

Patricio Becerra, Ph.D

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EDUCATION

11.2011 – 08.2016	University of Arizona , Tucson, AZ, USA Doctor of Philosophy [PhD] , Planetary Sciences (Minor in Geosciences) Thesis: "The Poles of Mars, Past and Present: A high-resolution observational study of the Martian Polar Regions and their connection to climate"
12.2012 – 12.2013	Graduate Certificate in Engineering Management
09.2009 – 11.2011	Master of Science [MSc] , Planetary Sciences
03.2002 – 12.2007	Pontificia Universidad Católica del Perú , Lima, Peru Bachelor of Science [BSc] , Physics

PROFESSIONAL EXPERIENCE

01.2021 – Present	Micro-Cameras and Space Exploration (MCSE) SA , Neuchâtel, Switzerland (NCCR PlanetS Technology Platform Knowledge Transfer grant) <i>Project Manager:</i> <ul style="list-style-type: none">- RadCam for ESA's JUICE Monitoring Cameras (JMC): Management of the design, construction, qualification and delivery of a color calibration target and image processing software for ESA's JMC (project under extremely tight schedule) <i>Project Scientist:</i> <ul style="list-style-type: none">- NASA Volatiles Investigating Polar Exploration Rover (VIPER) Imaging System (VIS): Leading the characterization and radiometric calibration of sensors for the 8 cameras of NASA's VIPER lunar rover- Cleanroom and calibration setup: Management of the concept, design, procurement and development of an in-house laboratory for the calibration of imaging sensors and camera systems.
02.2017 – Present	Physikalisches Institut, Universität Bern , Bern, Switzerland <i>Postdoctoral Researcher in Space Research and Planetary Sciences</i> <ul style="list-style-type: none">- Led multidisciplinary research projects in collaboration with local and international senior scientists and students- Made and published scientifically relevant discoveries through:<ul style="list-style-type: none">o Acquisition, manipulation and analysis of remote sensing data (images, spectra, topography, radar) of the Martian surfaceo Simulations and modelling to interpret remote sensing datao Design and execution of laboratory experiments: Electrical properties of soil samples to simulate the surfaces of Mars and Comets- Co-organized the 7th International Conference on Mars Polar Science and Exploration (2 weeks, 100 people). Brought conference to South America for the first time in its history.
08.2016 – 01.2017	Department of Planetary Sciences, University of Arizona , Tucson, AZ, USA <i>Research Specialist</i> <ul style="list-style-type: none">- Pattern detection in images of the Mars north polar ice cap
09.2009 – 07.2016	<i>Graduate Research Associate</i> <ul style="list-style-type: none">- Designed, led and successfully completed a multi-year, NASA-funded PhD project focused on studying the Martian polar ice sheets

03.2007 – 05.2009	<ul style="list-style-type: none"> - Specialised in data processing and analysis of satellite images, hyperspectral images, and 3D products (digital elevation models) - Created a novel data extraction method based on Fourier/Wavelet analysis and signal matching of geophysical data - Constructed a model of spectral reflectance to simulate data from satellite cameras and spectrometers (model is still in frequent use) <p>National Commission for Aerospace Research and Development (CONIDA) – Peruvian Space Agency, Lima, Peru</p> <p><i>Research Assistant: Astronomy Department</i></p> <ul style="list-style-type: none"> - Created and led a planetary astronomy research group - Organized a week-long Short Course on Planetology for 70 people - Successfully evaluated and reported on the sky conditions of a site selected for the construction of an observatory in Moquegua, Peru, through acquisition and processing of telescope images (Established a working relationship with agricultural communities around the observatory site, contributing to their education and development)
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SPACECRAFT MISSION EXPERIENCE

