

SYLVAIN PIQUEUX

Planetary and Exoplanetary Atmospheres, Jet Propulsion Laboratory
Phone: 818-393-9595 Fax: 818-354-2494 Sylvain.Piqueux@jpl.nasa.gov

Dr. Sylvain Piqueux is a Research Scientist (IV) at JPL/Caltech. His work focuses on characterizing planetary surface processes to constrain the geological history of the Solar System, with an emphasis on volatiles on Mars, the Moon, and Europa. He is an expert with thermal infrared data analysis and thermophysical modeling. He is an active science team member of multiple NASA missions, and the PI of several NASA-funded grants.

EDUCATION

Ph.D.	Planetary Sciences	Arizona State University	2009
M.S.	Geodynamics	Ecole Normale Supérieure, France	2003
M.S.	Sedimentary Basin Modeling	University of Paris VI, France	2003

PROFESSIONAL EXPERIENCE

Research Scientist	JPL/ California Institute of Technology	2015-present
Post-doctoral Researcher	JPL/ California Institute of Technology	2013-2014
Program Associate	AAAS, Washington, DC	2012
Post-doctoral Researcher	Arizona State University	2010-2011

MISSION EXPERIENCE

Europa Clipper	E-THEMIS Co-I and Investigation Scientist	2016-present
Mars Reconnaissance Orbiter	MCS Co-I	2013-present
InSight	Council of Terrains and HP ³ Science Team Member	2014-present
Mars Odyssey	THEMIS Co-I	2004-present
Mars 2020	Council of Terrains and <i>ad hoc</i> JPL Tasks	2016-present
Lunar Reconnaissance Orbiter	Diviner Science Team Member	2015-2018
Mars Science Laboratory	Science Team Member	2015-2017
Mars Global Surveyor	TES Science Team Member	2004-2006

SELECTED RESEARCH AWARDS

*Science PI P. Buhler **Estimation

<i>Program</i>	<i>Role</i>	<i>Budget</i>	<i>Period</i>
Mars Data Analysis Program	Co-I	\$ 58k	2021-2023
Solar System Workings	PI*	\$499k	2020-2022
Solar System Workings	PI	\$402k	2016-2019
Planetary Data Archiving, Restoration, and Tools	PI	\$545k	2016-2019
Critical Data Product, Mars 2020 Landing Site Char.	Co-I	\$200k	2016-2018
Critical Data Product, InSight Landing Site Char.	Sci. PI	\$120k	2016-2018
Mars Data Analysis	PI	\$331k	2015-2018
Mars Fundamental Research	Sci. PI	\$300k**	2010-2013
Mars Fundamental Research	Sci. PI	\$300k**	2007-2010
Critical Data Product, Phoenix Landing Site Monitoring	Co-I	\$ 30k**	2006

SELECTED PROFESSIONAL SERVICE AND AWARDS

Prizes/Awards:	NASA Group Achievement Awards x 2	2020
	NASA Early Career Public Achievement Medal	2018
	JPL Lew Allen Award for Excellence	2017
	JPL Voyager Award	2016
	Icarus Outstanding Reviewer Award	2015
	Antarctica Service Medal - US Dept. of Defense	2012
	Merit Prize Univ. Paris VI, France	2002
	Student Prize – Commiss. Ener. Atom. (CEA), France	1995

Organization/Chair:	AGU Fall Meeting, USA	2016-2017
	DPS 48 / EPSC 11, USA	2016
	6 th Int. Mars Pol. Sci. and Exploration, Iceland	2016
	3 rd Int. Workshop Mars Pol. Ener. Balance, USA	2009
Advising/Mentoring	Peter Buhler (NPP)	2018-2020
	Jon Bapst (JPL)	2018-2021
	+ 6 JPL Interns	2018-present
Panelist/Reviewer:	Mars Data Analysis	
	Outer Planet Research	
	Planetary Geology and Geophysics	
	Solar System Workings	
	NASA Postdoctoral Program	
	Mars Fundamental Research	
Journal Reviewer:	Planetary Instrument Definition and Development	
	Journal of Geophysical Research-Planets	
	Icarus	
	Nature–Geosciences	
	Geophysical Research Letters	
	Remote Sensing of the Environment	

