Steven D. Vance

Research Focus

My research innovates in the geophysical investigation of habitability, mainly in ocean worlds. I study how oceans influence thermal evolution and composition, and what this might mean for life. I assess geochemical fluxes in ocean worlds, by analogy to biogeochemical fluxes in the Earth system. As a comparative planetologist I develop analytical and numerical models for planetary interiors spanning the entire solar system. My experimental research develops fundamental inputs for those models, collecting thermodynamic equations of state and transport properties for fluids and ices. I use this information to evaluate oceanic heat transport and double diffusive convection in Europa, and to infer the geophysical constraints imposed by ocean composition on the radial structures of potentially habitable worlds. Increasingly, I use the associated open source data and software to develop model ensembles covering the parameter space of possible geophysical signals—seismic, magnetic, and gravitational—to improve the fidelity of returned science from investigations of composition and habitability.

Education

2001–2007 **Ph.D.**, *University of Washington*, Seattle, Geophysics and Astrobiology

1996–2000 **B.S.**, *University of California*, Santa Cruz, Physics (*with honors*)

Ph.D. Thesis

title *High Pressure and Low Temperature Equations of State for Aqueous Sulfate Solutions: Applications to the Search for Life in Extraterrestrial Oceans, with Particular Reference to Europa*

advisor Prof. J. Michael Brown

Bachelor Thesis

title *The Role of Methanol Frost in Particle Sticking and the Formation of Planets in the Early Solar Nebula*

advisor Prof. Frank G. Bridges

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Current Appointments

Research Scientist: Jet Propulsion Laboratory (JPL)–Caltech
Supervisor: Astrobiology Group (322A), JPL–Caltech
Elected Committee Member: Division of Planetary Science (DPS), American Astronomical Society
Member: DPS Professional Climate and Culture Subcommittee
Member: Steering Committee for the Outer Planets Assessment Group (OPAG)
Member: Steering Committee for NASA's LIFE Research Coordination Network
Vice Chair: Committee on Space Research (COSPAR) Sub-Commission B2: International Coordination of Space Techniques for Geodesy (joint with IUGG/IAG Commission I on Reference Frames)

Previous Appointments

Deputy Manager: Planetary Science Section (322), JPL–Caltech
Member: Steering Committee for the NASA xAG EDIA Working Group
President: Planetary Science Section, Asia Oceania Geosciences Society, Singapore
Global Science Coordinator: ELSI Origins Network, Tokyo Institute of Technology
Visiting Scholar: University of Washington, Seattle; Tokyo Institute of Technology

PI'd Grants; by submittal year

2024-2028 **Community of Practice Studying Liquids in Ocean Worlds**, *NASA ROSES Solar System Workings*, $1.9M

2022-2027 **Joint Inversion of Magnetic Induction and Gravity Science Measurements Using New Laboratory Data for Europa Analog Solutions**, *NASA ROSES Precursor Science Investigations for Europa*, $2.0M

2022-2024 **Electrical Properties of Ocean World Solutions: Carbonate and Ammonia**, *JPL Strategic University Research Partnership*, $60K

2020-2022 **Laboratory Electrical Conductivity Measurements for Exploring Ocean Worlds**, *JPL Topical Research and Technology Development*, $330K

2018-2020 **Enceladus Distributed Geophysical Explorer (EDGE)**, *JPL Strategic Research and Technology Development*, $400K

2018 **Overturning Circulation in Icy Ocean Worlds**, *JPL Researchers on Campus*, $14K

2017–2020 **Vital Signs: Seismic Investigation of Icy Ocean Worlds**, *NASA ROSES Habitable Worlds*, $772K

2015–2018 **Science Drivers for Icy Moon Seismology**, *JPL Strategic Research and Technology Development*, $355K

2011-2013 **CubeSat Hydrometric Atmospheric Radiometric Mission (CHARM)**, *NASA Hands-On Project Experience (HOPE)*, $2.8M

Co-I and Collaborator Grants; by submittal year

2024-2026 **Improving Thermodynamic Modeling of the Role of Organics on the Presence of Microhabitable Environments on Ocean World Ice Shells**, *NASA ROSES Habitable Worlds*, PI: Florent Bocher, $771K

2024-2026 **Modeling possible Europan Oceans using an updated electrical conductivity database including new lab experiments**, *NASA ROSES Future Investigators in NASA ROSES Earth and Space Science and Technology (FINESST-2023)*, PI: Catherine Psarakis, $100K

2024-2025 **Bringing EDIA to the Planetary Sciences Community: A Two-Day AG-style meeting of the cross-AG EDIA Working Group**, *NASA ROSES Topical Workshops, Symposiums, and Conferences (TWSC-24) in Space and Earth Sciences and Technology*, PI: Joshua "Kas" Nicely, $183K

2023-2024 **Modernizing the PlanetProfile geophysical framework**, *NASA ROSES Supplemental Open Source Software Awards*, PI: Mohit Melwani Daswani, $74K

2020-2023 **Experimental and Computational Thermodynamics, Organics, and Planetary Structure Modeling (ECTOPlaSM)**, *NASA ROSES Early Career Award*, PI: Mohit Melwani Daswani, $199K

2019-2022 **Did Solid Tides Prevent the Thermodynamic Death of Europa?**, *NASA ROSES Habitable Worlds*, PI: Mohit Melwani Daswani, $882K

2019-2022 **Tectonic history, thermal evolution, and interior structure of the Uranian satellites Miranda and Ariel**, *NASA ROSES Solar System Workings*, PI: Tom Nordheim, $591K

2019-2022 **Compositions of Ice Shells on Ocean Worlds**, *NASA ROSES Solar System Workings*, PI: Marc Neveu, $352K (JPL portion)

2019-2023 **Elastic wave analyzer for icy sub-surfaces (EWAIS) in the solar system**, *NASA ROSES PICASSO*, PI: Yoseph Bar-Cohen, $900K

2019-2022 **Flagship Concepts for Astrobiology at Enceladus**, *NASA ROSES Planetary Mission Concept Studies*, PI: Shannon MacKenzie, $–discreet

2018–2020 **Europa Seismic Package**, *Instrument Concepts for Europa Exploration-2*, PI: Mark Panning, $2.3M

2017–2022 **Habitability of Hydrocarbon Worlds: Titan and Beyond**, *NASA Astrobiology Institute, CAN 8*, PI: Rosaly Lopes, $8.3M

2017–2019 **Universal MEMS Seismometer**, *NASA ROSES PICASSO*, PI: Karl Yee, $4.0M

2017–2020 **Planetary Solution Chemistry**, *NASA ROSES Solar System Workings*, PI: J. Michael Brown, $636K

2016–2017 **Magnetic Induction Responses from Icy Satellites with Conductive Oceans**, *JPL Spontaneous Concepts*, PI: Bruce Bills, $30K

2016–2019 **A Planetary Broadband Seismometer for the Lunar Geophysical Network and the Ocean Worlds**, *NASA ROSES MATISSE*, PI: Talso Chui, $4M

2016–2018 **Water and Hydrate Isotopes via a Rapid Laser Sensor**, *NASA ROSES PICASSO)*, PI: Max Coleman, $429K