01.2021 – Present	<p>Bifrost – A helicopter mission concept to the north polar cap of Mars</p> <p><i>Mission Concept Definition Team (5 people)</i></p> <ul style="list-style-type: none"> - Definition of mission science objectives given engineering constraints and opportunities posed by a hexacopter that would land and fly on Mars
04.2021 – Present	<p>VIPER-VIS –Volatiles Investigating Polar Exploration Rover Imaging System</p> <p><i>MCSE Project Scientist</i></p> <ul style="list-style-type: none"> - Definition of requirements and execution of procedures for the calibration of the VIPER-VIS camera sensors
03.2021 – Present	<p>Jupiter ICy Moons Explorer (JUICE) Monitoring Cameras (JMC)</p> <p><i>MCSE Project Manager for image processing and color</i></p> <ul style="list-style-type: none"> - Led the design, assembly, integration, testing, and delivery to ESA of a color calibration target and image processing software for the JMC cameras
09.2017 – Present	<p>Colour and Stereo Surface Imaging System (CaSSIS) – Stereo camera onboard ESA ExoMars Trace Gas Orbiter</p> <p><i>Science Theme Deputy Lead for Ice and Periglacial Processes</i></p> <ul style="list-style-type: none"> - Managed several successful data acquisition campaigns - Selected, planned and reviewed scientifically relevant goals and data - Tested and validated image compression algorithms
08.2016 – Present	<p>High Resolution Imaging Science Experiment (HiRISE) – Ultra high-resolution camera onboard NASA Mars Reconnaissance Orbiter</p> <p><i>Science Theme Lead for Climate Change</i></p> <ul style="list-style-type: none"> - Prioritize image acquisition objectives related to climate change theme
09.2018 – 02.2020	<p>2019 NASA Discovery Program Mission Proposal: Climate Orbiter for Mars Polar Atmospheric and Subsurface Science (COMPASS)</p> <p><i>Co-Investigator: Dual-Mode Radar (Sounder and SAR) Instrument</i></p> <ul style="list-style-type: none"> - Member of a multi-national team of scientists that designed and proposed a mission to the NASA Discovery program (cost cap: USD 500 Million) - Co-designed measurement objectives for the radar instrument to meet the scientific goals of the mission
08.2014	<p>NASA Planetary Science Summer School: Argus (Io flyby mission)</p> <p><i>Risk and Programmatics Chair/Imaging camera Principal Investigator</i></p> <ul style="list-style-type: none"> - Member of a multidisciplinary team of scientists and engineers tasked with designing a viable NASA mission proposal in two weeks - Analysed risk and designed mitigation strategies of the mission - Devised measurement goals and required technical specifications of the camera instrument

APPROVED GRANTS

04.2021 – 06.2021	JUICE Monitoring Camera Simulator. NCCR PlanetS Technology Platform. “Knowledge Transfer with a Short-Term Project” <i>Principal Investigator</i>
04.2018 – 03.2020	Investigation of the solar system using remote sensing and laboratory techniques. Swiss National Science Foundation grant 200020_178847 <i>Contributor</i>
09.2016 – 08.2020	Ice Deposits in Polar Craters on Mars. NASA Mars Data Analysis Program grant number 80NSSC17K0510. NASA, USA <i>Contributor</i>
09.2013 – 08.2016	Wavelet Analysis of Martian Polar Stratigraphy from HiRISE Topography. NASA Earth and Space Science Fellowship grant NNX13AO55H. NASA, USA <i>Principal Investigator</i>

FELLOWSHIPS, AWARDS, HONOURS

04.2019	Geosciences Journal Travel Award
04.2019	Universität Bern Young Academics Support Award
04.2014	University of Arizona College of Science Galileo Circle Scholar
02.2014	Lunar and Planetary Institute Career Development Award
05.2013	NASA Earth and Space Science Fellowship
04.2013	Lunar and Planetary Laboratory Graduate Teaching Excellence Award

SUPERVISION OF JUNIOR RESEARCHERS

09.2018 – Present	Physikalisches Institut, Universität Bern, Bern, Switzerland <i>Main advisor to Adomas Valantinas. Ph.D. student. Remote Sensing Analysis of Slope Streaks in Arabia Terra, Mars. Official supervisor: Prof. Nicolas Thomas</i>
08.2020 – 02.2021	<i>Co-advisor to Lukas Affolter. M.Sc. student (Now a Ph.D. student at the Paul Scherrer Institute/Swiss Federal Institute of Technology in Zürich). Dielectric and photometric properties of Martian simulant soils. Co-supervised with Dr. Antoine Pommerol.</i>
01.2020 – 09.2021	Brown University, Providence, RI, USA <i>Advising collaborator to Alyssa Pascuzzo. Ph.D. student. Detangling the processes recorded in ice: Geomorphic and hyperspectral analysis of Mars’ north polar spiral troughs. Principal supervisor: Prof. Jack Mustard</i>
09.2017 – 09.2018	Georgia Institute of Technology, Atlanta, GA, USA <i>Advising collaborator to Sergio Parra. B.Sc. Student (Now a Ph.D. student at the California Institute of Technology). Surface texture of the North Polar Ice Cap of Mars. Principal supervisor: Dr. Sarah M. Milkovich (JPL)</i>

