

Robert T. Pappalardo

JPL Fellow | Europa Clipper Project Scientist

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RESEARCH AND MISSION LEADERSHIP

Planetary scientist and mission leader specializing in the geology, geophysics, and habitability of icy worlds, especially Europa. Research encompasses tectonics, ice-shell dynamics, subsurface oceans, and the geological evolution of Europa, Ganymede, Enceladus, and Titan. Mission leadership spans formulation and definition of the flagship Europa Clipper mission through development, launch, and early cruise, as well as science operations during Cassini's first extended mission at Saturn. Experience includes building consensus across scientific disciplines and institutions while working closely with NASA leadership and international partners.

EDUCATION

- **Ph.D., Geology**, Arizona State University, 1994.
- **B.A., Geological Sciences**, Cornell University, 1986.

PROFESSIONAL POSITIONS

- **JPL Fellow**, Jet Propulsion Laboratory, 2023–present.
- **Project Scientist, Europa Clipper Mission**, Jet Propulsion Laboratory, 2015–present.
- **Senior Research Scientist**, Jet Propulsion Laboratory, 2007–present; Principal Scientist and Director's Fellow, 2006–2007.
- **Visiting Faculty Associate**, Caltech, Division of Geological and Planetary Sciences, 2007–2011.
- **Assistant Professor**, University of Colorado, Boulder; Astrophysical and Planetary Sciences and Laboratory for Atmospheric and Planetary Sciences, 2001–2006.
- **Postdoctoral Research Associate**, Brown University, 1995–2001; Arizona State University, 1994–1995.

SELECTED SPACECRAFT MISSION LEADERSHIP AND FORMULATION

- **Project Scientist, Europa Clipper, 2015–present**. Leads the mission's scientific direction and represents its science to the Project and NASA.
- **Study Scientist, Europa mission options, 2011–2015; Chair, Europa Science Definition Team, 2011–2012**. Led scientific definition of the reduced-scope flagship mission that became Europa Clipper.
- **Pre-Project Scientist, Jupiter Europa Orbiter, 2009–2011; Europa Study Scientist, 2008–2010**. Led scientific integrity and served as liaison between the international science definition team and U.S. technical team.
- **Project Scientist, Cassini Equinox Mission, 2008–2010**. Led science during Cassini's first extended mission at Saturn.
- **Europa Flagship Science Definition Team Co-Chair, 2007; Jupiter Icy Moons Orbiter Science Definition Team, Member 2003–2004; Europa Orbiter Science Definition Team Member, 1998–1999**.
- **Affiliate Member, Galileo Solid State Imaging Team, 1994–2001**. Planned and analyzed images of Europa and Ganymede.

SELECTED PROFESSIONAL SERVICE

- **Elected Committee Member, Division for Planetary Sciences of the AAS, 2011–2014**. Helped lead and manage the affairs of the DPS.
- **Principal Organizer, Galileo at 30 Meeting, 2025**.
- **Member, NASA Phase E Cost Independent Study Team, 2023–2024**. Examined how NASA can identify mission operations cost growth earlier and more accurately.
- **Member, National Academies Space Studies Board, 2008–2014**.
- **Co-Chair, Committee on the Origins and Evolution of Life, 2008–2011**.
- **Steering Group Member and Vice Chair, Large Satellites Panel, first Planetary Decadal Survey, 2001–2002**.
- **Member, NASA Solar System Exploration Strategic Roadmap Committee, 2005–2006**.
- **Member, Solar System Exploration Subcommittee, 2004–2005**.
- **Member, Committee on Planetary and Lunar Exploration, 2000–2003**.
- **Participant, Outer Planets Assessment Group, 2005–present**.

SELECTED TEACHING

- **University of Colorado, 2001–2005**: Planetary Surfaces and Interiors; Extraterrestrial Life; General Astronomy; Planetary Science Seminar; Europa.
- **Astrobiology short courses**: University of Hawaii Astrobiology Winter School, 2005; NASA Astrobiology Institute Insight Course, 2003.

PROFESSIONAL SOCIETIES

American Astronomical Society, Full Member, 2026–present; Division for Planetary Sciences member, 1996–present. American Geophysical Union, member, 1989–present; Committee on Space Research, Associate Member, 2009–present; International Academy of Astronautics, Full Member, 2018–present.

SELECTED HONORS AND AWARDS

- **NASA Exceptional Service Medal, 2011**, for scientific and strategic leadership of Cassini and the Europa Jupiter System mission concept.
- **JPL Magellan Awards, 2020 and 2016**, JPL's highest individual award for scientific or technical accomplishment, recognizing Europa Clipper science leadership.
- **NASA Agency Group Achievement Award, 2025**, for work investigating Phase E cost growth and recommending solutions to NASA.
- **JPL Voyager Awards, 2025 and 2016**, for outstanding scientific leadership of the Europa Clipper Project and Project Science Group.
- **Johns Hopkins Applied Physics Laboratory Outstanding Paper Award, 2001**, for the Science article on Europa folds and crustal cycling.

