

## Karl L. Mitchell

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### Experience and Expertise

- **Science:** The application of the scientific method, employing fluid mechanics, thermodynamics and remote sensing techniques to study geological and environmental processes in the Solar System, especially ocean worlds: Triton, Titan, Enceladus and Uranus moons.
- **Mission involvement:**
  - Trident (Discovery 2019, Phase A), JPL Concept Champion, Project Scientist, 2017-2021.
  - Cassini RADAR Science Team, Associate, 2005-2017.
  - Cassini Satellite Orbiter Science Team (SOST), Cassini RADAR Team representative during Cassini Solstice mission planning, 2009-2017.
  - Cassini Titan Orbiter Science Team (TOST), science planner, 2015-2017 (incl. grand finale).
  - Mars Express High Resolution Stereo Camera Team, Co-I Associate, 1999-2005.
- **Program Management:**
  - Program Manager, Planetary Science Research & Analysis (4112), 2021-present.
  - Discipline Program Manager, Planetary Science Research & Analysis, 2020.
- **Science Formulation:** Several concept studies, mostly Ice-Giant focused, notably:
  - **Discovery 2019 “Trident” (Triton encounter mission) Project Scientist (2017-2021).**
    - Led initial science concept, managed science team throughout pre-phase-A study, tracked science requirements against implementation, designed observing sequence, managed science traceability, co-authored science section, lead, science implementation section and science heritage subsection. Phase A CSR received *Excellent* for both Form A (Science) and Form B (Science Implementation) evaluations.
- **Teaching:** Lead science mentor for the NASA Planetary Science Summer School/Seminar (2013-). PSSS trains the next generation of PIs - advanced graduate students and postdocs in science and engineering - to design a planetary science mission in response to a NASA AO.
- **Mentoring:** Trains all NASA Science Mission Design School (broader umbrella, includes Astrophysics and Heliophysics equivalents to PSSS) science mentors. Mentor for early career future Project Scientists, as part of ongoing mission concept work. Informal mentor for early career scientists in mission formulation and formulation Project Science roles.
- **Technology:** Science formulation and field test lead for various technology maturation projects, mostly related to cave and vent exploration technologies.

### Education and Professional Positions

- **2008-present:** Scientist, Planetary Interiors & Geophysics Group, JPL (Manager: S. D. Vance).
- **2005-2008:** NRC/NASA Postdoctoral Research Fellow (Advisor: R. M. C. Lopes), Engineering and Science Directorate, JPL (administered by ORAU).
- **2001-2005:** PPARC Postdoctoral Research Associate (Contact: L. Wilson), Environmental Science Dept., Lancaster University, UK.
- **1999-2001:** Research Assistant (Remote Sensing) (Contact: J.-P. A. L. Muller), Dept. of Geomatic Engineering, University College London, London, UK.
- **Ph.D., Lancaster University, 2002** (Advisor: L. Wilson): “The thermodynamics and fluid mechanics of near-vent processes in explosive volcanic eruptions on the Earth and Mars.”
- **M. Sc./D.I.C., Remote Sensing (Land Applications option), University of London, 1996.**

- B. Sc. (hons), Physics with Space Science and Technology, Leicester University, 1995.

### **Professional Awards**

- **NASA Honor Awards:** Cassini Radar Science and Operations Team, Cassini Science Planning and Sequencing Team Award, Cassini Science Support Web Pages Award.
- **JPL Voyager Awards:** 2015 (for proposal successes), 2019 (for science leadership on Trident).
- **JPL Team Award:** 2020 (Trident selection).

### **Grants/Awards: 15 NASA ROSES, 4 as PI 11 as Co-I.**

- **NASA Innovative Advanced Concepts Phase II 2020:** Co-I, “Enceladus Vent Explorer”, 2021- (PI: M. Ono).
- **Discovery 2019:** Project Scientist, “Trident: Mission to an exotic world”, 2020-2021 (PI: L. Prockter, Johns Hopkins University Applied Physics Lab).
- **Solar System Workings 2016:** Co-I, “Rheological investigations of cryovolcanic lavas”, 2018-present (PI: A. Whittington).
- **NASA Innovative Advanced Concepts Phase I 2015:** Co-I, “Journey to the Center of Icy Moons”, 2016-17 (PI: M. Ono).
- **NASA Innovative Advanced Concepts Phase II 2015:** Co-I, “PERISCOPE: PERIapsis Subsurface Cave Optical Explorer”, 2015-18 (PI: J. Nosanov).
- **Planetary Science & Technology Through Analog Research 2014:** PI, “Robotic geometric characterization of subterranean voids”, 2015-17.
- **Planetary Science & Technology Through Analog Research 2014:** Co-I, “FreeClimber: Analyzing Steep Terrain and Subsurface Habitability on Mars and Earth”, 2015-17 (PI: A. Parness).
- **Planetary Data Archiving, Restoration & Tools 2014:** PI, “High resolution terrain models from rigorous stereo analysis of Venus Magellan SAR imagery”, 2015-present.
- **NASA Innovative Advanced Concepts Phase I 2014:** Co-I, “PERISCOPE: PERIapsis Subsurface Cave Optical Explorer”, 2014-15 (PI: J. Nosanov).
- **NASA Innovative Advanced Concepts Phase I 2013:** Co-I, “TransFormers for Extreme Environments”, 2013-14 (PI: A. Stoica).
- **Cassini Data Analysis and Participating Scientist Program 2012:** Co-I, “Evolution of the polar landscape of Titan”, 2013-16 (PI: A. Hayes).
- **Outer Planets Research Program 2009:** Co-I, “The hydrology of Titan: An integrated topographic, geomorphic, and modeling approach”, 2010-14 (PI: J. Andrews-Hanna).
- **Outer Planets Research Program 2009:** Co-I, “Rheological and Thermal Property Measurements of Icy Satellite Analogs for Resurfacing Implications”, 2010-15 (PI: F. Zhong).
- **Outer Planets Research Program 2009:** Co-I, “Cryogenic Dielectric Properties Relevant to Radar and Radiometric Observations of Saturn's Icy Worlds”, 2010-15 (PI: M. Barmatz).
- **Planetary Missions Data Analysis Program 2009:** PI, “Rigorous Stereo Analysis of Venus Magellan SAR imagery: Application to studies of crustal evolution”, 2010-13.
- **Cassini Data Analysis Program 2008:** PI, “Liquid transport processes in Titan’s arctic lake district”, 2009-11.

### **Peer-Reviewed Publications (64 total)**

<https://publons.com/researcher/3438002/>