TEACHING

09.2017 – 12.2020	Physikalisches Institut, Universität Bern, Bern, Switzerland <i>Teaching Assistant in: Laborkurs Moderne Physik II, Physikpraktikum für Minor Physik und Pharmazie, Physik Praktikum Studierende Biologie.</i> Instructors: Prof. Ingo Leya, Prof. Michele Weber, Prof. Saverio Braccini
09.2015 – 12.2015	Department of Planetary Sciences, University of Arizona, Tucson, AZ, USA <i>Guest lecturer in: PTYS554 Evolution of Planetary Surfaces (Postgraduate level course).</i>
02.2012 – 06.2013	<i>Teaching Assistant in: PTYS214 Astrobiology, PTYS170B1 The Universe and Humanity.</i>

INSTITUTIONAL RESPONSIBILITIES

02.2017 – 12.2020	Physikalisches Institut, Universität Bern , Bern, Switzerland Centre for Space Research & Planetary Sciences (WP), Universität Bern, Seminar Series: <i>Committee Member</i>
03.2014 – 03.2015	Department of Planetary Sciences, University of Arizona , Tucson, AZ, USA Lunar and Planetary Laboratory “Mission Work” Seminar Series: <i>Co-creator and organiser</i>
08.2010 – 08.2012	Lunar and Planetary Laboratory Conference: <i>Co-organizer</i>

INVOLVEMENT IN CONFERENCES AND WORKSHOPS

01.2020	7th International Conference on Mars Polar Science and Exploration , Ushuaia, Argentina <i>Co-Lead Organizer and Convener, Session Chair, Lead Synthesizer</i>
07.2019	Ninth International Conference on Mars , Pasadena, CA, USA <i>Session Chair</i>
08.2017 – 11.2017	Keck Institute for Space Science Workshop “Unlocking the Climate Record Stored within Mars' Polar Layered Deposits I and II” <i>Invited lecturer and workshop participant</i>
03.2017, 03.2018 03.2016	Lunar and Planetary Science Conference , The Woodlands, TX, USA <i>GSA Dwornik Award judge</i> <i>Session chair</i>
09.2016	6th International Conference on Mars Polar Science and Exploration , Reykjavik, Iceland <i>Session chair</i>
11.2008	CONIDA First Short Course on Planetology , Lima, Peru <i>Lead organizer and convener</i>

SCIENTIFIC REVIEW

2017 – Present	NASA ROSES Planetary Science Research Program <i>Panelist and/or External Reviewer for Research and Analysis proposals to: Mars Data Analysis Program (MDAP), Cassini Data Analysis Program (CDAP), New Frontiers Data Analysis Program (NFDAP), NASA Earth and Space Science Fellowship (NESSF)</i>
2015 – Present	<i>Referee for: Icarus (2017 certificate for outstanding contribution), Planetary and Space Science, Nature Astronomy, Science Advances, Monthly Notices of the Royal Astronomical Society, Journal of Geophysical Research – Planets</i>
2016	NASA ROSES Planetary Science Research Program <i>Executive Secretary for Instrument Development proposals to Planetary Instrument Concepts for the Advancement of Solar System Observations (PICASSO)</i>

INVITED PRESENTATIONS

02.2021	<i>Why fly a drone to Mars' north pole? – Invited expert scientist presentation to NASA/JPL program managers on the best possible scientific motivation for a UAV mission to the Martian poles.</i>
10.2020	<i>Radar investigations of ice bodies on Mars – Seminar on Microwave Physics and Atmospheric Physics. Physics Institute, University of Bern.</i>
09.2020	<i>Los hielos polares de Marte y su registro climático – Coloquios de Física. Departamento Académico de Ciencias, Pontificia Universidad Católica del Perú.</i>

