

**Dr. Patricio Becerra**

Curriculum Vitae

Space Research and Planetary Sciences  
 Physikalisches Institut  
 Gesellschaftsstrasse 6  
 Universität Bern  
 CH-3012 Bern

Tel.: +41 78 697 64 38  
 E-mail: [patricio.becerra@space.unibe.ch](mailto:patricio.becerra@space.unibe.ch)  
 URL: [www.pbecerra.com](http://www.pbecerra.com)  
 LinkedIn: [www.linkedin.com/in/patriciobecerra](http://www.linkedin.com/in/patriciobecerra)

---

**EDUCATION**

---

**University of Arizona, Tucson, AZ, USA**

*Doctor of Philosophy [PhD], Planetary Sciences (Minor in Geosciences)* Conferred: **08/2016**

Dissertation: “The Poles of Mars, Past and Present: A high-resolution observational study of the Martian Polar Regions and their connection to climate”. Advisor: Dr. Shane Byrne

*Master of Science [MSc], Planetary Sciences* Conferred: **11/2015**

*Graduate Certificate in Engineering Management* Conferred: **12/2013**

**Pontificia Universidad Católica del Perú, Lima, Peru**

*Bachelor of Science [BSc], Physics* Conferred: **02/2008**

---

**HONORS AND AWARDS**

---

<a href="#">Geosciences Travel Award</a>	<b>04/2019</b>
Universität Bern Young Academics Support Award	<b>04/2019</b>
Sigma Xi International Research Conference Superior Student Presentation Award	<b>11/2014</b>
University of Arizona College of Science Galileo Circle Scholar	<b>04/2014</b>
Lunar and Planetary Institute Career Development Award	<b>02/2014</b>
NASA Earth and Space Science Fellowship	<b>05/2013</b>
Lunar and Planetary Laboratory Graduate Teaching Excellence Award	<b>04/2013</b>

---

**RESEARCH POSITIONS HELD**

---

**Planetary Imaging Group, Physikalisches Institut, Universität Bern, Bern, Switzerland**

*Postdoctoral Researcher in Space Research and Planetary Sciences* **02/2017 – Present**  
 Advisor: Prof. Dr. Nicolas Thomas, Physikalisches Institut Director.

- Paleoclimatology and stratigraphy of the Martian Polar Layered Deposits
- Remote sensing-based process geomorphology of the Martian polar regions
- Laboratory-based microwave studies of planetary analogue materials

**Lunar and Planetary Laboratory, Department of Planetary Sciences, University of Arizona, Tucson, AZ, USA**

*Research Specialist* **08/2016 – 01/2017**

Advisor: Dr. Shane Byrne, Associate Professor of Planetary Sciences.

- Periodicity analysis of the surface texture of the North Polar Residual Cap of Mars

**Lunar and Planetary Laboratory, Department of Planetary Sciences, University of Arizona, Tucson, AZ, USA**

*Graduate Research Associate* **09/2009 – 07/2016**

Advisor: Dr. Shane Byrne, Associate Professor of Planetary Sciences.

- Observations, image processing, and surface reflectance modelling of transient features on the south polar residual cap of Mars. Funded by Dr. Byrne's NASA Mars Data Analysis Program grant number NNX09AM01G.
- Quantitative analysis of Mars polar stratigraphy using high-resolution topographic data. Funded by own NASA Earth and Space Science Fellowship award number NNX13AO55H.

**National Commission for Aerospace Research and Development (CONIDA) – Peruvian Space Agency, Lima, Peru**

*Research Assistant: Astronomy Department* **03/2007 – 05/2009**

Department Lead: Walter Guevara

- Founded Planetary Science Research group.
- Photometric analysis of Saturn's F-ring from NASA Cassini's Imaging Science Subsystem (ISS). External Advisor: Dr. Mark Showalter (SETI/NASA Ames)
- Observations and data reduction to evaluate sky conditions for the construction of an observatory in Moquegua, Peru. Established a working relationship with surrounding agricultural communities, contributing to their education and development.

**Gemini Observatory (Gemini South), La Serena, Chile**

*Trainee: Observational Astronomy* **08/2007**

Advisor: Dr. Percy Gómez, Associate Scientist

- Image processing and photometry of star clusters

---

**PLANETARY EXPLORATION MISSION INVOLVEMENT**

---

**2019 NASA Discovery Mission Proposal: Climate Orbiter for Mars Polar Atmospheric and Subsurface Science (COMPASS)**

*Co-Investigator* **09/2018 – Present**

**Colour and Stereo Surface Imaging System (CaSSIS) – ESA ExoMars Trace Gas Orbiter (TGO)**

*Science Theme Deputy Lead (STDL) for Ice and Periglacial Processes* **02/2017 – Present**

- Management of observation campaigns, target prioritization, review of acquired images

*CaSSIS Targeting Lead (CaTL)* **02/2017 – Present**

- Selection of scientifically relevant targets for observation

- Planning of observations
- Image compression testing

### **High Resolution Imaging Science Experiment (HiRISE) – NASA Mars Reconnaissance Orbiter (MRO)**

*Science Theme Lead (STL) for Climate Change* **07/2016 – Present**

- Management of observation campaigns, target prioritization, review of acquired images

*Junior Science Team Member* **08/2010 – 07/2016**

- Image analysis and Digital Terrain Model (DTM) production

### **NASA Planetary Science Summer School**

Session III. Mission: Argus - Io Observer **08/2014**

*Risk and Programmatics Chair*

- Analysed risk and designed mitigation strategies for the mission proposal. Designed schedule and milestone program for the mission.