2014–2019 **ICY WORLDS: Astrobiology at the Rock-Water Interface and Beyond?**, *NASA Astrobiology Institute, CAN 7*, PI: Isik Kanik, $8.1M

2013 **Mapping the Ice Layer of Europa Using Radio Detection of Ultra-High Energy Cosmic Rays (UHECRs)**, *JPL Spontaneous Concepts*, PI:Andrew Romero Wolf, $30K

2013–2015 **Solution Thermochemistry Relevant to Outer Planets and Satellites**, *NASA ROSES Outer Planets Research*, PI: J. Michael Brown, $478K

2009–2014 **Astrobiology of Icy Worlds: Habitability, Survivability and Detectability**, *NASA Astrobiology Institute, CAN5*, PI: Isik Kanik, $8.18M

List of Publications (*:mentee)

[1] J. M. Brown, O. Bollengier, B. Journaux, U. Jones, and **S. D. Vance**. "Thermodynamics of NaCl(aq) from 230 to 2000 K and from 1 bar to 10,000 MPa: Applications to Earth and Other Ocean Worlds". In: *Geochimica et Cosmochimica Acta* (2026, in prep.).

[2] P. K. Byrne, H. G. Dawson, C. Klimczak, P. V. Regensburger, K. T. Crane, J. G. Catalano, C. M. Elder, B. J. Foley, C. R. German, A. P. Green, D. J. Hemingway, M. Melwani Daswani, M. P. Panning, N. Randolph-Flagg, B. Sherwood Lollar, P. Skemer, **S. D. Vance**, and D. A. Wiens. "Little to no active faulting likely at Europa's seafloor today". In: *Nature Communications* 17.1 (Jan. 2026). DOI: 10.1038/s41467-025-67151-3.

[3] S. Chang*, **S. D. Vance**, F. Petricca, B. Journaux, M. Melwani Daswani, and C. J. Cochrane. "Discerning Ocean Salinity from Europa Clipper's Geophysical Measurements". In: *The Planetary Science Journal* (2026 in prep.).

[4] H. G. Dawson, P. K. Byrne, C. Klimczak, K. T. Crane, P. V. Regensburger, **S. D. Vance**, M. Melwani Daswani, and D. J. Hemingway. "Quiescent Seafloors Across the Icy Moons of the Outer Solar System". In: *Journal of Geophysical Research: Planets* (2026, submitted).

[5] L. Mahboub*, J. Weber, J. Cortes, C. Psarakis, M. Melwani Daswani, and **S. D. Vance**. "Electrical Properties of Icy World Oceans from Laboratory Measurements". In: *ACS Earth and Space Chemistry* (2026 in press).

[6] C. A. Nixon, S. Birch, A. Chatain, C. Cockell, K. K. Farnsworth, P. M. Higgins, S. Le Mouélic, R. M. C. Lopes, M. J. Malaska, M. Melwani Daswani, K. E. Miller, C. D. Neish, O. G. Podlaha, J. Radebaugh, L. R. Schurmeier, A. Schoenfeld, K. M. Soderlund, A. Solomonidou, C. Sotin, N. A. Teanby, T. Tokano, and **S. D. Vance**. "Terrestrial Analogs to Titan for Geophysical Research". In: *Reviews of Geophysics* 64.2 (Apr. 2026). ISSN: 1944-9208. DOI: 10.1029/2025rg000909.

[7] F. Petricca*, C. J. Cochrane, G. Cascioli, E. Mazarico, S. Chang, **S. D. Vance**, F. Nimmo, and J. C. Castillo-Rogez. "Comprehensive Characterization of Europa's Interior Through Synthesis of Europa Clipper Data". In: *Earth and Space Science* (2026 in press).

[8] O. Prieto-Ballesteros, F. Tosi, W. B. McKinnon, A. Rhoden, P. Schenk, **S. D. Vance**, R. Wagner, J. Hao, P. L. Finkel, A. de Dios Cubillas, C. Haslebacher, and M. Ding. "Geology and Surface Properties of the Galilean Moons". In: *Space Science Reviews* 222.1 (Feb. 2026). ISSN: 1572-9672. DOI: 10.1007/s11214-026-01273-y.

[9] A. M. Schoenfeld, **S. D. Vance**, R. M. C. Lopes, M. J. Malaska, and M. Bland. ""Salt Tectonics" on Titan: Radial Labyrinths as Topographic Expressions of Solid-State Flow". In: *Journal of Geophysical Research: Planets* 131.1 (Jan. 2026). DOI: 10.1029/2025je009230.

[10] M. A. Shadab*, **S. D. Vance**, E. A. Silber, A. P. Crosta, E. Carnahan, J. S. Jordan, and M. A. Hesse. "Rapid migration of impact melt through ocean world ices: Selk crater on Titan and Mannann'an crater on Europa". In: *Earth and Planetary Science Letters* (2026 in prep.).

[11] K. T. Trinh*, F. Petricca*, D. J. Hemingway, and **S. D. Vance**. "Powering Ganymede's Dynamo with Protracted Core Formation". In: *Science Advances* (2026 in press).

[12] A. Bagheri*, M. Simons, R. S. Park, A. Berne, D. Hemingway, M. Melwani Daswani, and **S. D. Vance**. "Exploring the Interior Structure and Mode of Tidal Heating in Enceladus". In: *The Planetary Science Journal* 6.10 (2025), p. 245. DOI: 10.3847/psj/ae0cab.

[13] C. J. Cochrane, **S. D. Vance**, J. C. Castillo-Rogez, M. J. Styczinski, and L. Liuzzo. "Stronger Evidence of a Subsurface Ocean Within Callisto From a Multifrequency Investigation of Its Induced Magnetic Field". In: *AGU Advances* 6 (2025), e2024AV001237. DOI: 10.1029/2024AV001237.

[14] F. Klenner, L. M. Fifer, B. Journaux, A. D. Bravenec, A. M. M. Leal, **S. D. Vance**, and D. C. Catling. "Supercooling, Glass Formation and Mineral Assemblages Upon Freezing of Salty Ice Grains from Enceladus's Ocean". In: *Planetary Science Journal* 6 (2025). DOI: 10.3847/PSJ/adb305.

[15] E. Lesage, S. M. Howell, M. Neveu, J. W. Miller, M. Naseem, M. Melwani Daswani, J. Villette, and **S. D. Vance**. "Identifying signatures of past and present cryovolcanism on Europa". In: *Nature Communications* 16.1 (Feb. 2025). DOI: 10.1038/s41467-025-57070-8.

[16] F. Petricca*, J. C. Castillo-Rogez, A. Genova, M. Melwani Daswani, M. J. Styczinski, C. J. Cochrane, and **S. D. Vance**. "Partial differentiation of Europa and implications for the origin of materials in the Jupiter system". In: *Nature Astronomy* (2025). DOI: 10.1038/s41550-024-02469-4.