JPL/CALTECH PRESS RELEASES (LEADING AUTHOR ONLY)

<i>Test for Damp Ground at Mars' Seasonal Streaks Finds None</i> jpl.nasa.gov/news/news.php?feature=6597	2016
<i>Frosty Cold Nights Year-Round on Mars May Stir Dust</i> jpl.nasa.gov/news/news.php?feature=6564	2016
<i>NASA's Treasure Map for Water Ice on Mars</i> nasa.gov/feature/jpl/nasas-treasure-map-for-water-ice-on-mars	2019
<i>Science at Sunrise: Solving the Mystery of Frost Hiding on Mars</i> mars.nasa.gov/news/9184/science-at-sunrise-solving-the-mystery-of-frost-hiding-on-mars/	2022

PUBLICATIONS

- Lange, L., + 11 **colleagues**, (2022), InSight Pressure Data Recalibration, and its Application to the Study of Long-Term Pressure Changes on Mars, *J. Geophys. Res.*, accepted.
- Lange, L., **Piqueux, S.**, and C. Edwards, (2022), Gardening of the Martian Regolith by Diurnal CO₂ Frost and the Formation of Slope Streaks, *J. Geophys. Res.*, 127, 4, doi: 10.1029/2021JE006988
- Piqueux, S.**, + 19 colleagues, (2021), Soil Thermophysical Properties Near the InSight Lander Derived From 50 Sols of Radiometer Measurements, *J. Geophys. Res.*, 126, 8, doi: DOI10.1029/2021JE006859.
- Müller, N., **Piqueux, S.**, + 16 colleagues, (2021), Near Surface Properties of Martian Regolith Derived From InSight HP3-RAD Temperature Observations During Phobos Transits, *Geophys. Res. Lett.*, 48, 15, doi: DOI10.1029/2021GL093542.
- Piqueux, S.**, Vu, T.H., Bapst, J., Garvie, L.A.J., Choukroun, M., Edwards, C.S., (2021), Specific Heat Capacity Measurements of Selected Meteorites for Planetary Surface Temperature Modeling, *J. Geophys. Res.*, 126, 11, doi: DOI10.1029/2021JE007003.
- Grott, M., + 16 **colleagues**, (2021), Thermal Conductivity of the Martian Soil at the InSight Landing Site From HP3 Active Heating Experiments, *J. Geophys. Res.*, 126, 7, doi: DOI10.1029/2021JE006861.
- Ahern, A.A., Rogers, A.D., Edwards, C.S., **Piqueux, S.**, (2021), Thermophysical Properties and Surface Heterogeneity of Landing Sites on Mars From Overlapping Thermal Emission Imaging System (THEMIS) Observations, *J. Geophys. Res.*, 126, 8, doi: DOI10.1029/2020JE006713.