*Principal Investigator for the Io GLObal Optical Observer (IGLOO) instrument*

- Led the IGLOO (multiband imager) instrument team, decided on instrument-specific science objectives and conceived the instrument design.

---

### **APPROVED RESEARCH GRANTS**

---

**Investigation of the solar system using remote sensing and laboratory techniques.** Swiss National Science Foundation (SNF) grant 200020\_178847

*Contributor* **04/2018 – 03/2020**

**Ice Deposits in Polar Craters on Mars.** NASA Mars Data Analysis Program grant number 80NSSC17K0510. NASA, USA

*Contributor* **09/2016 – 08/2020**

**Wavelet Analysis of Martian Polar Stratigraphy from HiRISE Topography.** NASA Earth and Space Science Fellowship grant NNX13AO55H. NASA, USA

*Student Principal Investigator* **09/2013 – 08/2016**

---

### **SUPERVISION OF JUNIOR RESEARCHERS**

---

**Adomas Valantinas** **09/2018 – Present**

*Ph.D. student*, University of Bern. Remote Sensing Analysis of Slope Streaks in Arabia Terra, Mars. Principal advisor: Dr. Nicolas Thomas

**Camila Cesar** **09/2018 – Present**

*Ph.D. student*, University of Bern. Studies of Polar Spots on Mars. Principal advisor: Dr. Nicolas Thomas

**Sergio Parra** **09/2017 – 09/2018**

*B.Sc., Student*, Georgia Institute of Technology (Now a Ph.D. student at the California Institute of Technology – Caltech). Surface texture of the North Polar Residual Cap of Mars. Principal advisor: Dr. Sarah M. Milkovich

---

**TEACHING**


---

**Physikalisches Institut, Universität Bern, Bern, Switzerland**

*Teaching Assistant* in Physikpraktikum für Minor Physik und Pharmazie **Spring 2020**

Instructor: Prof. Ingo Leya

- In charge of “Diffraction” experiment

*Teaching Assistant* in Laborkurs Moderne Physik II **Fall 2017, 2018, 2019**

Instructor: Prof. Ingo Leya

- In charge of “Light Scattering” gonio-radiometer experiment

*Teaching Assistant* in Physik Praktikum Studierende Biologie **Spring 2018**

Instructors: Prof. Michele Weber, Prof. Saverio Braccini

**Department of Planetary Sciences, The University of Arizona, Tucson, AZ, USA**

*Guest Lecturer* PTYS554: Evolution of Planetary Surfaces (Graduate level course) **Fall 2015**

*Teaching Assistant* PTYS214: “Astrobiology: A Planetary Perspective” **Fall 2012**

Instructor: Dr. Ilaria Pascucci

*Teaching Assistant, Guest Lecturer* PTYS170B1: “The Universe and Humanity” **Spring 2012**

Instructor: Dr. Tamara Rogers

- Lunar and Planetary Laboratory Graduate Teaching Excellence Award

---

**PROFESSIONAL SERVICE AND INSTITUTIONAL INVOLVEMENT**


---

**Institutional Responsibilities**

Centre for Space Research & Planetary Sciences (WP), Universität Bern, **02/2017 – Present**  
Seminar Series: Committee Member

Lunar and Planetary Laboratory Conference: Co-organiser **08/2010 – 08/2012**

Lunar and Planetary Laboratory “Mission Work” Seminar Series: **03/2014 – 03/2015**  
Organiser

**Involvement in Conferences and Workshops**

COSPAR Capacity building workshop in planetary science data analysis: Lecturer on MRO and TGO/CaSSIS data analysis **07/2020**

7<sup>th</sup> International Conference on Mars Polar Science and Exploration, Ushuaia, Argentina: Co-Lead Organizer and Convener **09/2016 – 01/2020**

Ninth International Conference on Mars: Session Chair **07/2019**

Keck Institute for Space Science Workshop “Unlocking the Climate Record Stored within Mars' Polar Layered Deposits I and II”: Invited lecturer and workshop participant **2017, 2018**

Lunar and Planetary Science Conference: GSA Dwornik Award Judge **2017 – 2018**

6<sup>th</sup> International Conference on Mars Polar Science and Exploration: Session chair **09/2016**

47<sup>th</sup> Lunar and Planetary Science Conference: Session chair **03/2016**  
 First Short Course on Planetology (CONIDA, Lima, Peru). Lead organizer and Convener **11/2008**

### Scientific Review

*Icarus* (Certificate of outstanding contribution in reviewing), *Planetary and Space Science* **2015 – Present**  
 NASA ROSES Planetary Science Research Program: Panelist and External Reviewer **2017 – Present**  
 NASA ROSES Planetary Science Instrument Development Program: Executive Secretary **2016**

---

### INVITED TALKS

---

*El Hielo de Marte: Glaciología Marciana en Ushuaia* – Featured public talk during the 7<sup>th</sup> International Conference on Mars Polar Science and Exploration, Ushuaia, Tierra del Fuego, Argentina. **01/2020**

*Estudios de la superficie de Marte con el Colour and Stereo Surface Imaging System (CaSSIS) a bordo de Trace Gas Orbiter de ESA* – Curso de Geomorfología de la Patagonia Argentina, Universidad de la Patagonia Austral, Río Gallegos, Santa Cruz, Argentina. **03/2019**

*Imaging of the Martian surface by the Colour and Stereo Surface Imaging System (CaSSIS) of ExoMars Trace Gas Orbiter* – Center for Space Habitability Lunch Seminar, Universität Bern **10/2018**