[17] F. Petricca*, **S. D. Vance**, M. Parisi, D. Buccino, G. Cascioli, J. Castillo-Rogez, B. G. Downey, F. Nimmo, G. Tobie, B. Journaux, A. Magnanini, U. Jones, M. Panning, A. Bagheri, A. Genova, and J. I. Lunine. "Titan's strong tidal dissipation precludes a subsurface ocean". In: *Nature* 648.8094 (Dec. 2025), pp. 556–561. DOI: 10.1038/s41586-025-09818-x.

[18] L. E. Rodriquez, J. M. Weber, M. L. Cable, L. M. Barge, J. C. Castillo-Rogez, M. Chodas, S. N. Ferguson, P. Schenk, **S. D. Vance**, K. Carpenter, M. D. Ingham, C. J. Cochrane, B. L. Henderson, S. Hosseini, A. G. Marusiak, A. C. Noell, S. Perl, and M. Ono. "A roadmap for the exploration of Enceladus". In: *Journal of Geophysical Research-Planets* (2025). DOI: 10.1029/2024JE008907.

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[19] J. C. Stern, H. V. Graham, B. Burcar, E. S. Martin, A. Noell, K. Hand, J. S. Bowman, P. Doran, V. Edgcomb, J. F. Holden, A. E. G. Howells, M. J. Malaska, B. L. Nunn, J. Radebaugh, L. E. Rodriguez, S. Borges, D. Bower, S. Courville, M. Diaz, B. Hockman, J. Huber, J. Lawrence, T. Vick-Majors, C. A. Nixon, J. R. Spear, A. V. Steckel, A. Solomonidou, N. Schmerr, B. Schmidt, M. O. Schrenk, L. Seyler, A. R. Smith, C. C. Walker, P. Whelley, N. Wolfenbarger, and **S. D. Vance**. "A Comprehensive Framework for Assessing Terrestrial Analogue Field Sites for Ocean Worlds". In: *Journal of Geophysical Research: Planets* 130.9 (Sept. 2025). ISSN: 2169-9100. DOI: 10.1029/2024je008803.

[20] **S. D. Vance**, A. Crosta, M. Melwani Daswani, S. Fagents, B Journaux, and C. Neish. "Exchange processes between surface, atmosphere, and interior". In: *Titan After Cassini-Huygens*. Springer, 2025. DOI: 10.1016/B978-0-323-99161-2.00009-7.

[21] T. M. Becker, M. Yu Zolotov, M. S. Gudipati, J. M. Soderblom, M. A. McGrath, B. L. Henderson, M. M. Hedman, M. Choukroun, R. N. Clark, C. J. Chivers, N. S. Wolfenbarger, C. R. Glein, J. C. Castillo-Rogez, O. Mousis, K. M. Scanlan, S. Diniega, F.P. Seelos, F. Goode W. andPostberg, C Grima, S.-W. Hsu, L. Roth, S. K. Trumbo, K. E. Miller, K. Chan, C. Paranicas, S. M. Brooks, K. M. Soderlund, W. B. McKinnon, C. A. Hibbitts, H. T. Smith, P. M. Molyneux, G. R. Gladstone, M. L. Cable, B. D. Ulibarri Z. E. andTeolis, M. Horanyi, X. Jia, E. J. Leonard, K. P. Hand, **S. D. Vance**, S. M. Howell, L. C. Quick, I. Mishra, A. M. Rymer, C. Briois, D. L. Blaney, U. Raut, J. H. Waite, K. D. Retherford, E. Shock, P. Withers, J. H. Westlake, I. Jun, K. E. Mandt, B. J. Buratti, H Korth, R. T. Pappalardo, and the Europa Clipper Composition Working Group. "Exploring the Composition of Europa with the upcoming Europa Clipper mission". In: *Space Science Reviews* (2024). DOI: 10.1007/s11214-024-01069-y.

[22] C. J. Cochrane, **Vance, S. D.**, J. B. Biersteker, M. J. Styczinski, and B. Weiss. "On detecting and characterizing planetary oceans in the solar system using a distance-based ensemble modelling approach: application to the Uranus system". In: *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 382.2286 (2024). ISSN: 1471-2962. DOI: 10.1098/rsta.2024.0086.

[23] H. J. Lee, Y. Bar-Cohen, M. Badescu, S. Sherrit, M. Panning, **S. Vance**, and S-S. Lih. "Development of elastic wave analyzer for icy sub-surfaces (EWAIS) in water-bearing worlds". In: *Proc. of SPIE* 12950 (2024). DOI: 10.1117/12.3010158.

[24] R. T. Pappalardo, B. J. Buratti, H. Korth, D. A. Senske, D. L. Blaney, D. D. Blankenship, J. Burch, P. R. Christensen, S. Kempf, M. G. Kivelson, E. M. Mazarico, K. D. Retherford, E. P. Turtle, J. H. Westlake, B. G. Paczkowski, T. L. Ray, J. Kampmeier, K. L. Craft, S. M. Howell, R. L. Klima, E. J. Leonard, A. Matiella Novak, C. B. Phillips, Ingrid J. Daubar, J. Blacksberg, S. M. Brooks, M. N. Choukroun, C. J. Cochrane, S. Diniega, C. M. Elder, C. M. Ernst, M. S. Gudipati, A. Luspay-Kuti, S. Piqueux, A. M. Rymer, J. H. Roberts, G. Steinbrügge, M. L. Cable, J. E. C. Scully, J. C. Castillo-Rogez, H. C. F. C. Hay, D. M. Persaud, C. R. Glein, W. B. McKinnon, J. M. Moore, C. A. Raymond, D. M. Schroeder, **S. D. Vance**, D. Y. Wyrick, M. Y. Zolotov, K. P. Hand, F. Nimmo, M. A. McGrath, J. R. Spencer, J. I. Lunine, C. S. Paty, J. M. Soderblom, G. C. Collins, B. E. Schmidt, J. A. Rathbun, E. L. Shock, T. C. Becker, A. G. Hayes, L. M. Prockter, B. P. Weiss, C. A. Hibbitts, A. Moussessian, T. G. Brockwell, H.-W. Hsu, X. Jia, G. R. Gladstone, A. S. McEwen, G. Wesley Patterson, R. L. McNutt Jr.,

J. P. Evans, T. W. Larson, L. A. Cangahuala, G. G. Havens, B. B. Buffington, Ben Bradley, S. Campagnola, S. H. Hardman, J. M. Srinivasan, K. L. Short, T. C. Jedrey, J. A. St. Vaughn, K. P. Clark, J. Vertesi, and C. Niebur. "Science Overview of the Europa Clipper Mission". In: *Space Science Reviews* (2024). DOI: 10.1007/s11214-024-01070-5.

[25] R. S. Park, N. Mastrodemos, R. A. Jacobson, A. Berne, A. T. Vaughan, D. J. Hemingway, E. J. Leonard, J. C. Castillo-Rogez, C. S. Cockell, J. T. Keane, A. S. Konopliv, F. Nimmo, J. E. Riedel, M. Simons, and **S. Vance**. "The Global Shape, Gravity Field, and Libration of Enceladus". In: *Journal of Geophysical Research: Planets* 129.1 (Jan. 2024). DOI: 10.1029/2023je008054.