SELECTED FUNDED RESEARCH AS PRINCIPAL OR CO-INVESTIGATOR

- **PI, Enhancing SatStress GUI: Simplifying Stress Calculations for Satellites**, NASA Planetary Data Archiving, Restoration, and Tools Program, 2016–2019.
- **Co-I, A Global Geologic Map of Enceladus**, NASA Planetary Geology and Geophysics Program, 2014–2018.
- **Co-I, Strike-Slip Faulting Processes on Ganymede**, NASA Outer Planets Research Program, 2013–2016.
- **PI, Fracture Formation on Europa and Other Icy Satellites**, NASA Outer Planets Research Program, 2006–2009.
- **PI, Causes and Consequences of Faulting on Europa and Other Icy Satellites**, NASA Planetary Geology & Geophys. Program, 2004–2007.
- **PI, Astrobiological and Geological Implications of Convective Transport in Icy Outer Planet Satellites**, NASA Exobiology Program, 2002–2005.
- **PI, Origin, Structure, and Evolution of Grooved Terrain on Ganymede and Comparison to Europa**, NASA Jupiter System Data Analysis Program, 1998–2001.

SELECTED RECENT AND FOUNDATIONAL PUBLICATIONS

- Parekh, R., et al. Mass-wasting features on Galilean icy moons: Morphological analysis and implications. *PSJ* 7(2) (2026).
- Pappalardo, R. T., et al. Ganymede's geology. In *Ganymede*, Cambridge University Press, 87–103 (2025).
- Roth, L., et al. Plume activity on Europa: Current knowledge and search strategy for Europa Clipper. *PSJ* 6, 182 (2025).
- Becker, T. M., et al. Exploring the composition of Europa with the upcoming Europa Clipper mission. *Space Science Rev.* 220, 49 (2024).
- Daubar, I. J., et al. Planned geological investigations of the Europa Clipper mission. *Space Sci. Rev.* 220, 18 (2024).
- Pappalardo, R. T., et al. Science overview of the Europa Clipper mission. *Space Sci. Rev.* 220, 40 (2024).
- Roberts, J. H., et al. Exploring the interior of Europa with Europa Clipper. *Space Sci. Rev.* 219, 46 (2023).
- Leonard, E. J., et al. Finding order in chaos: Quantitative predictors of chaos terrain morphology on Europa. *GRL* 49 (2022).
- Howell, S. M., and R. T. Pappalardo. NASA's Europa Clipper—A mission to a potentially habitable ocean world. *Nature Comm.* 11, 1311 (2020).
- Leonard, E. J., A. Yin, and R. T. Pappalardo. Ridged plains on Europa reveal a compressive past. *Icarus* 343, 113709 (2020).
- Cameron, M., et al. Tidal stress modeling of Ganymede: Strike-slip tectonism and Coulomb failure. *Icarus* 319, 99–120 (2019).
- Howell, S. M., and R. T. Pappalardo. Can Earth-like plate tectonics occur in ocean world ice shells? *Icarus* 322, 69–79 (2019).
- Howell, S. M., and R. T. Pappalardo. Band formation and ocean-surface interaction on Europa and Ganymede. *GRL* 45, 4701–4709 (2018).
- Nimmo, F., and R. T. Pappalardo. Ocean worlds in the outer solar system. *JGR Planets* 121 (2016).
- Vance, S. D., K. P. Hand, and R. T. Pappalardo. Geophysical controls of chemical disequilibria in Europa. *GRL* 43, 4871–4879 (2016).
- Yin, A., and R. T. Pappalardo. Gravitational spreading, bookshelf faulting, and tectonic evolution of the South Polar Terrain of Enceladus. *Icarus* 260, 409–439 (2015).
- Collins, G. C., et al. Global geologic map of Ganymede. *U.S. Geological Survey Scientific Investigations Map* 3237 (2014).
- Pappalardo, R. T., et al. Science potential from a Europa lander. *Astrobiology* 13, 740–773 (2013).
- Gleeson, D. F., et al. Biosignature detection at an Arctic analog to Europa. *Astrobiology* 12, 1–16 (2012).
- Moore, J. M., and R. T. Pappalardo. Titan: An exogenic world? *Icarus* 212, 790–806 (2011).
- Pappalardo, R. T., W. B. McKinnon, and K. K. Khurana, eds. *Europa*. University of Arizona Press, 727 pp. (2009).
- Smith-Konter, B., and R. T. Pappalardo. Tidally driven stress accumulation and shear failure of Enceladus's tiger stripes. *Icarus* 198, 435–451 (2008).
- Nimmo, F., et al. A shear-heating mechanism for the generation of vapor plumes and high heat fluxes on Enceladus. *Nature* 447, 289–291 (2007).
- Nimmo, F., and R. T. Pappalardo. Diapir-induced reorientation of Enceladus. *Nature* 441, 614–616 (2006).
- Barr, A. C., and R. T. Pappalardo. Onset of convection in ice I: Application to the icy Galilean satellites. *JGR* 110, E12005 (2005).
- Prockter, L. M., et al. Morphology of European bands at high resolution: A mid-ocean ridge-type rift mechanism. *JGR* 107(E5), 5028 (2002).
- Prockter, L. M., and R. T. Pappalardo. Folds on Europa: Implications for crustal cycling and accommodation of extension. *Science* 289, 941–943 (2000).
- Pappalardo, R. T., et al. Does Europa have a subsurface ocean? Evaluation of the geological evidence. *JGR* 104, 24,015–24,055 (1999).
- Carr, M. H., et al. Evidence for a subsurface ocean on Europa. *Nature* 391, 363–365 (1998).
- Pappalardo, R. T., et al. Geological evidence for solid-state convection in Europa's ice shell. *Nature* 391, 365–368 (1998).
- Pappalardo, R. T., et al. Grooved terrain on Ganymede: First results from Galileo high-resolution imaging. *Icarus* 135, 276–302 (1998).