*The Icy Polar Deposits of Mars and their Connection to Climate* – Earth and Atmospheric Sciences Seminar Series, Georgia Institute of Technology, Atlanta, GA, USA. **03/2018**

*Polar Stratigraphy* – 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. **08/2017**

*Decifrando el Récord Climático de los Polos de Marte* – Department of Physics. Pontificia Universidad Católica del Perú. San Miguel, Lima, Perú. **11/2016**

*Halos en el Polo Sur de Marte* – Comisión Nacional de Investigación y Desarrollo Aeroespacial. San Isidro, Lima, Perú. **12/2014**

---

### OUTREACH

---

Member of the EuroPlanet Early Career Network “New Frontiers” and “EPSC” Working Groups. **09/2019 – Present**

Management of CaSSIS social media accounts (Instagram, Twitter) **02/2018 – Present**

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	<b>06/2016</b>
External advisor to “The Mars Society – Chile”	<b>12/2018 – Present</b>
Founder of the “Planetólogos Latinos” Facebook group: A community of Latin-American planetary scientists	<b>05/2018 – Present</b>
Talk for Astronomy on Tap – Bern: “Listening to Mars’ Polar Climate Record”	<b>11/2018</b>
Astronomy on Tap – Bern: Collaborator	<b>07/2018 – Present</b>
Outreach presentations on planetary science in Tucson, AZ, USA and Lima, Peru	<b>2014, 2015</b>

---

## PRESS

---

Phys.org article “ <a href="#">Ice islands on Mars and Pluto could reveal past climate change</a> ” on 2019 JGR paper with Michael M. Sori, et al.	<b>09/2019</b>
<a href="#">EOS Editors’ Highlight</a> and Cover Image on 2019 GRL paper: Timescales of the climate record in the south polar ice cap of Mars	<b>07/2019</b>
<a href="#">EOS Research Spotlight</a> on 2017 GRL paper: Signals of astronomical climate forcing in the exposure topography of the North Polar Layered Deposits of Mars	<b>02/2017</b>
Interview on Radio Capital in Lima, Peru to promote the study of planetary science within the Peruvian student community.	<b>12/2016</b>
Outreach Interview for Punto edu (Pontificia Universidad Católica del Perú)	<b>04/2015</b>

---

## SKILLS

---

### Remote Sensing

- Data analysis experience:
  - Imaging: HiRISE, MRO Context Camera (CTX), CaSSIS, Mars Orbiter Camera (MOC)
  - Imaging spectroscopy: Compact Reconnaissance Imaging Spectrometer for Mars (CRISM)
  - Radar: Shallow Radar (SHARAD)
  - Topography: Mars Orbiter Laser Altimeter (MOLA), HiRISE and CaSSIS Digital Terrain Models
  - Attended science team meetings of HiRISE, CaSSIS, and SHARAD
  - Attended Science Working Team (SWT) meetings for ExoMars TGO
- NASA NAIF SPICE Toolkit (Domestic training class, Columbia, MD. October 2014)
- ESRI ArcGIS
- ENVI Image Processing and Analysis
- Java Mission-planning and Analysis for Remote Sensing (JMARS)
- PLAN-C planning software for CaSSIS targeting

- USGS Integrated Software for Imagers and Spectrometers (ISIS3): User
- Photogrammetric Processing of Planetary Stereo Imaging with SOCET SET®
- Programming: Interactive Data Language (IDL), Matlab, Python, C
- Unix/Linux, Mac OSX, MS Windows, MS Office, MS Project, and Internet tools

### Laboratory Experience

- Coaxial microwave measurement of dielectric properties of wet and granular samples (EpsiMu®)
- Granular sample handling and grain size distribution control
- Particle density measurements with Helium pycnometer (Quantachrome® Upyc-1200e-V5.04)
- Ice simulant production using the University of Bern's Setups for Production of Icy Planetary Analogues (SPIPA)
- Goniometry

### Field Experience

- Santa Cruz, Argentina **Spring 2019**
  - Completed a field course in quaternary geomorphology of the Austral Patagonia
- Volcanoes National Park, Hawai'i **Spring 2014**
  - Roughness measurements of lava flows from Kilauea and Mauna Ulu, Volcanoes National Park, Hawai'i
- Southern Nevada **Spring 2012**
  - Terrestrial Laser Scanning, soil shear strength and infiltration rate measurements to understand the formation of vegetation bands in dry lands
- Various locations throughout the Southwestern United States **Fall 2009 – Spring 2014**
  - Educational field trips as part of a Planetary Geology Field Practicum class
  - Focus on comparing terrestrial geology to landforms on other planetary surfaces

---

### 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**


---

- 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 (under review in *J. of Geophys. Res.: Planets*)
- 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 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, [doi.org/10.1016/j.icarus.2018.12.029](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 5<sup>th</sup> IEEE International Workshop on Metrology for Aerospace. [10.1109/MetroAeroSpace.2018.8453527](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, [doi:10.1016/j.icarus.2017.06.027](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. [doi:10.1007/s11214-017-0436-7](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, [doi:10.1002/2016GL071197](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, [doi:10.1002/2015JE004992](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](https://doi.org/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. doi: [10.1111/maps.12646](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](https://doi.org/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, doi:[10.1029/2012JF002465](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. doi: [10.1016/j.icarus.2012.02.020](https://doi.org/10.1016/j.icarus.2012.02.020)