- Buhler, P.B., and **S. Piqueux**, (2021), Obliquity-Driven CO₂ Exchange Between Mars' Atmosphere, Regolith, and Polar Cap, *J. Geophys. Res.*, 126, 5, doi: DOI10.1029/2020JE006759.
- Diniega S., + 18 **colleagues**, (2021), Modern Mars' geomorphological activity, driven by wind, frost, and gravity, *Geomorphology*, 380, 107627, doi: 10.1016/j.geomorph.2021.107627.
- Golombek, M. Kass, D., Williams, N., Warner, N., Daubar, I., **Piqueux, S.**, Charalambous, C., Pike, W.T., (2020), Assessment of InSight Landing Predictions, *J. Geophys. Res.*, 125, 8, doi: 10.1029/2020JE006502.
- Shirley, J. H., Kleinböhl, A., Kass, D. M., Steele, L. J., Heavens, N. G., Suzuri, S., **Piqueux, S.**, Schofield, J. T., McCleese, D. J., (2020), *Geophys. Res. Lett.*, 47, 9, doi: 10.1029/2019GL084317.
- Gary-Bicas, C.E., Hayne, P.O., Horvath, T., Heavens, N. G., Kass, D.M., Kleinböhl, A., **Piqueux, S.**, Shirley, J. H., Schofield, J. T., McCleese, D. M., (2020), *J. Geophys. Res.*, 125, 5, doi:10.1029/2019JE006150.
- Smith I. B., + 38 colleagues, (2020), The Holy Grail: A road map for unlocking the climate record stored within Mars' polar layered deposits, *Plan. Space. Sci.*, 184, doi: 10.1016/j.pss.2020.104841.
- Golombek, M., + 46 colleagues, (2020), Geology of the InSight Landing Site on Mars, *Nature Com.*, 11, 1, doi:10.1038/s41467-020-14679-1;
- Piqueux, S.**, Buz, J., Edwards, C.S., Bandfield, J.L., Kleinböhl, A., Kass, A.M., Hayne, P.O., and the MCS and THEMIS teams, (2019), Widespread Shallow Water Ice on Mars at High and Mid Latitudes, *GRL*, 46, 24, 14,290-14,298, doi:10.1029/2019GL083947.
- Heavens, N. G., Kass, D. M., Shirley, J. H., **Piqueux, S.**, Cantor, B. A., (2019), An Observational Overview of Dusty Deep Convection in Martian Dust Storms, *J. Atm. Sci.*, 76, 11, 3299-3326, doi: 10.1175/JAS-D-19-0042.1
- Buhler, P. B., Ingersoll, A. P., **Piqueux, S.**, Ehlmann, B. L., Hayne, P. O., (2019), Coevolution of Mars's atmosphere and massive south polar CO₂ ice deposit, *Nature Astron.*, 10.1038/s41550-019-0976-8.
- Mischna, A. M. and **S. Piqueux**, (2019), The Role of Atmospheric Pressure on Mars Surface Properties and Early Mars Climate Modeling, *Icarus*, doi:10.1016/j.icarus.2019.113496.
- Vu, T. H., **Piqueux, S.**, Choukroun, M., Edwards, C.S., Chritensen, P.R., Glotch, T.D., (2019), Low-temperature specific heat capacity measurements and application to Mars thermal modeling, *Icarus*, 321, 824-840, doi: 10.1016/j.icarus.2018.10.004.
- Morgan, P., Grott, M., Knapmeyer-Endrun, B., Golombek., M., Delage, P., Loignonne, P., **Piqueux, S.**, + 10 colleagues, (2018), A Pre-Landing Assessment of Regolith Properties at the InSight Landing Site, *Space Sci. Rev.*, 214, 6, UNSP 104.
- Golombek, M., + 45 colleagues, (2018), Geology and Physical Properties Investigations by the InSight Lander, *Space Sci. Rev.*, 214, 5, UNSP 84.
- Smith, I., Diniega, S., Beaty, D., Thorsteinssen, T., Becerra, P., Bramson, A., Clifford, S., Hvidberg, C. Portyankina, C., **Piqueux, S.**, Spiga, A., Titus, T., (2018), 6th international conference on Mars polar science and exploration: Conference summary and five top questions, *Icarus*, 308, 2-14, doi: 10.1016/j.icarus.2017.06.027.
- Edwards, C., **Piqueux, S.**, Hamilton, V., Ferguson, R., Herkenhoff, K., Vasavada, A., Bennett, K., Sacks, L., Lewis, K., Smith, M., (2018), The Thermophysical Properties of the Bagnold Dunes, Mars: Ground-Truthing Orbital Data, *J. Geophys. Res.*, 123, 5, 1307-1326, doi:10.1029/2017JE005501.
- Heavens, N., Kleinböhl, A., Chaffin, M., Halekas, J.S., Kass, D.M., Hayne, P.O., McCleese, D.J., **Piqueux, S.**, Shirley, J.H., and J.T. Schofield, Enhanced hydrogen escape from Mars's atmosphere because of deep convection in dust storm (2018), *Nature Astron.*, 2, 2, 126-132, doi: 10.1038/s41550-017-0353-4.
- Golombek, M., Kipp, D., Daubar, I.J., Ferguson, R., Kirk, R.L., Beyer, R., Huertas, A., **Piqueux, S.**, + 26 colleagues, (2017), Selection of the InSight Landing Site, *Space Sci. Rev.*, 211,1-4,5-95, doi: doi.org/10.1007/s11214-016-0321-9.
- Siegler, M.A., Smekar, S.E., Grott, M., **Piqueux, S.**, Müller, N., Williams, J.-P., Plesa, A.-C., Spohn, T., (2017), The InSight Mars Lander and Its Effect on the Subsurface Thermal Environment, *Space Sci. Rev.*, 211,1-4,259-275, doi: doi.org/10.1007/s11214-017-0331-2.
- Schaible, M., Johnson, R., Zhigilei, Z., **Piqueux, S.**, (2017), High energy electron sintering of icy regolith: formation of the PacMan anomalies at Saturn, *Icarus*, 285, 211-223, doi: 10.1016/j.icarus.2016.08.033.
- Vasavada, A. R., **S. Piqueux**, K. W. Lewis, M. T. Lemmon, M. D. Smith, (2017), Thermophysical properties along *Curiosity's* traverse in Gale crater, Mars, derived from the REMS ground temperature sensor, *Icarus*, 284, 372-386, doi: 10.1016/j.icarus.2016.11.035.