SELECTED PUBLIC COMMUNICATION

- **Washington Post op-ed, 2024:** “On Europa Clipper: Our Earthly emissary will visit a place we cannot.”
- **Planetary Society Cosmic Shores Gala keynote, 2024:** Exploring Ocean World Habitability with Europa Clipper.
- **National Air and Space Museum Exploring Space lecture, 2016:** NASA's Mission to Europa.
- **Science media and education:** advisor or interviewee for NOVA, PBS NewsHour, National Geographic, BBC Radio, NASA eClips, and other programs.

DPS Vice-Chair Statement

Robert Pappalardo

Jet Propulsion Laboratory, California Institute of Technology

I am honored to be nominated for the position of Vice-Chair of the Division for Planetary Sciences. DPS has long been central to my life as a planetary scientist: a place where people across the diverse disciplines, institutions, career stages, and professional paths of planetary science—in the U.S. and internationally—come together as one community. I value DPS for its outstanding scientific meetings, and for its role as a town hall and professional home for planetary scientists.

Planetary science is in a demanding period. We face constrained resources, uncertainty in mission opportunities, pressure on R&A programs, and a need to support scientists across career stages, institutions, backgrounds, and national boundaries. At the same time, missions and research advances are transforming our understanding of planetary bodies and habitability. DPS has a central role in helping our community sustain scientific momentum while responding constructively to these pressures.

My perspective is shaped by working at the interface of science and missions. My career has included Cornell, Arizona State University, Brown University, the University of Colorado, and JPL, giving me experience across varied institutional cultures and approaches to planetary research. Before becoming Project Scientist for the flagship Europa Clipper mission, I spent years helping to formulate and define it; I have since led its scientific direction through development, launch, and early cruise. I also served as Cassini Project Scientist during its first extended mission at Saturn.

These roles have required me to work with large, distributed teams spanning diverse institutions and the breadth of planetary science. This work required listening, clear communication, consensus-building, close coordination with NASA leadership and international colleagues, and an understanding of the constraints under which missions and research programs operate. That is the integrative experience that I would bring to DPS leadership.

Our community needs strong advocacy for a healthy and balanced planetary science ecosystem: robust R&A programs, data analysis, laboratory studies, modeling, theory, observations, technology development, and mission opportunities across scales. DPS is well positioned to articulate that full ecosystem and explain its value to NASA, Congress, partner agencies, institutions, students, and the public. Effective DPS leadership also requires a constructive relationship with the AAS, from which DPS draws shared resources, organizational support, and a broader platform for advocacy.

I am particularly attuned to continuity: enabling students and early-career scientists to gain the experience, mentorship, visibility, and confidence needed to become the next generation of principal investigators and community leaders. DPS meetings helped confirm my own professional path and remain central to scientific exchange, mentorship, and belonging. DPS should continue to foster inclusive, accessible meetings and a professional culture in which all members can contribute fully.

As Vice-Chair, I would support the Chair, Committee, and subcommittees in the work already underway. I would listen, seek broad input, strengthen the DPS–AAS partnership, and help identify where DPS can act most effectively. And I would bring a practical, consensus-building style and deep commitment to the long-term health of planetary science.