---

## OTHER NON-REFEREED PUBLICATIONS

---

- Becerra, P.** and Smith, I. (2020). Report on the 7<sup>th</sup> International Conference on Mars Polar Science and Exploration. Nature Astronomy Meeting Report. Invited article, in prep.
- Thomas, N., **Becerra, P.**, Smith, I.B., (2019) Mars and the Science Programme: The case for Mars Polar Science. White Paper submitted to Voyage 2050: Long-term planning of the ESA Science Programme. <https://www.cosmos.esa.int/web/voyage-2050/white-papers>
- Smith, I.B., Hayne, P.O., Byrne, S., **Becerra, P.**, Kahre, M., Calvin, W., Hvidberg, C., Milkovich, S., Buhler, P., Landis, M., Horgan, B., Kleinbohl, A., Perry, M., Obbard, R., Stern, J., Piqueux, S., Thomas, N., Zacny, K., Carter, L., Edgar, L., Emmet, J., Navarro, T., Hanley, J., Koutnik, M., Putzig, N., Henderson, B.L., Holt, J.W., Elhman, B., Parra, S., Lalich, D., Hansen, C., Hecht, M., Banfield, D., Herkenhoff, K., Paige, D.A., Skidmore, M., Stahle, R.L., Siegler, M. (2018) Executive Summary of the Keck Institute for Space Science Workshop “Unlocking the Climate Record Stored within Mars’ Polar Layered Deposits”.
- Becerra, P.** “Gutta” encyclopaedia entry in: Hargitai and Kereszturi (2014). Encyclopedia of Planetary Landforms. Springer Science and Business Media New York. ISBN: 978-1-4614-9213-9 (Online).

---

## CONFERENCE ABSTRACTS

---

### 2020

- Becerra, P.**, Conway, S., N. Thomas. (2020). Avalanches of the Martian North polar cap. EGU General Assembly 2020. EGU2020-22331.
- A. Valantinas, N. Thomas, A. Pommerol, **P. Becerra**, G. Cremonese, and the CaSSIS Team (2020) Low latitude dawn observations of mars using the colour and stereo surface imaging system (CaSSIS). Lunar and Planetary Science Conference LI. Abs. 2453.
- A.Valantinas, N. Thomas, A. Pommerol, P. Becerra, E. Hauber, L. L. Tornabene, A. McEwen, G. Cremonese and the CaSSIS Team (2020). Multi-angular observations of martian bright slope streaks. Lunar and Planetary Science Conference LI. Abs. 2419.
- 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) The first CaSSIS

observations of Martian recurring slope lineae: implications for their origin and evolution. Lunar and Planetary Science Conference LI. Abs. 1456.

**Becerra, P.**, D. Nunes, I. Smith, M.M. Sori, Y. Brouet, N. Thomas. (2020). Two views of the Martian North Polar Layered Deposits: Toward a correlation of radar and visible stratigraphic records. 7th International Conference on Mars Polar Science and Exploration. Abstract 6055.

## 2019

**Becerra, P.**, D. Nunes, I. Smith, M.M. Sori, Y. Brouet, N. Thomas. Correlating Radar and Visible Stratigraphic Records in the Martian North Polar Layered Deposits. EPSC-DPS Joint Meeting 2019-1705

**Becerra, P.**, N. Thomas, A. Pommerol, M. Almeida, C. Cesar, E. Simioni, S. Tulyakov, G. Cremonese, and The CaSSIS Team. CaSSIS Observations of Polar and Circumpolar Layered Deposits on the Martian Southern Hemisphere. EPSC-DPS Joint Meeting 2019-707

M. Almeida, M. Read, N. Thomas, G. Cremonese, **P. Becerra**, G. Borrini, M. Gruber, R. Heyd, C. Marriner, A. McEwen, A. Pommerol, C. Schaller, and the CaSSIS Science and Engineering Team. ExoMars/CaSSIS: Targeted Planning on Mars. EPSC-DPS Joint Meeting 2019-1808

A. Valantinas, N. Thomas, A. Pommerol, **P. Becerra**, E. Hauber, L. L. Tornabene, G. Cremonese and The CaSSIS Team. CaSSIS Observations of Fresh Bright Slope Streak Candidates in Arabia Terra. EPSC-DPS Joint Meeting 2019-1720

Byrne, S., Hayne, P.O., **Becerra, P.**, and The COMPASS Team Climate Orbiter for Mars Polar Atmospheric and Subsurface Science (COMPASS): Deciphering the Martian Climate Record. EPSC-DPS Joint Meeting 2019-912

C. Cesar, A. Pommerol, N. Thomas, **P. Becerra**, C.J. Hansen, G. Portyankina, G. Cremonese, and The CaSSIS Team, Polar Spots on Mars Observed with the Colour and Stereo Surface Imaging System (CaSSIS). EPSC-DPS Joint Meeting 2019-697

N. Thomas, G. Cremonese, J. Perry, M. Almeida, M. Banaszkiwicz, J.N. Bapst, **P. Becerra**, J.C. Bridges, S. Byrne, S. Conway, V. Da Deppo, S. Debei, M.R. El-Maarry, A. Fennema, E. Hauber, R. Heyd, C.J. Hansen, A. Ivanov, L. Keszthelyi, R. Kirk, W. Kofman, R. Kuzmin, A. Lucchetti, N. Mangold, C. Mar-riner, L. Marinangeli, M. Massironi, A.S. McEwen, C. Okubo, P. Orleanski, M. Pajola, A. Parkes Bowen, M.R. Patel, A. Pommerol, R. Pozzobon, M.J. Read, P.A. Tesson, L. Tornabene, S. Tulyakov, P. Wajer, P. Witek, J. Wray, and R. Ziethe. A summary of observations by the CaSSIS imaging system onboard ESA's ExoMars Trace Gas Orbiter. EPSC-DPS Joint Meeting.