01.2020	<i>El Hielo de Marte: Glaciología Marciana en Ushuaia</i> – Keynote public talk during the 7th International Conference on Mars Polar Science and Exploration, Ushuaia, Tierra del Fuego, Argentina.
03.2019	<i>Estudios de la superficie de Marte con el Colour and Stereo Surface Imaging System (CaSSIS) a bordo de Trace Gas Orbiter de ESA</i> – Curso de Geomorfología de la Patagonia Argentina, Universidad de la Patagonia Austral, Río Gallegos, Santa Cruz, Argentina.
11.2018	“Listening to Mars’ Polar Climate Record” – Invited outreach presentation for Astronomy on Tap, Bern
10.2018	<i>Imaging of the Martian surface by the Colour and Stereo Surface Imaging System (CaSSIS) of ExoMars Trace Gas Orbiter</i> – Center for Space Habitability Lunch Seminar, Universität Bern
03.2018	<i>The Icy Polar Deposits of Mars and their Connection to Climate</i> – Earth and Atmospheric Sciences Seminar Series, Georgia Institute of Technology, Atlanta, GA, USA.
08.2017	<i>Polar Stratigraphy</i> – Short Course Lecture for the Keck Institute for Space Science Workshop “Unlocking the Climate Record Stored within Mars’ Polar Layered Deposits I”. California Institute of Technology, Pasadena, CA, USA.
11.2016	<i>Decifrando el Récord Climático de los Polos de Marte</i> – Department of Physics. Pontificia Universidad Católica del Perú. San Miguel, Lima, Perú.
12.2014	<i>Halos en el Polo Sur de Marte</i> – Comisión Nacional de Investigación y Desarrollo Aeroespacial. San Isidro, Lima, Perú.

OUTREACH AND PRESS

02.2018 – 08.2021	Management of CaSSIS social media
07.2020	SRF 10-vor-10 interview about the status and “big questions” of Mars Science
09.2019	Phys.org article “ Ice islands on Mars and Pluto could reveal past climate change ” on 2019 JGR paper with Michael M. Sori, et al.
07.2019	EOS Editors’ Highlight and Cover Image on 2019 GRL paper: Timescales of the climate record in the south polar ice cap of Mars
06.2019	Designed the CaSSIS Mars display for the “Bern im All” event on the Bern Bundesplatz in celebration of 50 years of the Apollo 11 Moon landing
12.2018 – Present	External advisor to “The Mars Society – Chile”
05.2018	Founder of the “Planetólogos Latinos” Facebook group: A community of Latin-American planetary scientists
07.2018 – 12.2019	Astronomy on Tap – Bern: Organisation collaborator
02.2017	EOS Research Spotlight on 2017 GRL paper: Signals of astronomical climate forcing in the exposure topography of the North Polar Layered Deposits of Mars
12.2016	Interview on Radio Capital in Lima, Peru to promote the study of planetary science within the Peruvian high-school and university student community
2014, 2015	Outreach presentations on planetary science in Tucson, AZ, USA and Lima, Peru

SKILLS AND CERTIFICATIONS

Imaging and sensor calibration

- Experience with European Machine Vision Association (EMVA) 1288 standard for characterizing and calibrating cameras and sensors (AEON EMVA 1288 Training Course, October 2021)

Data analysis and computing

- Pattern detection in imaging data through time-series analysis and signal matching
- Remote sensing data analysis: Imaging (HiRISE, CTX, CaSSIS, MOC), spectroscopy (CRISM), sub-surface sounding radar (SHARAD), topography (MOLA, HiRISE & CaSSIS Digital Terrain Models)

- Remote sensing software: ESRI® ArcGIS, ENVI Image Processing and Analysis, Java Mission-planning and Analysis for Remote Sensing (JMARS), NASA NAIF SPICE Toolkit (Domestic training class, Columbia, MD. October 2014), PLAN-C planning software for CaSSIS targeting, USGS Integrated Software for Imagers and Spectrometers (ISIS3)
- Photogrammetric Processing of Planetary Stereo Imaging with SO CET SET®
- Programming: IDL (Advanced), Matlab (Intermediate), Python, C (Basic)
- Mac OSX, MS Windows, Unix/Linux, MS Office, MS Project, Adobe Creative Suite, and Internet tools

Laboratory Experience

- Coaxial microwave measurement of dielectric properties of wet and granular samples
- Granular sample handling: grain size distribution control through sonic sifting, particle density measurements (helium pycnometer)
- Goniometry and bidirectional reflectance distribution function (BRDF) measurements

