nolan, M., Enos, H., and Lauretta, D., "Revisiting OSIRIS-REx Touch-and-Go (TAG) Performance Given the Realities of Asteroid Bennu," 43rd Guidance and Control Conference, American Astronautical Society, Breckenridge, CO, 2020, AAS-20-088.
- Liounis, A. J., Swenson, J. C., Small, J., Lyzhoft, J. R., Ashman, B. W., **Getzandanner, K. M.**, Highsmith, D. E., Moreau, M. C., Adam, C. D., Antreasian, P. G., et al., "Independent Optical Navigation Processing for the OSIRIS-REx Mission Using the Goddard Image Analysis and Navigation Tool," 2nd RPI Space Imaging Workshop, Saratoga Springs, NY, 28–30 October, 2019.
- Highsmith, D. E., Swenson, J. C., Ashman, B. W., Small, J. L., Liounis, A. J., **Getzandanner, K. M.**, Lyzhoft, J., Donaldson, J. E., Rowlands, D. D., Mazarico, E. M., Moreau, M. C., Leonard, J. M., Adam, C. D., Antreasian, P. G., and Lauretta, D. S., "NASA Goddard Independent Navigation Results for OSIRIS-REx Initial Encounter at Bennu," 2019 AAS/AIAA Astrodynamics Specialist Conference, American Astronautical Society, Portland, ME, 2019.
- P. Antreasian, M. Moreau, C. Adam, A. French, J. Geeraert, **K. Getzandanner**, D. Highsmith, J. Leonard, E. Lessac-Chenen, A. Levine, J. McAdams, L. McCarthy, D. Nelson, B. Page, J. Pelgrift, S. Rieger, E. Sahr, D. Wibben, B. Williams, K. Williams,

"Early Navigation Performance from the OSIRIS-REx Approach to Bennu." 42nd Annual AAS Guidance, Navigation and Control Conference, Breckenridge, CO, paper AAS 19-035.

- Gnam, C., Liounis, A. J., Ashman, B. W., **Getzandanner, K. M.**, Lyzhof, J. R., Small, J., Highsmith, D. E., Adam, C. D., Leonard, J. M., Antreasian, P. G., et al., "A Novel Surface Feature Navigation Algorithm Using Ray Tracing," 2nd RPI Space Imaging Workshop, Saratoga Springs, NY, 28–30 October, 2019.
- Scheeres, et. al., "The Dynamic Geophysical Environment of (101955) Bennu Based on OSIRIS-REx Measurements." *Nature Astronomy*, Vol. 3, Issue 4, 352:361 (2019).
- B. Williams, P. Antreasian, E. Carranza, C. Jackman, J. Leonard, D. Nelson, B. Page, D. Stanbridge, D. Wibben, K. Williams, M. Moreau, K. Berry, **K. Getzandanner**, A. Liounis, A. Mashiku, D. Highsmith, B. Sutter, D. Lauretta, "OSIRIS-REx Flight Dynamics and Navigation Design," *Space Science Reviews*, 214:69 (2018).
- E. Mazarico, D. Rowlands, T. Sabaka, **K. Getzandanner**, D. Rubincam, J. Nicholas, M. Moreau, "Recovery of Bennu's Orientation for the OSIRIS-REx Mission: Implications for the Spin State Accuracy and Geolocation Errors," *Journal of Geodesy*, Vol. 91, Issue 10 (2017).
- Jackman, C. D., Nelson, D. S., McCarthy, L. K., Finley, T. J., Liounis, A. J., **Getzandanner, K. M.**, Antreasian, P. G., and Moreau, M. C., "Optical Navigation Concept of Operations for the OSIRIS-REx Mission," *Proceedings of the AAS/AIAA Space Flight Mechanics Meeting*, 2017, AAS 17-489.
- K. Getzandanner**, D. Rowlands, E. Mazarico, P. Antreasian, C. Jackman, M. Moreau (2016). "An Independent Orbit Determination Simulation for the OSIRIS-REx Asteroid Sample Return Mission." 39th Annual AAS Guidance, Navigation and Control Conference, Breckenridge, CO, paper AAS 16-103.
- M. A. Shoemaker, C. A. Wright, A. J. Liounis, **K. M. Getzandanner**, J. M. Van Eepoel, and K. D. DeWeese, "Performance Characterization of a Landmark Measurement System for ARRM Terrain Relative Navigation," *AAS Space Flight Mechanics Meeting*, Napa, CA, Feb. 2016.
- C. Wright, M. Shoemaker, J. Van Eepoel, K. DeWeese, and **K. Getzandanner**, "Relative Terrain Imaging Navigation Tool (Retina) for the Asteroid Robotic Redirect Mission," 39th AAS Guidance, Navigation and Control Conference, Breckenridge, CO, 2016. AAS 16-084.
- B. Barbee, B. Wie, S. Mark, and **K. Getzandanner**, "Conceptual Design of a Flight Demonstration Mission for a Hypervelocity Asteroid Intercept Vehicle," *Acta Astronautica*, Vol. 106, 2015, pp. 139-159.
- S. Hernandez, B.W. Barbee, S. Bhaskaran, **K. Getzandanner**, "Mission opportunities for the flight validation of the kinetic impactor concept for asteroid deflection," *Acta Astronaut.* 103 (2014) 309–321.

Awards

- 2022 **John L. 'Jack' Swigert Award for Space Exploration: OSIRIS-REx Group Award**, Space Foundation
- 2021 **Mission Engineering & Systems Analysis Division Product Development Lead of the Year**, NASA/GSFC
- 2020 **NASA Exceptional Achievement Medal**, NASA
- 2017 **NASA Group Achievement Award: OSIRIS-REx Flight System Development Team**, NASA
- 2015 **Robert H. Goddard Award for Exceptional Achievement in Engineering**, NASA/GSFC
Robert H. Goddard Group Achievement Award for New Opportunities Captured: OSIRIS-REx, NASA/GSFC
Mission Engineering & Systems Analysis Division Excellence Award, NASA/GSFC
- 2014 **Solar System Exploration Division Special Act Award**, NASA/GSFC
- 2013 **NASA Early Career Achievement Medal**, NASA
- 2011 **Mission Engineering & Systems Analysis Division Rookie of the Year**, NASA/GSFC

Professional Memberships

American Institute of Aeronautics & Astronautics (AIAA)
American Astronautical Society (AAS)

Institute of Navigation (ION)