**Becerra, P.**, M. M. Sori, N. Thomas, A. Pommerol, S. S. Sutton, S. Tulyakov, E. Simioni, G. Cremonese. Timescales of the Climate Record in the Martian South Polar Layered Deposits. Ninth International Conference on Mars. Abs. [6273. Oral Presentation.](#)

N. Thomas, G. Cremonese, J. Perry, M. Almeida, M. Banaszkiwicz, J.N. Bapst, **P. Becerra**, J.C. Bridges, S. Byrne, S. Conway, V. Da Deppo, S. Debei, M.R. El-Maarry, A. Fennema, E. Hauber, R. Heyd, C.J. Hansen, A. Ivanov, L. Keszthelyi, R. Kirk, W. Kofman, R. Kuzmin, A. Lucchetti, N. Mangold, C. Mar-riner, L. Marinangeli, M. Massironi, A.S. McEwen, C. Okubo, P. Orleanski, M. Pajola, A. Parkes Bowen, M.R. Patel, A. Pommerol, R. Pozzobon, M.J. Read, P.A. Tesson, L. Tornabene, S. Tulyakov, P. Wajer, P. Witek, J. Wray, and R. Ziethe. The Effects of Past and Current Geologic Processes Observed by the CaSSIS Imager on board ESA's ExoMars Trace Gas Orbiter. Ninth International Conference on Mars. Abs. 6156. Print Only.

- C. Cesar, A. Pommerol, N. Thomas, P. Becerra, C.J. Hansen, G. Portyankina, G. Cremonese, and The CaSSIS Team, Polar Spots on Mars Observed with the Colour and Stereo Surface Imaging System (CaSSIS). Ninth International Conference on Mars. Abs. 6253. Poster.
- A. Valantinas, N. Thomas, A. Pommerol, **P. Becerra**, E. Hauber, L. L. Tornabene, G. Cremonese and The CaSSIS Team. CaSSIS Observations of Fresh Bright Slope Streak Candidates in Arabia Terra. Ninth International Conference on Mars. Abs. 6259. Poster
- Byrne, S., Hayne, P.O., **Becerra, P.**, and The COMPASS Team Climate Orbiter for Mars Polar Atmospheric and Subsurface Science (COMPASS): Deciphering the Martian Climate Record. Ninth International Conference on Mars. Abs. 6450. Poster.
- Becerra, P.**, M. M. Sori, N. Thomas, S. Tulyakov, S. S. Sutton, A. Pommerol, G. Cremonese, The HiRISE Team, The CaSSIS Team. Climate Record Signals in the South Polar Cap of Mars from HiRISE and CaSSIS Stereo Imaging. Lunar and Planetary Science Conference L. Abs. 1283. Oral Presentation
- Thomas, N., G. Cremonese, M. Almeida, M. Banaszekiewicz, J.N. Bapst, **P. Becerra**, J. Bridges, S. Byrne, S. Conway, V. Da Deppo, S. De-bei, M.R. El-Maarry, E. Hauber, C.J. Hansen, A. Ivanov, L. Keszthelyi, R. Kirk, R. Kuzmin, A. Lucchetti, N. Mangold, C. Marriner, L. Marinangeli, M. Massironi, A.S. McEwen, C. Okubo, P. Orleanski, M. Pajola, M.R. Patel, J. Perry, A. Pommerol, R. Pozzobon, M.R. Read, L. Tornabene, S. Tulyakov, P. Wajer, P. Witek, J. Wray, and R. Ziethe. CaSSIS: Overview of imaging in the first 9 months of the prime mission. Lunar and Planetary Science Conference L. Abs.
- N. Thomas, G. Cremonese, M. Almeida, J. Backer, **P. Becerra**, G. Borrini, S. Byrne, M. Gruber, P. Gubler, R. Heyd, A. Ivanov, L. Keszthelyi, C. Marriner, G. McArthur, A.S. McEwen, C. Okubo, M.R. Patel, J. Perry, A. Pommerol, C. Re, M.R. Read, C. Schaller, S. Scheidt, E. Simioni, S. Sutton, S. Tulyakov, and C. Zimmermann. CaSSIS: Operational approach. Lunar and Planetary Science Conference L. Abs.
- Sori, M.M., Bapst, J., **Becerra, P.**, Byrne, S. The Paleoclimate Record of Outlier Ice Deposits Near the Martian Poles. Lunar and Planetary Science Conference L. Abs. 1181.

## 2018

- Pommerol, A., Thomas, N., Yoldi, Z., Roloff, V., Almeida, M., **Becerra, P.**, Tulyakov, S., Tornabene, L., Seelos, F., Hansen, C.J., Portyankina, G., Cremonese, G. Ices, frosts and clouds on Mars observed by CaSSIS during the first months of TGO's primary science mission. European Planetary Science Congress 2018-272.
- Becerra, P.**, Nunes, D., Smith, I., Sori, M.M., Brouet, Y., Thomas, N. The Radar and Visible Stratigraphic Records of Mars' North Polar Layered Deposits. European Planetary Science Congress 2018-1171.
- Becerra, P.**, Sori, M.M., Thomas, N., Pommerol, A., Cremonese, G., Almeida, M., and The CaSSIS Team. Stereo-topographic mapping of the Stratigraphy of Mars' South Polar Layered Deposits. European Planetary Science Congress 2018-225.
- Thomas, N., Cremonese, G., Almeida, M., Banaszekiewicz, M., **Becerra, P.**, Borrini, G., Gruber, M., Gubler, P., Heyd, R., Ivanov, A., Keszthelyi, L., Marriner, C., McArthur, G., McEwen, A.S., Okubo, C., Patel, M., Pommerol, A., Re, C., Schaller, C., Scheidt, S., Simioni, E., Sutton, S., Tulyakov, S., Zimmermann, C. CaSSIS – Targeting, Operations, and Data Reduction. European Planetary Science Congress 2018-145.
- Thomas, N., Cremonese, G., Almeida, M., Banaszekiewicz, M., **Becerra, P.**, Bridges, J., Byrne, S., Da Deppo, V., Debei, S., El-Maarry, M.R., Hauber, E., Hansen, C.J., Ivanov, A., Keszthelyi,