Field Experience

- Field course in quaternary geomorphology (Santa Cruz, Argentina. Spring 2019)
- Roughness of lava flows (Volcanoes National Park, Hawai'i, USA. Spring 2014)
- Terrestrial Laser Scanning of vegetation bands (Southern Nevada, USA. Spring 2012)
- Planetary geology field courses (Southwestern USA. 2009 – 2014)

PROFESSIONAL MEMBERSHIPS

- European Geosciences Union
- American Astronomical Society, Division of Planetary Sciences
- American Geophysical Union
- Europlanet Society
- The Planetary Society
- International Association of Cryospheric Sciences

PEER-REVIEWED PUBLICATIONS

* Research advisee or student collaborator

In prep.

Becerra, P., Mateu, I., Halser, L., Pommerol, A., Kinch, K.M., Madsen, M.B., Braccini, S. Reflectance evolution under ionising radiation of ceramic color standards for radiometric calibration, *in prep.*

*Pascuzzo, A.C., A.M. Bramson, **P. Becerra**, J.F. Mustard. Development and evolution of exposed icy layers at Mars north pole through space and time, *in prep.*

Almeida, M., M. Read, N. Thomas, G. Cremonese, **P. Becerra**, G. Borrini, M. Gruber, R. Heyd, C.M. Marriner, G. McArthur, A.S. McEwen, A. Pommerol, J. Perry, C. Schaller. Planning targeted images on Mars with ExoMars' Colour and Stereo Surface Imaging System, *in prep. for Planetary and Space Science*

Tornabene L.L., **P. Becerra**, V. Rangarajan, F. Seelos, S. Byrne, C. Cesar, S. Conway, G. Cremonese, A. Lucchetti, G. Munaretto, A. McEwen, M. Pajola, M. Patel, L. Perry, A. Pommerol, N. Thomas, J. Wray, *A. Valantinas. Colour and multispectral analysis with the ExoMars Trace Gas Orbiter's Colour and Stereo Surface Imaging System (CaSSIS), *in prep. for Planetary and Space Science*

Under review

Lethuillier, A., E. Kaufmann, C. Feller, **P. Becerra**, A. Pommerol, N. Hännidd, D. Haack, D. Rebecca, B. Gundlach, J. Blum, G. Kargl, J. Knollenberg, N. S. Molinski, T. Gilke, H. Sierks, P. Tiefenbacher, H. Capelo, C. Güttler, K. Otto, D. Bischoff, M. Schweighart (2021) Cometary dust analogue for physics experiments, *under review in Mon. Not. R. Astron. Soc.*

*Valantinas, A., **P. Becerra**, A. Pommerol, N. Thomas, E. Hauber, L.L. Tornabene, A.S. McEwen, G. Cremonese (2021) Multi-Angular Observations of Martian Slope Streaks, *under minor revisions for Planetary and Space Science (CaSSIS special issue)*

Grau Galofre A., Serla J., **P. Becerra** (2021) Gelifluction lobes inside Reull Vallis: A case study for the integration of CaSSIS data, *under review in Planetary and Space Science (CaSSIS special issue)*

Pommerol, A., N. Thomas, **P. Becerra**, M. Almeida, M. Read, E. Simioni, C. Re, G. Cremonese, A. McEwen, J. Perry, L. Tornabene, S. Tulyakov (2021) In-flight photometric calibration of images taken by the ExoMars TGO Colour and Stereo Surface Imaging System, *under review in Planetary and Space Science (CaSSIS special issue)*

Munaretto, G., M. Pajola, A. Lucchetti, G. Cremonese, E. Simioni, C. Re, S. Bertoli, L. Tornabene, A. McEwen, **P. Becerra**, V.G. Rangarajan, A. Valantinas, A. Pommerol, N. Thomas, G. Portyankina (2021) Multiband

photometry of Martian Recurring Slope Lineae (RSL) and dust-removed features at Horowitz crater, Mars from TGO/CaSSIS color observations, *under review in Planetary and Space Science (CaSSIS special issue)*

Sori, M.M., **P. Becerra**, J. Bapst, S. Byrne, R. McGlasson. Orbital forcing of Martian climate revealed in an outlier ice deposit, *submitted to Nature Astronomy*