[26] F. Petricca*, S. Tharimena, D. Melini, G. Spada, A. Bagheri, M. J. Styczinski, and **S. D. Vance**. "Exploring the tidal responses of ocean worlds with PyALMA". In: *Icarus* (2024), p. 116120. DOI: 10.1016/j.icarus.2024.116120.

[27] L. Pou, M. P. Panning, M. J. Styczinski, M. Melwani Daswani, C. Nunn, and **S. D. Vance**. "Tidal Seismicity in the Moon and Implications for the Rocky Interior of Europa". In: *The Planetary Science Journal* 5.6 (2024), p. 142. DOI: 10.3847/psj/ad47bc.

[28] C. Psarakis*, T. Fidelis, K. Chin, B. Journaux, A. Kavner, P. Sarker, M. Styczinski, **S. D. Vance**, and T. Wei. "Electrical conductivity of subsurface ocean analog solutions from molecular dynamics simulations". In: *ACS Earth and Space Chemistry* (2024). DOI: 10.1021/acsearthspacechem.3c00345.

[29] L. R. Schurmeier, G. E. Brouwer, J. P. Kay, S. A. Fagents, A. G. Marusiak, and **S. D. Vance**. "Rapid Impact Crater Relaxation Caused by an Insulating Methane Clathrate Crust on Titan". In: *The Planetary Science Journal* 5.9 (2024), p. 211. DOI: 10.3847/psj/ad7018.

[30] J. R. Szalay, F. Allegrini, R. W. Ebert, F. Bagenal, S. J. Bolton, S. Fatemi, D. J. McComas, A. Pontoni, J. Saur, H. T. Smith, D. F. Strobel, **S. D. Vance**, A. Vorburger, and R. J. Wilson. "Oxygen production from dissociation of Europa's water-ice surface". In: *Nature Astronomy* (2024). DOI: 10.1038/s41550-024-02206-x.

[31] D. Trang, C. E. Swafford, T. A. Kreps, **S. D. Vance**, J. Davidson, J. Filiberto, L. R. Ostrach, and C. R. Richey. "A survey of the severity of mental health symptoms in the planetary science community". In: *Nature Astronomy* 8.6 (June 2024), pp. 691–696. ISSN: 2397-3366. DOI: 10.1038/s41550-024-02293-w.

[32] M. T. Bland, C. Beddingfield, T. A. Nordheim, D. A. Patthoff, and **S. D. Vance**. "Constraints on the composition and thermal structure of Ariel's icy crust as inferred from its largest observed impact crater". In: *Icarus* 395 (2023). DOI: 10.1016/j.icarus.2023.115452.

[33] B. H. Chua, E. Gloesener, M. Choukroun, T. H. Vu, M. Melwani Daswani, B. Journaux, M. J. Styczinski, and **S. D. Vance**. "Low-Temperature Specific Heat Capacity of Water–Ammonia Mixtures Down to the Eutectic". In: *ACS Earth and Space Chemistry* 7.10 (2023), pp. 1971–1979. DOI: 10.1021/acsearthspacechem.3c00091.

[34] C. S. Cockell, M. Simons, J. Castillo-Rogez, P. M. Higgins, L. Kaltenegger, J. T. Keane, E. J. Leonard, K. L. Mitchell, R. S. Park, S. M. Perl, and **S. D. Vance**. "Sustained and comparative habitability beyond Earth". In: *Nature Astronomy* (2023). DOI: 10.1038/s41550-023-02158-8.

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[35] B. Journaux, A. Pakhomova, I. E. Collings, S. Petitgirard, T. Boffa Balaran, J. M. Brown, **S. D. Vance**, S. Chariton, V. B. Prakapenka, D. Huang, J. Ott, K. Glazyrin, G. Garbarino, D. Comboni, and M. Hanfland. "On the discovery of hyper-hydrated sodium chloride hydrates, stable at icy moon conditions". In: *PNAS* 120 (2023). DOI: 10.1073/pnas.2217125120.

[36] A. G. Marusiak*, S. Tharimena, M. P. Panning, S. Stähler, **S. D. Vance**, and C. Boehm. "Estimating the 3D structure of the Enceladus ice shell from flexural and Crary waves using seismic simulations". In: *Earth and Planetary Science Letters* 603 (2023), p. 117984. DOI: 10.1016/j.epsl.2022.117984.

[37] O. Mousis, A. Schneeberger, J. I. Lunine, C. R. Glein, A. Bouquet, and **S. D. Vance**. "Early stages of Galilean moon formation in a water-depleted environment". In: *Ap. J. Lett.* 944 (2023), p. L37. DOI: 10.3847/2041-8213/acb5a4.

[38] M. Naseem, M. Neveu, S. Howell, E. Lesage, M. Melwani Daswani, and **S. D. Vance**. "Salt distribution from freezing intrusions in ice shells on ocean worlds: Application to Europa". In: *Planetary Science Journal* (2023). DOI: 10.3847/PSJ/ace5a2.

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Patents and New Technology Reports

Vance, S., L. E. Christensen, A. Aubrey, 2013. Carbon Responsive Isotope Laser Spectrometer (CRILS). NTR-49291.

Flight Project Experience

2025–present **Europa Clipper: Affiliate to the Europa Clipper Magnetometer Investigation**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Science expert on Europa's geophysics and habitability

2023–present **Standing Review Board Member, Venus Tunable Laser Spectrometer**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Responsible for assessing V-TLS instrument investigation approach to meeting DAVINCI Level 1 science goals

2019–2024 **Europa Clipper: Subject Matter Expert**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Science expert on Europa's geophysics and habitability

2020–2023 **Europa Clipper: Co-Chair, Habitability Assessment Board (HAB)**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Lead for planning science observations and synthesis to meet the mission's overarching mission Goal to investigate Europa's habitability

2015–2020 **Europa Clipper: Facilitator, Habitability Thematic Working Group**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Technical interface between the Habitability Working Group and Project Science team

2015–2019 **Europa Clipper: MASPEX Investigation Scientist**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Science and technical interface between the MASPEX instrument team at the Southwest Research Institute and the Europa Project Science team

2013–2018 **Europa Clipper: Staff Scientist**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Participating in Europa Clipper mission concept formulation activities

October 2011–July 2012 **Project Manager and PI: CubeSat Hydrometric Atmospheric Radiometric Mission (CHARM)**, *JPL Phaeton Program*, Jet Propulsion Laboratory, Pasadena
Developed the early stages of a small Earth-orbiting satellite project to measure radiance temperatures from low-Earth orbit for atmospheric science and rapid TRL advancement. Required hiring, schedule and budget management, and negotiating and documenting requirements according to NASA and JPL project practices

Flight Project Formulation Experience

2022–present **Nightingale New Frontiers Mission Concept Science Team Member**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Provide leadership, guidance, and modeling of geophysical means to investigate the habitability of Saturn's moon Enceladus

2020–2021 **Trident Discovery Mission Concept: Subject Matter Expert**, *Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Provided key modeling data sets for statistical investigation of magnetic induction sounding. Participated in Discovery Review final Site Visit

2018-2020 **Joint Europa Mission Concept: Science Definition Team Member**, *ESA-NASA Study*

2015-Present **JPL Team A Participant**, Jet Propulsion Laboratory, Pasadena
Mission concept target bodies considered: Ceres, Europa, Enceladus, ocean world subsurfaces, Saturn moons

2013, 2014, 2023, 2025 **Planetary Science Summer School Review Board Member**, Jet Propulsion Laboratory, Pasadena
Critiqued studies of Io and ice giants mission concepts.