L., Kirk, R., Kuzmin, R., Mangold, N., Mariangeli, L., Markiewicz, W., Massironi, M., McEwen, A.S., Okubo, C., Orleanski, P., Patel, M., Pommerol, A., Roloff, V., Tulyakov, S., Wajer, P., Wray, J., Ziethe, R. CaSSIS – First Images from Science Orbit. European Planetary Science Congress 2018-141.

Pajola, M., Tornabene L.L., Seelos, F.P., Marzo G.A., Lucchetti, A., Cremonese, G., Pommerol, A., **Becerra, P.**, and Thomas, N. Spectral clustering applied on the ExoMars/CaSSIS simulated imagery dataset. European Planetary Science Congress 2018-171.

**Becerra, P.**, Sori, M.M., Thomas, N. The Exposed Stratigraphy of the Martian South Polar Layered Deposits. Lunar and Planetary Science Conference XLIX. Abs. 2445.

**Becerra, P.**, Nunes, D., Smith, I., Sori, M.M., Brouet, Y., Thomas, N. Correlation of the Visible and Radar Stratigraphic Records of Mars' NPLD. Lunar and Planetary Science Conference XLIX. Abs. 1888.

Nunes, D.C., **Becerra, P.**, Smith, I.B. Local variability of radar stratigraphy at the North Polar Layered Deposits, Mars. Lunar and Planetary Science Conference XLIX. Abs. 2486.

Molaro, J.L., **Becerra, P.**, Hery, C., Marschall, R., El-Maarry, M.R., Thomas, N., Pommerol, A., Theologou, P. Thermally-driven Formation of Fractures on Comet 67P/Churymov-Gerasimenko. Lunar and Planetary Science Conference XLIX. Abs. 2881.

Parra, S.A., Milkovich, S.M., Byrne, S., Russell, P.S., and **Becerra, P.** Variations in Texture of the North Polar Residual Cap of Mars. Lunar and Planetary Science Conference XLIX. Abs. 2272.

## 2017

Molaro, J.L., **Becerra, P.**, Hery, C., Marschall, R., El-Maarry, M.R., Thomas, N., Pommerol, A., Theologou, P. Thermally-driven Formation Mechanisms for Fractures on Comet 67P/Churymov-Gerasimenko. European Planetary Science Congress. Vol. 11, EPSC2017-374.

**Becerra, P.**, Nunes, D., Smith, I., Sori, M.M., Brouet, Y., Pommerol, A., Thomas, N., Guallini, L. Correlation of Radar and Visible Data of Mars' North Polar Layered Deposits. European Planetary Science Congress. Vol. 11, EPSC2017-660-1.

**Becerra, P.**, Sori, M.M., Byrne, S. Signals of Astronomical Climate Forcing in the Exposure Topography of the North Polar Layered Deposits of Mars. Lunar and Planetary Science Conference XLVIII. Abs. 1638.

## 2016

**Becerra, P.**, Byrne, S. Sori, M.M. Searching for a Climate Signal in the Polar Deposits of Mars. Oral Presentation. 6<sup>th</sup> International Conference on Mars Polar Science and Exploration. Abs. 6037.

Brown, A. J., Calvin, W.M., **Becerra, P.**, Byrne, S. The Martian north polar summer water cycle. Sixth International Conference on Mars Polar Science and Exploration. Abs. 6044.

Byrne, S., Sori, M.M., Russell, P.S., Pathare, A.V., **Becerra, P.**, Molaro, J.L., Sutton, S., Mellon, M.T., HiRISE Team. Why Icy Polar Cliffs are Stressed Out and Falling to Pieces. Sixth International Conference on Mars Polar Science and Exploration. Abs. 6022.

**Becerra, P.**, Byrne, S., Sori, M., Sutton, S., Herkenhoff K.E. Stratigraphy of the North Polar Layered Deposits of Mars from High-Resolution Topography. Oral Presentation. Lunar and Planetary Science Conference XLVII. Abs. 1325.

**Becerra, P.**, Byrne, S., Sori, M. Searching for a Climate Signal in Mars' North Polar deposits. Poster. Lunar and Planetary Science Conference XLVII. Abs. 1732

Brown, A.J., Calvin, W.M., **Becerra, P.**, Byrne, S. The Martian north polar water cycle. Lunar and Planetary Science Conference XLVII. Abs. 1753.

## 2015

**Becerra, P.**, Byrne, S., Sori, M., Sutton, S., Pelletier, J.D., Herkenhoff K.E., HiRISE Team. Martian Polar Stratigraphy from HiRISE Stereo Topography. Oral presentation. Lunar and Planetary Science Conference XLVI. Abs. 1729.