In press/published

Becerra, P., I.B. Smith, C. Andres, A.M. Bramson, P. Buhler, A. Coronato, S. Diniega, J.A. Emmett, A. Grau Galofre, C. HERNY, S. Hibbard, M.A. Kahre, J.P. Knightly, S. Nerozzi, G. Portyankina, J. Rabassa, L. Tamppari, T. Titus, J.L. Whitten, Z. Yoldi (2021), Past, Present and Future of Mars Polar Science: Outcomes and Outlook from the 7th International Conference on Mars Polar Science and Exploration, *The Planetary Science Journal*, 2:209, <https://doi.org/10.3847/PSJ/ac19a5>

Dundas, C.M., **P. Becerra**, S. Byrne, M. Chojnacki, I. J. Daubar, S. Diniega, C.J. Hansen, K.E. Herkenhoff, M. Landis, A.S. McEwen, G. Portyankina, *A. Valantinas (2021) Active Mars: A Dynamic World, *J. of Geophys. Res.: Planets*, <https://doi.org/10.1029/2021JE006876>

Thomas, N., **P. Becerra**, I.B. Smith, (2021) Mars and the ESA Science Programme: The case for Mars Polar Science, *Experimental Astronomy*, <https://doi.org/10.1007/s10686-021-09760-6>

G. Munaretto, M. Pajola, G. Cremonese, C. Re, A. Lucchetti, E. Simioni, A. S. McEwen, A. Pommerol, **P. Becerra**, S. J. Conway, N. Thomas, M. Massironi (2020), First CaSSIS observations of Martian Recurring Slope Lineae: implications for their origin and evolution, *Planetary and Space Science* 187, <https://doi.org/10.1016/j.pss.2020.104947>

Smith, I.B., P.O. Hayne, S. Byrne, **P. Becerra**, M. Kahre, W. Calvin, C.S. Hvidberg, S. Milkovich, P. Buhler, M. Landis, B. Horgan, A. Kleinbohl, M. Perry, R. Obbard, J. Stern, S. Piqueux, N. Thomas, K. Zacny, L. Carter, L. Edgar, J. Emmett, T. Navarro, J. Hanley, M. Koutnik, N. Putzig, B. Henderson, J.W. Holt, B. Ehlmann, S. Parra, D. Lalich, C. Hansen, M. Hecht, D. Banfield, K. Herkenhoff, D.A. Paige, M. Skidmore, R.L. Staehle, M. Siegler (2020) The Holy Grail: A Strategy for Unlocking the Climate Record Stored within Mars' Polar Layered Deposits, *Planetary and Space Science*, 184, <https://doi.org/10.1016/j.pss.2020.104841>.

Sori, M.M., J. Bapst, **P. Becerra**, and S. Byrne (2019), Islands of ice on Mars and Pluto, *J. of Geophys. Res.:Planets*, 124. <https://doi.org/10.1029/2018JE005861>. Cover of the issue.

Becerra, P., Sori, M. M., Thomas, N., Pommerol, A., Simioni, E., Sutton, S. S., Tulyakov, S., Cremonese, G. (2019). Timescales of the climate record in the south polar ice cap of Mars. *Geophys. Res. Lett.* 46, 7268–7277. <https://doi.org/10.1029/2019GL083588>. AGU Eos Editors' Highlight (<2% of papers are highlighted) and cover of the issue.

Brouet, Y., **Becerra, P.**, Sabouroux, P., Pommerol, A., Thomas, N., (2018), A Laboratory-based Dielectric Model for the Radar Sounding of the Martian Subsurface, *Icarus* 321: 960-973, <https://doi.org/10.1016/j.icarus.2018.12.029>.

Brouet, Y., Cerubini, R., Pommerol, A., Thomas, N., Neves, L., Sabouroux, **P., Becerra, P.**, Grima, C., (2018) Dielectric spectroscopy measurements of saline aqueous solutions in the VHF-UHF bands: towards a dielectric model for icy satellites' water reservoirs. *Proceedings of the 5th IEEE International Workshop on Metrology for Aerospace*. <https://doi.org/10.1109/MetroAeroSpace.2018.8453527>

Smith, I.B., S. Diniega, D.W. Beaty, T. Thorsteinsson, **P. Becerra**, A. M. Bramson, S.M. Clifford, C.S. Hvidberg, G. Portyankina, S. Piqueux, A. Spiga and T.N. Titus (2018), 6th international conference on Mars polar science and exploration: Conference summary and five top questions, *Icarus* 308: 2-14, <https://doi.org/10.1016/j.icarus.2017.06.027>