October 2009 to 2013 **Europa Habitability Mission Study, Science Study Team Member, Science Definition Team member (2012-2013)**, *JPL Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Participated in studies of Flagship class missions to Europa, particularly in aspects related to habitability and composition

Summer 2008 **JPL Planetary Science Summer School**, *JPL Planetary Science Project Office*, Jet Propulsion Laboratory, Pasadena
Participated in development of a mission concept to impact trojan asteroids: SHOTPUT

Prior Research Experience

2009–2010 **Caltech Postdoctoral Fellow**, *supervisor: Dr. Isik Kanik*, Jet Propulsion Laboratory, Pasadena, Developed applications of diffusion mobility spectroscopy. Participated in astrobiology related work as part of the Europa Jupiter System Mission science definition team. Developed the science rationale for instrumentation on the Jupiter Europa Orbiter for EJSM

2007–2009 **NASA Postdoctoral Fellow**, *supervisor: Dr. Christopher R. Webster*, Jet Propulsion Laboratory, Pasadena, Developed scientific applications for the Mars Science Laboratory Tunable Laser Spectrometer using comparable laboratory and field instruments developed at JPL. Investigated applications of physical chemistry to the structure and evolution of habitable planets

2001–2007 **Research Assistant**, *supervisor: Prof. J. Michael Brown*, University of Washington, Seattle, Constructed and operated high-pressure instrumentation; collected and analyzed sound velocity data for aqueous solutions obtained by the method of impulsive stimulated scattering (ISS). Applied results to understanding physical processes in deep extraterrestrial oceans and hydrothermal systems

2003–2004 **Research Associate**, *supervisor: Prof. Jody Deming*, Canadian Arctic Shelf Exchange Study, Prepared and inventoried shipboard laboratory on *CCGS* Amundsen while frozen into Franklin Bay, Northwest Territories, Canada; collected and preserved ice core samples for characterizing winter intra-ice bacterial populations

2003 **Research Associate**, *supervisor: Prof. Tilman Spohn*, Institut für Planetologie, Münster, Reviewed hydrothermal systems literature and investigated means for modeling permeability of extraterrestrial seafloors

2001 **Research Associate**, *supervisor: Dr. Remington Stone*, UCO/Lick Observatory, Operated Nickel reflector telescope to acquire pioneering optical SETI data

1998-2001 **Research Assistant**, *supervisor: Prof. Frank Bridges*, University of California, Santa Cruz, Built apparatus and performed experiments investigating impact sticking of water- and methanol-frosted ices. Applied results to understanding accretion of large-particles ($> cm$-size) in the early solar nebula

Science Community Service

- NASA Decadal Astrobiology Research and Exploration Strategy (NASA-DARES):
  - Task Force 1: Lead
  - Task Force 2: Selected Participant for
  - White paper lead: "Workplace Robustness by Rewarding Self-Care"
  - White paper lead: "Geophysics For Revealing Ocean World Habitability"
- Steering Committee member for OPAG, 2024-present
- Steering Committee member for DPS, 2024-present
- Vice Chair for COSPAR Subcommittee B0.2: Geodesy, 2022-present
- Member, cross-AG Equity Diversity Inclusion and Accessibility (EDIA) Working Group, 2020-present
- Invited panelist for Planetary Protection of Icy Worlds, COSPAR Panel on Planetary Protection (PoPP), National Academies Space Science Week, March 2024
- Lead Author on white papers for the 2023-2032 Planetary Sciences Decadal Survey:
  - "Addressing Mental Health in Planetary Science"
  - "Distributed Geophysical Exploration of Enceladus and Other Ocean Worlds"
  - "Planetary Seismology: The Solar System's Ocean Worlds"
- Vice President, AOGS Planetary Sciences Section, 2024-present
- President, AOGS Planetary Sciences Section, 2019-2024
- Secretary, AOGS Planetary Sciences Section, 2014-2019
- Participant, AGU Congressional Geosciences Visits, September 2008, November 2018
- Lead Author, "Geophysical Investigations of Habitability in Icy Ocean Worlds," white paper for the 2018 NRC Astrobiology panel.
- Participant, NASA Roadmap for Ocean Worlds, 2016
- Contributor and lead author, Astrobiology Strategy (astrobiologyfuture.org), 2013-2015
- NASA Panel Reviewer, 2009, 2014-present
- NASA Panel Review Chair, 2016
- Participant, AAS Planetary Science Congressional Visits, April 2012
- Organizer, Outer Planet Colloquium Series (outerplanets.jpl.nasa.gov), 2008-2011
- Lead Author, "Icy Satellite Processes in the Solar System: A plurality of worlds," white paper for the 2009-2010 Planetary Sciences Decadal Survey (Appendix B)

Conference Honors and Duties; C=Convener, SC=Session Chair

Current Member: American Geophysical Union, Asia Oceania Geoscience Society (**Former President, Vice President, Secretary for Planetary Science**), Division of Planetary Science

- **American Geophysical Union Fall Meeting**
  - 2019-2024: Ice and Ocean Worlds: Geology, Oceanography, Chemistry, Habitability, **C, SC**
  - 2018: P42B, From the Earth to the Moons: Unraveling the Geologic, Oceanographic, and Chemical Mysteries of Ice and Ocean Worlds **C, SC**
  - 2015: P026, Science from Current and Future Planetary Missions **C, SC**
  - 2014: P52A, Icy World Eruptions and Their Analogs **C, SC**
  - 2010: P17, Icy Ocean Worlds **C**
  - 2009: P18, Potential Biomarkers, Mars: Detection, Characterization, Earth Analogue Systems **C**
  - 2006: P31D, Once in a Blue Moon: The Surprising Diversity of Outer Planet Satellites I **SC** P23E, Satellites, Rings, and Ices Posters **SC**
- **Asia Oceania Geosciences Society Meeting**
  - 2026: PS09 Surface Science and Exploration of the Moon and Airless Planetary Bodies including Volatiles, ISRU & Habitat **C**
  - 2020-2024: General Topics in Planetary Science **C**
  - 2018: Lead for PS18 Understanding Icy Worlds, Ocean Worlds, and Habitability **C**
  - 2015: US Secretary for Planetary Science; PS07 Icy Satellites and Rings **C**
  - 2014: PS03 Outer Solar System Satellites With an Atmosphere **C** , PS02 Icy Satellites and Rings, PS09-10 Astrobiology: Habitable Worlds in the Solar System and Beyond, and the Quest for Life's Origins **C**
  - 2013: PS04 Quest for Habitable Worlds, PS13 Active Satellites in the Solar System **C**
  - 2012: PS09 Active Satellites in the Outer Solar System, PS10 Exploring Habitability in the Solar System and Beyond **C**
  - 2011: PS06 Outer Planets and Icy Worlds, PS14 Astrobiology - Life in the Universe **C**
  - 2010: PS03 Astrobiology and Ices **C**, PS11 Satellites and Rings in the Outer Solar System **C**
  - 2009: PS09-15 Planetary Ices and Astrobiology **C**
  - 2008: PS08 Satellites and Rings in the Outer Solar System **C, SC**
- **Astrobiology Science Conference (AbSciCon)**
  - 2024: Geophysical Investigations of Habitability in Icy Ocean Worlds **C, SC**
  - 2022: Deep Dive into the Geophysics of Ocean Worlds **C, SC**
  - 2020: Interiors of habitable planets: influence of deep processes and new sub-surface habitats **C**; The Many Layers of Titan **C** (CANCELLED)
  - 2015: Panelist: Where, why, and how of places to search for life in the Solar System
  - 2012: Serpentinization in Astrobiology: From Molecular to Cosmic Scales **C**
  - 2008: Session 13. The Deep Cold Biosphere? Interior Processes of Icy Satellites and Dwarf Planets **C, SC**, Session 2. Advances in Astrobiological Instrumentation Development **C**
- **Division of Planetary Science (DPS), Online October 2020**, Tuesday Plenary Moderator
- **Titan After Cassini-Huygens, ESAC September 2019**, Science Organizing Committee member
- **First Billion Years: Habitability, Big Sky, Montana, September 2019**, Science Organizing Committee member
- **Cryovolcanism in the Solar System, LPI June 2018**, Science Organizing Committee member