- Piqueux, S., Kleinböhl, A., Hayne, P., Heavens, N., Kass, D., McCleese, D., Schofield, J., Shirley, J.,** (2016), Discovery of a widespread low-latitude diurnal CO₂ frost cycle on Mars, *J. Geophys. Res.*, *121*, 1174-1189, doi:10.1002/2016JE005034.
- Edwards, C., **Piqueux, S.**, The Water Content of Recurring Slope Lineae on Mars, (2016), *Geophys. Res. Let.*, *43*, 8912-8919, doi:10.1002/2016GL070179.
- Plesa, A., Grott, M., **Piqueux, S.**, Sielger, Interannual Variability of the Martian Surface Planetary Heat Flow Due to Dust Loading of the Atmosphere, (2016), *J. Geophys. Res.*, *121*, 2166-2175, doi:10.1002/2016JE005127.
- Piqueux, S., Byrne, S., Titus, Timothy, Hansen Candice, Kieffer H.,** (2015), Enumeration of Mars Years since the Beginning of the Telescopic Exploration, *Icarus*, *251*, 332-338.
- Heavens, N., Cantor, B., Hayne, P., Kass, D., Kleinböhl, K., McCleese, D., **Piqueux, S.**, Schofield, J., Shirley J., (2015), Extreme Detached Dust Layers near Martian Volcanoes: Evidence for Dust Transport by Mesoscale Circulations Forced by High Topography, *Geophys. Res. Let.*, *42*, 10, 3730-3738, doi: 10.1002/2015GL064004.
- Piqueux, S., Kleinböhl, A., McCleese, D., Hayne, P., Schofield, T., Kass, D.,** (2015), Variability of the martian seasonal CO₂ cap extent over eight mars years, *Icarus*, *251*, 164-180 doi: 10.1016/j.icarus.2014.10.045.
- Brown, A., **Piqueux, S., Titus, T.,** (2014), A H₂O ice cycle on the CO₂ ice south polar cap of Mars, *Earth Plan. Sci. Let.*, *406*, 102-109, doi: 10.1016/j.epsl.2014.08.039.
- Piqueux, S., and P.R. Christensen,** (2012), Visible and thermal infrared observations of the Martian surface during three Phobos shadow transits, *Geophys. Res. Let.*, doi:10.1029/2012GL053352.
- Piqueux, S., and P.R. Christensen** (2011), Temperature-dependent thermal inertia of homogeneous Martian regolith, *J. Geophys. Res.*, *116*, E7, doi:10.1029/2011JE003805.
- Piqueux, S., and P. R. Christensen** (2009), A model of thermal conductivity for planetary soils: 1. Theory for unconsolidated soils, *J. Geophys. Res.*, *114*, E9, doi:10.1029/2008JE003308.
- Piqueux, S., and P.R. Christensen** (2009), A model of thermal conductivity for planetary soils: 2. Theory for cemented soils, *J. Geophys. Res.*, *114*, E9, doi:10.1029/2008JE003309.
- Piqueux, S., C.S. Edwards, and P.R. Christensen** (2008), Distribution of the ices exposed near the south pole of Mars using Thermal Emission Imaging System (THEMIS) temperature measurements, *J. Geophys. Res.*, *113*, E8, doi:10.1029/2007JE003055.
- Piqueux, S., and P. R. Christensen** (2008), North and south sub-ice gas flow and venting of the seasonal caps of Mars: A major geomorphological agent, *J. Geophys. Res.*, *113*, E6, doi:10.1029/2007JE003009.
- Piqueux, S., and P.R. Christensen** (2006), Deposition of CO₂ and erosion of the Martian south perennial cap between 1972 and 2004: Implications for current climate change, *J. Geophys. Res.*, *113*, E2, E02006, doi: 10.1029/2007JE002969.
- Piqueux, S., S. Byrne, and M. I. Richardson** (2003), Sublimation of Mars's southern seasonal CO₂ ice cap and the formation of spiders, *J. Geophys. Res.*, *108*, E8, doi:10.1029/2002JE002007.