Tornabene, L.L, F. P. Seelos, A. Pommerol, N. Thomas, C.M. Caudill, **P. Becerra**, J.C. Bridges, S. Byrne, M. Cardinale, M. Chojnacki, S.J. Conway, G. Cremonese, C.M. Dundas, M.R. El-Maarry, C.J. Hansen, K. Hansen, T.N. Harrison, R. Henson, L. Marinangeli, A.S. McEwen, M. Pajola, S.S. Sutton, J.J. Wray (2018), Simulation and assessment of the colour and spatial capabilities of the Colour and Stereo Surface Imaging System (CaSSIS) on the ExoMars Trace Gas Orbiter, *Space Sci. Rev.* 214: 18. <https://doi.org/10.1007/s11214-017-0436-7>.

Becerra, P., M. M. Sori, and S. Byrne (2017), Signals of astronomical climate forcing in the exposure topography of the North Polar Layered Deposits of Mars, *Geophys. Res. Lett.*, 44, 62–70, <https://doi.org/10.1002/2016GL071197>. AGU Eos Research Spotlight.

Becerra, P., S. Byrne, M. M. Sori, S. Sutton, and K. E. Herkenhoff (2016), Stratigraphy of the north polar layered deposits of Mars from high-resolution topography, *J. Geophys. Res. Planets*, 121, 1445–1471, <https://doi.org/10.1002/2015JE004992>.

Brown, A. J., Calvin, W.M., **Becerra, P.**, Byrne, S. (2016), Martian north polar cap summer water cycle, *Icarus*, 277, 401 - 415, doi:10.1016/j.icarus.2016.05.007.

- Thompson, M.S., Zega, T.J., **Becerra, P.**, Keane, J.T., Byrne, S. (2016). The Oxidation State of Nanophase Fe Particles in Lunar Soil: Implications for Space Weathering. *Meteoritics and Planetary Science* 51, 6: 1082–1095. <https://doi.org/10.1111/maps.12646>.
- Becerra, P.**, Byrne, S., Brown A. J. (2015). Transient Bright “halos” on the South Polar Residual Cap of Mars: Implications for mass balance. *Icarus* 251: 211-225. doi: 10.1016/j.icarus.2014.04.050.
- Pelletier, J. D., DeLong, S. B., Orem, C. A., **Becerra, P.**, Compton, K., Gressett, K., Lyons-Baral, J., McGuire, L. A., Molaro, J. L., and Spinler J. C. (2012). How do vegetation bands form in dry lands? Insights from numerical modelling and field studies in southern Nevada, USA. *J. Geophys. Res.*, 117, F04026, <https://doi.org/10.1029/2012JF002465>.
- French, R.S., Showalter, M. R., Sfair, R., Argüelles, C., Pajuelo, M., **Becerra, P.**, Hedman, M. M., Nicholson, P. D. (2012). The Brightening of Saturn’s F Ring. *Icarus* 219: 181-193. <https://doi.org/10.1016/j.icarus.2012.02.020>

NON-REFEREED PUBLICATIONS

- Becerra, P.**, I.B. Smith, A. Coronato, J. Rabassa (2020). Mars Polar Science at the End of the World. *Nature Astronomy* (Meeting Report). <https://doi.org/10.1038/s41550-020-1127-y>
- Becerra, P.**, A.M. Bramson, A.J. Brown, et al. (2020) The Importance of the Climate Record in the Martian Polar Layered Deposits, White Paper #144 submitted to the Planetary Science and Astrobiology Decadal Survey 2023–2032, *Bulletin of the AAS*, Vol. 53, Issue 4, <https://doi.org/10.3847/25c2cfef.90c37f59>
- Smith, I.B., Hayne, P.O., Byrne, S., **P. Becerra**, et al. (2020) Unlocking the Climate Record Stored within Mars’ Polar Layered Deposits, White Paper #378 submitted to the Planetary Science and Astrobiology Decadal Survey 2023–2032, *Bulletin of the AAS*, Vol. 53, Issue 4, <https://doi.org/10.3847/25c2cfef.f5ee96dc>
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LANGUAGES

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