- **Conference on the Habitability of Icy Worlds, 2014** Member of Local Organizing Committee; Ocean Physics and Chemistry **SC**
- **Japanese Geoscience Union Meeting**
  2019: P-PS01 Outer Solar System Exploration Today, and Tomorrow **C, SC** 2018: P-PS01 Outer Solar System Exploration Today, and Tomorrow **C** 2017: P-PS01 Outer Solar System Exploration Today, and Tomorrow **C** 2016: P-PS01 Outer Solar System Exploration Today, and Tomorrow **C** 2015: P-PS01 Outer Solar System Exploration **C, SC**, P-P04 International Collaboration **C, SC**
- **Lunar and Planetary Sciences Conference**
  - 2015: Pluto, Kuiper Belt Objects, and New Horizons: Casting Light on Dark Worlds **SC**
  - 2013: License to Chill (or, the solar system's icy moons), **SC** Dwornik Awards Judge
  - 2009: Special Session: Icy Satellites of Jupiter and Saturn: Cosmic Gymnasts **SC**
  - 2008: Titan **SC**
  - 2007: Astrobiology **SC**
- **Ocean Worlds 4, USRA May 2019**, Science Organizing Committee member
- Graduate Student Representative at Graduate Preliminary Examinations, Department of Earth and Space Sciences, University of Washington, Seattle, 2005-2006
- Graduate Student Representative to Faculty, Department of Earth and Space Sciences, University of Washington, Seattle, 2004-2005

Media Involvement

- Speaker, Texas Eclipse Festival, 2024/04/06
- Guest, Stories From Space podcast 2024/01/27
- Science Consultant, undisclosed video game project 2020-2021
- Science Consultant, The Sea in the Sky podcast, 2018
- Panelist, Europa Clipper, Long Beach Comic Con, 2018/09/07
- Guest, The Pestle podcast, 2017/12/19
- Speaker, Oregon Eclipse Festival, 2017/08/19
- Panelist, Long Beach Aquarium World Oceans day, 2015/06/08
- Lead Artist, Interstellar Emissary, inspired by the Voyager Disc and Record, 2015-present:
  - Mind Field, 2018, Guest S3 E6 "How to Talk to Aliens"
  - Yuri's Night Los Angeles, 2015 and 2018
  - Dr. Mae Jemison - 25 Strong, 2017
  - Burning Man, 2015, 2017, 2019
  - Further Future, 2015
- Guest, Bill Caroll Show, KFI AM 640, 2015/03/31
- Consultant, The Science and Entertainment Exchange, 2011-present
- Panelist, Exploration of Europa, San Diego Comic-Con 2013
- Scientific Advisor, "Europa Report", a feature film, 2011-2013
- Musical Director, "Piled Higher and Deeper," a feature film, 2011

Blog Contributions and Popular Articles

- "How the Solar System's Largest Ocean Worlds Compare in Size", Business Insider, 2016/10
- "My History with the Proposed Europa Clipper Mission," ELSI Blog, 2015/03/12
- "My Month in Japan," ELSI Blog, 2014/09/18
- Europa Multiple Flyby Mission schematic caption, National Geographic, 2014/07
- "Scientific Inspiration in Tokyo," ELSI BLog, 2014/01/21
- "Destination: Europa!" Planetary Society, 2013/12/16
- "Europa Is The New Mars: How Sci Fi Follows Science", Popular Science online, 2013/06

Select Invited Public Lectures

- "The Search for Life in Ocean Worlds", UC Riverside, Palm Desert Campus, 2024/01
- "Exploring Icy Ocean Worlds in the Solar System and Beyond", U St. Andrews, UK, 2018/11.
- "The Europa Clipper Mission", Explore Your Universe, UCLA, 2018/11
- "Exploring Icy Ocean Worlds in the Solar System and Beyond", Rothney Astronomical Observatory, Calgary, 2018/09.

Mentoring—student/postdoc papers denoted with * in Pubs List

- Recruitment to JPL's Planetary Science Section
  1. Space Physicist (internal move) 2022—Corey Cochrane
  2. Lunar Seismologist 2021—Ceri Nunn
  3. Geochemist 2020—Mohit Melwani Daswani
  4. Planetary Seismologist 2017—Mark Panning
- Postdoctoral (joint or **primary** advisor)
  1. Flavio Petricca, 2024-present (NASA PD, JPL)
  2. Ashley Schoenfeld, 2023-present (JPL PD)
  3. Amirhossein Bagheri, 2023-present (Caltech PD)
  4. **Marshall Styczinski**, 2021-2023 (NASA PD, JPL—now Software Engineer, Covisus Inc.)
  5. Angela Marusiak, 2020-2022 (JPL PD—now Assist. Research Prof., U Arizona)
  6. **Saikiran Tharimena**, 2018-2020 (JPL PD—now Senior Data Specialist, Nåva Space Inc.)
  7. **Mohit Melwani Daswani**, 2018-2020 (JPL PD—now Scientist, Institute Science Tokyo)
  8. Baptiste Journaux, 2016-2020 (NASA PD, UW Seattle—now Assoc. Research Prof., UW Seattle)
  9. Olivier Bollengier, 2014-2019 (UW Seattle — now Scientist, U Nantes)
- Graduate
  1. Edoardo Santero Mormile, 2026-present (JVSRP, Università di Trento)
  2. Rose Garrity, 2026-present (JVSRP, UCLA)
  3. Scott Chang, 2025-present (UW Seattle) **jointly advising**
  4. Viviane Figueiredo Peixoto, 2025-2026 (JVSRP, U. Rio de Janero, Brazil)
  5. Mara Niesyt 2025 (CSU STAR, Cal Poly San Luis Obispo)
  6. Leïla Mahboub, 2024 (JVSRP, U Paris-Saclay)
  7. Catherine Psarakis, 2021-present (SURF–YIP–JVSRP, UCLA) **PhD committee**
  8. Mohammad Afzal Shadab, 2023 (SURF, UT Austin)
  9. Mathis Pinceloupe, 2023 (JVSRP, U Nantes)