Thompson, M.S., Zega, T.J., Keane, J.T., **Becerra, P.**, Byrne, S. The oxidation state of Fe nanoparticles in Lunar soil: Implications for space weathering processes. Lunar and Planetary Science Conference XLVI. Abs. 2932.

Byrne, S., Hayne, P.O., **Becerra, P.** Evolution and stability of the southern residual CO<sub>2</sub> Ice Cap of Mars. Lunar and Planetary Science Conference XLVI. Abs. 1657.

Marcucci, E., Hays, L.E., Holstein-Rathlou, C., Keane J.T., **Becerra, P.**, Basu, K., Davis, B., Fox, V., Herman, J.F.C., Hughes, A.C.G., Mendez-Ramos, Nelessen, A., E., Neveu, M., Parrish, N.L., Scheinberg, A., Wrobel, J.S. Argus: A concept study for an Io observer mission from the 2014 NASA/JPL Planetary Science Summer School. Lunar and Planetary Science Conference XLVI. Abs. 2624.

## 2014

**Becerra, P.**, Byrne, S., Mattson, S., Pelletier, J.D., Herkenhoff K.E., The HiRISE Team. Martian Polar Stratigraphy from HiRISE Stereo Topography. Poster. Sigma Xi International Research Conference.

Holstein-Rathlou, C., Hays, L.E., **Becerra, P.**, Basu, K., Davis, B., Fox, V., Herman, J.F.C., Hughes, A.C.G., Keane J.T., Marcucci, E., Mendez-Ramos, Nelessen, A., E., Neveu, M., Parrish, N.L., Scheinberg, A., Wrobel, J.S. Argus: An Io observer mission concept study from the 2014 NASA/JPL Planetary Science Summer School. Poster ID P43B-3977. American Geophysical Union Fall Meeting.

**Becerra, P.**, Holstein-Rathlou, C., Hays, L.E., Keane J.T., Neveu, M., Basu, K., Davis, B., Fox, V., Herman, J.F.C., Hughes, A.C.G., Marcucci, E., Mendez-Ramos, Nelessen, A., M., Parrish, N.L., Scheinberg, A., Wrobel, J.S. Argus: A concept study for an Io observer mission from the 2014 NASA/JPL Planetary Science Summer School. Poster. Abs. 2071168. 46<sup>th</sup> Annual Meeting of the AAS Division for Planetary Sciences.

**Becerra, P.**, Byrne, S., Brown A.J. Transient Bright "Halos" on the South Polar Residual Cap of Mars: Implications for Mass Balance. Oral presentation. European Planetary Science Congress. Abs. 634.

**Becerra, P.**, Byrne, S., Mattson, S., Pelletier, J.D., Herkenhoff K.E., The HiRISE Team. Polar Stratigraphy from HiRISE Stereo Topography. Poster. European Planetary Science Congress. Abs. 647.

**Becerra, P.**, Byrne, S., Brown A.J. Transient Bright "Halos" on the South Polar Residual Cap of Mars: Implications for Mass Balance. Eighth International Conference on Mars. Abs. 1013.

**Becerra, P.**, Byrne, S., Mattson, S., Pelletier, J.D., Herkenhoff K.E., The HiRISE Team. Polar Stratigraphy from HiRISE Stereo Topography. Eighth International Conference on Mars. Abs. 1183.

- Byrne, S., Russell, P.S., Pathare, A.V., **Becerra, P.**, Molaro, J.L., Mattson, S., Mellon, M.T., HiRISE Team. Icy Polar Cliffs: Stressed Out and Falling to Pieces. Eighth International Conference on Mars. Abs. 1257.
- Byrne, S., Hayne, P.O., **Becerra, P.**, HiRISE Team. “Evolution and Stability of the Residual CO<sub>2</sub> Ice Cap”. Eighth International Conference on Mars. Abs. 1252.
- Becerra, P.**, Byrne, S., Brown A.J. Transient Bright “Halos” on the South Polar Residual Cap of Mars: Implications for Mass Balance. Oral presentation. Lunar and Planetary Science Conference XLV. Abs. 1388.
- Becerra, P.**, Byrne, S., Mattson, S., Herkenhoff K.E., HiRISE Team. Martian Polar Stratigraphy from HiRISE Stereo Topography. Poster. Lunar and Planetary Science Conference XLV. Abs. 2408

### 2013

- Becerra, P.**, Byrne, S., Brown, A.J. Dust-Driven Halos on the Martian South Polar Residual Cap. Poster ID P41A-1913. American Geophysical Union Fall Meeting.
- Byrne, S., **Becerra, P.**, Diniega, S., Dundas, C.M., Geissler, P., Hansen, C.J., McEwen, A.S., Russell, P.S., Thomas, N. Mars: Cold, windy and occasionally unstable. ID P31C.05B. American Geophysical Union Fall Meeting.
- Becerra, P.**, Byrne, S., Brown, A.J. Frost Halos on the South Polar Residual Cap of Mars. Poster. Lunar and Planetary Science Conference XLIV Abs. 1284.
- Byrne, S., Russell, P., Pathare, A.V., **Becerra, P.**, Molaro, J., Matson, S., Mellon, M.T. Fracturing the Icy Polar Cliffs of Mars. Lunar and Planetary Science Conference XLIV Abs. 1659.

### 2012

- Becerra, P.**, Byrne, S., Brown, A.J. CO<sub>2</sub> Frost Halos on the South Polar Residual Cap of Mars. Oral presentation. First iPLEX Conference on Ices and Organics in the Inner Solar System. UCLA, Los Angeles, California, U.S.A.
- Becerra, P.**, and Byrne, S. CO<sub>2</sub> Frost Halos on the South Polar Residual Cap of Mars. Oral presentation. Lunar and Planetary Science Conference XLIII Abs. 2513.