PRESENTATIONS (FIRST AUTHOR ONLY)

- Piqueux, S., et al.,** (2021), Ongoing Shallow Water Ice Mapping Campaign by the Mars Climate Sounder, Eos Trans. AGU, Fall Meet., Suppl. #P25G-2230.
- Piqueux, S., A. Kleinböhl, P. O. Hayne, D. M. Kass, N. Heavens, D. J. McCleese M. I. Richardson J. T. Schofield, J. Shirley,** Atmospheric CO₂ Depletion at the Surface in the Polar Regions of Mars, (2020), 7th Mars Polar Sci. Conf., Ushuaia, Argentina, #6016.
- Piqueux, S., et al.,** (2020), Ongoing Shallow Water Ice Mapping Campaign by the Mars Climate Sounder, Eos Trans. AGU, Fall Meet., Suppl. #P023-0010.
- Piqueux, S., Buz, J., Edwards, C.S., Bandfield, J.L., Kleinböhl, A., Kass, A.M., Hayne, P.O., and the MCS and THEMIS teams,** Widespread Shallow Water Ice on Mars at High and Mid Latitudes, (2019), Eos Trans. AGU, Fall Meet., Suppl. #P23C-2737.P54A-07.
- Piqueux, S., Buz, J., Edwards, C.S., Bandfield, J.L., Kleinböhl, A., Kass, A.M., Hayne, P.O., and the MCS and THEMIS teams,** Widespread Shallow Water Ice on Mars at High and Mid Latitudes, (2019), 9th Int. Conf. on Mars, Pasadena, California, #2089.