10. Cody Cly, 2023 (MSP, UTSA)
11. Mara Niesyt 2021 (CSU STAR, Cal Poly San Luis Obispo)
12. Evan Carnahan, 2020-2023 (YIP, UT Austin) **Masters, PhD committee**—now Senior Research Eng., Zendar Inc.
13. Ana Helena de Oliveira Lobo, 2018-2021 (YIP, Caltech)
14. Marshall Styczyinski, 2018-2021 (NASA SG/NESSF, UW Seattle) **PhD committee**
15. Bruno Pereira, 2016 (JVSRP, UC Santa Barbara; returning)
16. Nguyen Nguyen, 2015 (SIRI, CSU Long Beach)
17. Rodolfo Batista Negri, 2015 (JVSRP, George Washington U.)
18. Elena Amador, 2014 (JVSRP, UW, Seattle)
19. Jonathan Bapst, 2014 (JVSRP, UW, Seattle)
20. Nina Bothamy, 2014 (JVSRP, ENS Lyon)
21. Amira Elsenousy, 2014 (JVSRP, U Arkansas)
22. Bruno Pereira, 2013 (JVSRP, Brazil, U. Federal de Uberlândia)
23. Mathieu Bouffard, 2012 (JVSRP, ENS Lyon)
24. Aomawa Shields, 2011 (JVSRP, UW Seattle)
25. Patricia Gavin, 2011 (JVSRP, U Arkansas)
26. Shelly Shaul, 2009 (CSU STAR, Cal Poly Pomona)
27. Nicholas Castle, 2007 (Graduate Student, UW Seattle)

- Undergraduate

1. Jesus Cortes 2025 (Summer Space Grant, Colby College)
2. Scott Chang 2024-2025 (Europa Clipper ICONS–YIP, UW Madison)
3. Artyom Lisitsyn, 2021 (YIP, U Edinburgh)
4. Samentha Dumervil, 2020-2021 (MSP, Howard U)
5. Andrew Chan, 2020-2021 (SURF, YIP, Caltech)
6. Jeremy Engels, 2019 (YIP, UCLA)
7. Nikhil Pawar, 2019 (YIP, UCLA)
8. Katherine Vega, 2018 (SIP, CU Boulder)
9. Lacy Schneemann, 2018 (YIP, USC)
10. Eduardo Salazar, 2017-2018 (YIP, Cal Poly Pomona)
11. Elise Cutts, 2016 (SURF, Caltech)
12. Riley James, 2016 (SURF, Occidental College)
13. Peiyun Zhu, 2016 (Caltech SURF, U. Michigan)
14. Jesse Mendoza, 2016 (UCR MIRO, UC Riverside)
15. Kimberly Lykens, 2015 (CSU STAR, Stebbins High School)
16. Leila Chang, 2015 (YIP, Yale)
17. Garrett Levine, 2015 (SURF, Caltech)
18. Yury Aglyamov, 2015 (SURF, Caltech)
19. Cauê Borlina, 2015 (YIP, U-Michigan—now Prof. at Purdue U.)
20. Jessica Williams, 2014-2016 (SIRI-YIP, Cal Poly Pomona)
21. Natalie Cobian, 2015 (SIRI, East LA College)
22. Hohvannes Gregorchuk, 2014-2015 (SIRI-YIP, Glendale Community College)
23. Marika Leitner, 2014 (YIP, CSU Humboldt)
24. Eliav Maas, 2013-2014 (SIRI-YIP, Santa Monica Community College)

25. Rana Abdel Sattar, 2013 (SIRI, Glendale Community College)
26. Adam Hoffmann, 2013 (SIRI, Mt. San Antonio Community College)
27. Roshan Nanu, 2010 (SURF, Caltech)
28. Noemie Pochat, 2009 (Undergraduate Summer Fellow, Wheaton College)
29. Hoku West-Foyle, 2006-2007 (MinPhys lab intern, UW Seattle)
30. Virginia Player, 2006 (MinPhys lab intern, UW Seattle)

Teaching Experience

2026 **Guest Lecturer**, *Great Papers in Astrobiology, EAS/CHEM/BIOS 8802/4802*, Georgia Institute of Technology, Lecture and group discussion on the review of our understanding of the chemistry of Saturn's moon Enceladus

2026 **Guest Lecturer**, *Graduate Intro to Planetary Processes*, Caltech, Lecture on structure and solid-state convection in icy worlds, including assigned problems

2020-present **Lead**, *Habitable Geophysics Group*, Jet Propulsion Laboratory, Caltech, Coordinate an active group of students, interns, postdocs, and collaborators around the country for weekly research exchange, journal discussion, and career development. Maintain an active Slack workspace to support these activities

2023 **Guest Lecturer**, *Graduate Seminar*, Massachusetts Institute of Technology, Lecture on geophysical exploration of ocean worlds

2023 **Guest Lecturer**, *Graduate Seminar*, University of California, Los Angeles, Lecture on geophysical exploration of ocean worlds

2021 **Guest Lecturer**, *Spring Summer School*, European Astrobiology Network Association, Lecture on hydrothermal systems and habitability of Europa

2017, 2019, 2021, 2023 **Guest Lecturer**, *Geobiology & Astrobiology, BISC 483*, University of Southern California, Discussion of ocean worlds and mission concepts for exploring them

2005-2007 **Founder and Facilitator**, *UWAB Planetology Discussion Group*, University of Washington, Seattle, Organized weekly reviews among fellow astrobiology graduate students of selected journal articles pertaining to the formation and evolution of solar system objects and exoplanets

Winter 2004 **Teaching Assistant**, *Physics Department*, University of Washington, Seattle, 114 and 121: Waves and Mechanics. Taught three sections, approximately 20 students per section

2002-2003 **Visiting Scientist**, *Project AstroBio*, Seattle, Presented two guest lectures for a Seattle fifth grade class of approximately 30 students

2002-2005 **Tutor**, *University Tutoring Service*, Seattle, Three undergraduate or high-school students per year. Topics included algebra, trigonometry, calculus, physical chemistry, and introductory physics

Spring-Summer, 2001 **Teaching Assistant**, *Physics Department*, University of California, Santa Cruz, 5B Labs: Wave motion in matter, including sound waves. Taught two sections, approximately 20 students per section

1998-2001 **Mathematics and Physics Tutor**, *Self-employed*, University of California, Santa Cruz, Taught two undergraduate or high-school students per year on average. Topics included econometrics, calculus, and introductory physics