### 2011

- Becerra, P.**, and Byrne, S. Modeling the Formation of CO<sub>2</sub> Frost Halos on the South Polar Residual Cap of Mars. Oral presentation. Fifth International Conference on Mars Polar Science and Exploration Abs. 6024.
- Becerra, P.**, and Byrne, S. Investigating Trigger Mechanisms of Martian North Polar Avalanches. Oral presentation. Fifth International Conference on Mars Polar Science and Exploration Abs. 6034.
- Becerra, P.**, and Byrne, S. Mars’ South Polar Halos and Triton’s Aureoles: Sublimation-Driven Models of Formation. Poster. New Horizons Workshop on Icy Surfaces. Lowell Observatory, Flagstaff, AZ. [http://www2.lowell.edu/workshops/aug2011/workshop\\_abstracts/becerra.pdf](http://www2.lowell.edu/workshops/aug2011/workshop_abstracts/becerra.pdf)
- Becerra, P.**, and Byrne, S. Modeling the Formation of CO<sub>2</sub> Frost Halos on the South Polar Residual Cap of Mars. Oral presentation. Lunar and Planetary Science Conference XLII Abs. 2252.
- Ferradas-Alva, C., Ferrero, G., Huamán, M., Guevara-Day, W., Meza, E., Samanes J., **Becerra, P.** Seeing measurement on Sasahuine mountain, Moquegua, Perú. Proceedings of the International Astronomical Union, 7, 448-451. doi:10.1017/S174392131200525X.

**2010**

**Becerra, P.**, and Byrne, S. Modeling the Formation of CO<sub>2</sub> Frost Halos on the South Polar Residual Cap of Mars. Poster. Lunar and Planetary Science Conference XLI Abs. 2097.

Showalter, M. R., French, R. S., Sfair, R., Argüelles, C., Pajuelo, M., **Becerra, P.**, Hedman, M. M., Nicholson, P. D. The Brightening of Saturn's F Ring. European Planetary Science Congress. Abs. 317.

**2009**

Showalter, M. R., French, R. S., Sfair, R., Argüelles, C., Pajuelo, M., **Becerra, P.**, Hedman, M. M., Nicholson, P. D. The Brightening of Saturn's F Ring. Vol. 41. p. 896. 40<sup>th</sup> Annual Meeting of the AAS Division for Planetary Sciences.

---

**LANGUAGES**


---

- Spanish/English Bilingual
- Italian: Upper-intermediate (B2). Completed course at Istituto Italiano, Firenze, Italia
- German: Pre-Intermediate (A2). Inlingua Language School, Bern, Switzerland.

---

**EXTRA-CURRICULAR**


---

- SCUBA and Free Diving
  - 74 logged SCUBA dives
  - PADI Rescue Diver (Emergency First Responder)
  - PADI Peak Performance Buoyancy Specialty Diver
  - PADI Dry suit Specialty Diver
  - PADI Freediver
- Volunteering
  - University of Arizona Health Network (Jun – Dec 2013): Volunteer in Pediatric Chronic Diseases Wing
  - Census aid after the 2008 Earthquake in Pisco, Peru.
- Sports:
  - Triathlon (University of Arizona Triathlon Club Alumnus)
  - Cycling (Category 4 USAC Road. University of Arizona Cycling Club Alumnus)
  - Climbing (Lead indoor up to 6a+/5.10c, outdoor up to 5c/5.9+), Ice Climbing (top rope up to 4I).
  - Snowboarding

---

**REFERENCE CONTACTS**

---

**Prof. Nicolas Thomas**, Physikalisches Institut, Universität Bern  
*Relationship:* Postdoctoral advisor, CaSSIS Principal Investigator  
*Email:* [nicolas.thomas@space.unibe.ch](mailto:nicolas.thomas@space.unibe.ch)  
*Phone:* +41 31 631 44 06  
*Address:* Gesellschaftsstrasse 6, CH-3012, Bern. Switzerland

**Prof. Shane Byrne**, Lunar and Planetary Laboratory, The University of Arizona  
*Relationship:* Ph.D. Advisor and Chair of Thesis Committee  
*Email:* [shane@lpl.arizona.edu](mailto:shane@lpl.arizona.edu)  
*Phone:* +1 520 626 0407  
*Address:* 1629 E. University Blvd., Tucson, AZ, 85721. USA

**Prof. Michael M. Sori**, Lunar and Planetary Laboratory, The University of Arizona  
*Relationship:* Collaborator (starting at Purdue University in Fall 2020)  
*Email:* [sori@lpl.arizona.edu](mailto:sori@lpl.arizona.edu), [msori@purdue.edu](mailto:msori@purdue.edu)  
*Phone:* +1 520 626 9631  
*Address:* 1629 E. University Blvd. Tucson, AZ, 85721. USA

**Dr. Antoine Pommerol**, Physikalisches Institut, Universität Bern  
*Relationship:* Collaborator, CaSSIS Co-Investigator  
*Email:* [antoine.pommerol@space.unibe.ch](mailto:antoine.pommerol@space.unibe.ch)  
*Phone:* +41 31 631 39 98  
*Address:* Gesellschaftsstrasse 6, CH-3012, Bern. Switzerland

Age: 34  
Current Swiss Immigration Status: **Peruvian National. Ausweis B: Residence permit for non-EU nationals**  
February 20<sup>th</sup>, 2020