- Piqueux, S.,** Vu, T., Choukroun, M., Garvie, L., Edwards, S., (2019), Specific Heat Capacity of a Suite of Meteorites and Mineral Endmembers between 100 and 285K - Implications for Planetary Thermal Modeling, Thermal Models for Planetary Science III, Budapest, Hungary.
- Piqueux S.,** Edwards C. S., Ferguson R., L. Laura J., Weintraub A., et al., (2018), Improving Thermal Model Capability for the Planetary Science Community, XLIX Lunar Plan. Sci. Conf., LPI, Houston, #1027.
- Piqueux, S.,** Kass, D.M., Kleinboehl, A., Hayne, P.O., Heavens, N.G., McCleese, D.J., Schofield, J.T., Shirley, J.H., (2017), Dedicated Low Latitude Diurnal CO₂ Frost Observation Campaigns by the Mars Climate Sounder, Eos Trans. AGU, Fall Meet., Suppl. #P23C-2737.
- Piqueux, S.,** A. Kleinböhl, P. O. Hayne, N. G. Heavens, D. M. Kass, D. J. McCleese, J. T. Schofield, J. H. Shirley, (2017): Widespread Low-Latitude Diurnal CO₂ Frost on Mars, XLVIII Lunar Plan. Sci. Conf., LPI, Houston, #1485.
- Piqueux, S.,** A. Kleinböhl, P. Hayne, D. Kass, J. Schofield, D. McCleese, M. Richardson, (2017), Near-Surface Non-Condensable Gas Enrichment in the Martian Polar Regions from MCS Surface Observations, 6th Int. Workshop Mars Atm.: Modelling and Obs., Granada, Spain.
- Piqueux, S.,** P. Hayne, A. Kleinböhl, C. Edwards, C. Elder, N. Heavens, D. Kass, D. McCleese, J. Schofield, J. Shirley, M. Smith (2016), Global Surface Dust Distribution Changes on Mars (MY 28-33), Eos Trans. AGU, Fall Meet., Suppl. #P21A-20174.
- Piqueux, S.,** and the Diviner Team, (2016), Depth-Dependency of Lunar Regolith Thermophysical Properties from Transient Shadows Observed by Diviner, XXXVII Lunar Plan. Sci. Conf., LPI, Houston, #1762.
- Piqueux, S.,** and the MCS Team: A widespread low-latitude diurnal CO₂ frost cycle on Mars revealed by Mars Climate Sounder observations (2015), Eos Trans. AGU, Fall Meet., Suppl. #P22A-03.
- Piqueux, S.,** Kleinböhl, A., McCleese, D., Hayne, P., Schofield, T., Kass, D., and the MCS Team: Thermal Inertia Mapping Using Mars Climate Sounder Measurements., (2014), Eos Trans. AGU, Fall Meet. Suppl. #P33A-4021.
- Piqueux, S.,** Kleinböhl, A., McCleese, D., Hayne, P., Schofield, T., Kass, D., and the MCS Team: Tracking the Seasonal Caps of Mars over Eight Mars Years, (2013), Eos Trans. AGU, Fall Meet. Suppl., #P31C-06.
- Piqueux, S.,** (2013), Thermophysical Modeling and Measurements of Martian-Like Particulated Materials: Effect of Temperature and Cementing Phases, Jet Propulsion Laboratory, Mars Seminar.
- Piqueux S.** and P. Christensen: (2012), *invited*, Radiometric determination of particulate material thermal conductivity between 77-300K at-and-below atmospheric pressure, Eos Trans. AGU, Fall Meet. Suppl. #P11F-08.
- Piqueux, S.,** (2011), *invited*, Exploring the Surface of Mars with Thermal Infrared Data, University of California Riverside, Department of Earth Science Seminar.
- Piqueux S.** and P.R. Christensen (2009), Basal Sublimation and Venting of the North Translucent (“Cryptic”) Seasonal Cap, 3rd Int. Workshop on Mars Pol. En. Bal. & CO₂ Cycle, LPI, Seattle, #7001.
- Piqueux, S.,** Edwards, C., Christensen, P.R., (2009) Summer Surface Temperatures of the North Polar Region of Mars as Measured by THEMIS, Eos Trans. AGU, 90(52), Fall Meet. Suppl., # P43D-1466.
- Piqueux S.** and P.R. Christensen (2007), Recent Deposition of CO₂ and Erosion of the South Polar Cap: Implications for Climate Change, 7th Intern. Conf. Mars, Caltech, Pasadena, #3068.
- Piqueux, S.,** and P.R. Christensen, (2007), Basal sublimation and venting of the north seasonal cap of Mars, Eos Trans. AGU, 88(52), Fall Meet. Suppl., # P11A-0258.
- Piqueux S.** Christensen, P.R., (2007), Basal Sublimation of the Seasonal Caps and Sub-Ice Gas Flow: A Major Geomorphological Agent in the Martian Polar Regions, 7th Intern. Conf. Mars, Pasadena, #3069, 2007.
- Piqueux S.,** Christensen, P.R., Mapping the Exposed Water Ice and CO₂ Perennial Cap Around the South Pole of Mars with THEMIS Visible and Infrared Data, XXXVI Lunar Plan. Sci. Conf., LPI, Houston, #1163, 2006.
- Piqueux, S.,** Edwards, C., Ferguson, R., Christensen, P.R., (2006), Exposed Surface and Subsurface Material around the South Pole of Mars, Eos Trans. AGU, 87(52), Fall Meet. Suppl., # P31A-0119.
- Piqueux, S.,** Byrne, S., and M.I. Richardson (2003), Polygonal landforms at the South Pole and implications for exposed water ice, 6th Intern. Conf. Mars, Caltech, Pasadena, #3275.