Awards and Honors

- JPL Team Award, "For extraordinary [group leadership] during the COVID pandemic," 2021
- JPL Team Award, "For contributions on the Trident Discovery Class Mission...." 2021
- JPL Voyager Award, "Acting Group Supervisor for Planetary Chemistry and Astrobiology," 2019
- JPL Team Award, "For leadership & development of the Titan Astrobiology Institute node," 2018
- JPL Voyager Award, "For significant contributions to the Europa Mission," 2016
- JPL Voyager Award, "For refurbishments of the Planetary Ices Laboratory," 2015
- JPL Group Achievement Award, "For ... advancing our understanding of the habitability, survivability, and detectability of life on icy worlds through transdisciplinary astrobiological investigations," 2015
- NASA Postdoctoral Fellowship, 2007-2009
- Misch Fellowship, 2007
- Stephens Graduate Support Grant, 2006
- National Science Foundation IGERT/NASA Astrobiology Institute Grant, 2002-2005
- Research support, University of Washington Alumni Grant, Winter / Spring, 2003-2004
- Elks National Foundation Scholarship, 1996-2000 / Kern County Elks Scholarship, 1996
- Howard and Mamie Nichols Scholarship, 1996-2000
- Texaco Foundation Scholarship, 1996-2000
- David Wayne Christensen Memorial Scholarship, 1997
- Kleines Deutschland Scholarship, 1996

Recent Oral Presentations

Vance, S.D., C. J. Cochrane, M. Melwani Daswani, S. Reddy, 2025. Overview of Magnetic Induction in the Solar System's Icy Moons. *4th Outer Planet Moon-Magnetosphere Interaction Workshop* **INVITED** *Cologne, Germany*

Vance, S.D., 2024. Investigating the Habitability of the Solar System's Ocean Worlds. *Cambridge Origins Federation Workshop* **INVITED** *Leverhulme Centre for Life in the Universe, Moller Institute, Cambridge University, United Kingdom*

Vance, S.D., B. Journaux, J. Castillo-Rogez, U. Jones, M. Melwani Daswani, C. Cochrane 2024. Hot and Cold Futures for Large Ocean Worlds. *Astrobiology and the Future of Life* **INVITED** *Lunar and Planetary Institute, Houston*

Vance, S.D. 2024. How do Seafloor Processes Work in Ocean Worlds? Scientific Ocean Drilling & NASA Science: A workshop to Explore Missions to Planet Earth **INVITED** *Washington DC*

Vance, S.D. 2023. The Habitability of Ocean Worlds in the Solar System. *Network for Ocean Worlds Workshop* **INVITED** *Wrigley Institute, Catalina Island*

Vance, S.D. 2023. Europa Clipper's Exploration of Ocean World Habitability: Toward Joint Inversion of Geophysical Data to Determine Interior Properties. *Fujihara Seminar* **INVITED** (Mount Naeba, Japan).

Vance, S.D. 2022. Electrical Conductivity Data for Investigating Ocean World Habitability. *COSPAR*. **INVITED** (Athens).

Vance, S.D. 2022. Revealing the Salty Secrets of Icy Ocean Worlds. *Workshop on Ice-Ocean Interactions in Moons in the Solar System*. **INVITED** (Princeton).
Vance, S.D. 2021. **INVITED** participant, "Next Generation Planetary Geodesy", Keck Institute for Space Studies.
Vance, S.D. 2020. Using Geophysics to Investigate the Habitability of Ocean Worlds. *ISAS Planetary Exploration Workshop*. **INVITED** (online only).
Vance, S.D. and J. Green 2020. Current and Future Prospects for International Cooperation in Planetary Sciences *Joint JpGU-AGU Meeting*. **INVITED** (cancelled due to COVID-19).
Vance, S., R. Barnes, B. Journaux, 2020. Our solar system's ocean worlds as analogue habitable ice-covered exoplanets. Exoplanets in our Backyard. Woodlands, TX. **INVITED**.
Vance, S.D. and M. Melwani Dawani 2019. Hydrothermal Activity in the Solar System's Ocean Worlds. *Fall AGU Meeting*. **INVITED**.
Vance, S.D., 2019. Exploring Icy Ocean Worlds in the Solar System and Beyond. *Earth Science Colloquium*, University of Oregon, Eugene. **INVITED**.
Vance, S.D., 2018. Exploring Icy Ocean Worlds in the Solar System and Beyond. *Physics Colloquium*, University of Calgary. **INVITED**.
Vance, S.D., 2018. Serpentin(it)e and the search for life beyond Earth. *Serpentinite in the Earth System*, Royal Society, London. **INVITED**.
Vance, S.D., 2018. Exploring Icy Ocean Worlds in the Solar System and Beyond. *Physics Colloquium*, University of Calgary. **INVITED**.
Vance, S.D., J. M. Brown, O. Bollengiar, B. Journaux, E. H. Abramson, G. Shaw, M. Malaska, 2018. Delving Into Ocean World Interiors. *Experimental Analysis of the Outer Solar System*, U. Arkansas, Fayetteville. **INVITED**.
Vance, S.D., 2018. Habitability of Icy Moons. *Pop-Up Institute on Planetary Habitability*, UT Austin. **INVITED**.
Vance, S.D., 2018. Deep Oceans in Large Icy Moons. *Workshop on "ExoOceans: Space Exploration of the Outer Solar System Icy Moons Oceans"*, ISSI, Bern. **INVITED**.
Vance, S.D., 2016. DIY Thermodynamics: Developing flexible equations of state for fluids and using them to understand planetary interiors. *Georgia Tech Earth and Atmospheric Sciences Geophysics Seminar*. Atlanta. **INVITED**.
Vance, S.D., 2016. Atmosphere disequilibration in different planetary contexts. *Georgia Tech Earth and Atmospheric Sciences Seminar*. Atlanta. **INVITED**.
Vance, S.D., 2016. Atmosphere disequilibration in different planetary contexts. *Earth-Life Science Institute Annual Symposium*. Tokyo. **INVITED**.
Vance, S.D., K. P. Hand, R. T. Pappalardo, 2015. Geophysical Controls on the Habitability of Icy Worlds: Focus on Europa. *Japanese Geosciences Union*. Makuhari Messe, Chiba City.
Vance, S., 2015. Europa and other icy worlds: Astrobiology at the water rock interface and beyond. Natural History Museum of Los Angeles, staff seminar, **INVITED**.
Vance, S., 2015. Thermodynamic and Geophysical Constraints on the Habitability of Icy World and Exoplanet Oceans, Canadian Astrobiology Training Program Seminar. **INVITED**.
Vance, S., 2015. Thermodynamic and Geophysical Constraints on the Habitability of Icy World and Exoplanet Oceans, Canadian Astrobiology Training Program Seminar. **INVITED**.

Languages

German	Fluent (CEFR B2) but out of practice
French	Intermediate
Japanese	Beginner/Intermediate
Spanish	Beginner/Intermediate
Turkish	Beginner
Portuguese	Beginner

Computer skills

Code Matlab, Python, C, LabView, git

Hardware Custom PCs, RPi, Arduino, National Instruments

Design SolidWorks, Illustrator, LaTeX

Field Work

- Instrument deployment, gas sampling, serpentinization on three continents
- Two live-aboard oceanographic cruises; I don't get seasick easily!
- SCUBA: PADI Advanced Open Water certified

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