Lu Pan

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Education

- **California Institute of Technology** — Pasadena, CA
  PhD in Planetary Science — *Aug. 2012 – Jul. 2017*
- **Peking University** — Beijing, China
  Bachelor of Science in Geology — *Sep. 2008 – July. 2012*

Work experience

- **University of Lyon, Université Claude Bernard Lyon 1** — Villeurbanne, France
  Postdoc, supported by MSCA Individual Fellowship & ANR project — *Aug. 2017 – Feb. 2020*
- **University of Copenhagen** — Copenhagen, Denmark
  Postdoc, supported by Carlsberg Foundation — *Mar. 2020 – Present*

Fellowship and grants

- **Marie Skodowska-Curie Actions Individual Fellowship** — Jul. 2017 – Jul. 2019
  Project: GeoInSight (PI) — *EU contribution €173,076.*
- **Agence Nationale de la Recherche (ANR) project** — Apr. 2021 – Mar. 2024
  Project: PaleoSilica (External collaborator) — *EU contribution €395,000.*

Publications (* under review ‖ • peer-reviewed)

* **Pan, L.**, C. Quantin-Nataf, L. Mandon, M. Martinot, P. Beck. Spectral endmember variability on hyperspectral datasets of a Martian meteorite - implications for planetary surfaces, *Icarus*, *under revision.*

- Knapmeyer-Endrun B., M. P. Panning et al. (incl. **L. Pan**), Thickness and structure of the Martian crust from InSight seismic data, *Science*, 2021, Vol. 373, Issue 6553, pp. 438-443.

- Mandon L., P. Beck, C. Quantin-Nataf, E. Dehouck, A. Pommerol, Z. Yoldi, R. Cerubini, **L. Pan**, M. Martinot, V. Sautter, Martian meteorites reflectance and implications for *in situ* studies, *Icarus*, 2021, 366, 114517.

- Liu Z., Y. Liu, **L. Pan**, J. Zhao, E. Kite, Y. Wu, Y. Zou, Inverted channel belts and floodplain clays to the East of Tempe Terra, Mars: Implications for persistent fluvial activity on early Mars. *Earth and Planetary Science Letters*, 2021, 562, 116854.

- **Pan, L.**, J. Carter, C. Quantin-Nataf, M. Pineau, B. Chauviré, L. Le Deit, N. Mangold, B. Rondeau, V. Chevrier. Voluminous silica precipitation in martian waters during late-stage aqueous alteration, *Planetary Science Journal*, 2021, 2 65.

- Mandon L., A. Parkes Bowen, C. Quantin-Nataf, J. C. Bridges, J. Carter, **L. Pan**, P. Beck, E. Dehouck, M. Volat, N. Thomas, G. Cremonese, L. L. Tornabene, Morphological and spectral diversity of the clay-bearing unit at the ExoMars landing site Oxia Planum, *Astrobiology*, 2021 21:4, 464-480.

- Quantin-Nataf C., J. Carter, L. Mandon, P. Thollot, M. Balme, M. Volat, **L. Pan**, D., Loizeau, C. Millot, S. Breton, E. Dehouck, P. Fawdon, S. Gupta, J. Davis, P.M., Grindrod, Andrea Pacifici, Benjamin Bultel, Pascal Allemand, Anouck Ody, Loic Lozach, J. Broyer, Oxia Planum the landing site for the 2020 ExoMars Rosalind Franklin Rover Mission: geological context and pre-landing interpretation, *Astrobiology*, Mar 2021. 345-366.

- Perrin C., S. Rodriguez, A. Jacob, A. Lucas, A. Spiga, N. Murdoch, R. Lorenz, I. J. Daubar, **L. Pan**, T. Kawamura, P. Lognonné, D. Banfield, M. E. Banks, R. F. Garcia, C. E. Newman, L. Ohja, R. Widmer-Schnidrig, A. S. McEwen, W. B. Banerdt, Dust Devil Tracks Around the InSight Landing Site, Mars: 8 Months of Monitoring from HiRISE Satellite Images and Comparison with in-situ Atmospheric Data, *Geophy. Res. Lett.*, 2020.

- Lognonné P., W. Banerdt, W. T. Pike, D. Giardini, et al. *including* **L. Pan**, Constraints on the shallow elastic and anelastic structure of Mars from InSight seismic data, *Nature Geoscience*, 2020.

- Johnson C., Mittelholz A., B. Langlais , C. Russell, V. Ansan, D. Banfield, P. Chi, M. Fillingim, F. Forget , H. F.Haviland, S. Joy, P. Lognonné, X. Liu, C. Michaut, **L. Pan**, C. Quantin-Nataf, A. Spiga, S. Stanley, S. Thorne, M. Wieczorek, Y. Yu, S. E. Smrekar , B. Banerdt. Crustal and Time-Varying Magnetic Fields at the InSight Landing Site on Mars, *Nature Geoscience*, 2020.

- **Pan, L.**, C. Quantin-Nataf, B. Tauzin, C. Michaut, M. Golombek, P. Lognonn, P. Grindrod et al. Crust stratigraphy and heterogeneities of the first kilometers at the dichotomy boundary in western Elysium Planitia and implications for InSight lander. *Icarus*, 338, 2020, 113511, ISSN 0019-1035, .

- **Pan, L.**, C. Quantin-Nataf, S. Breton, and C. Michaut. (2019). The Impact Origin and Evolution of Chryse Planitia on Mars Revealed by Buried Craters. *Nature Communications* 10 (1): 4257. (Picked up by *Planetary Newsletter*)

- **Pan, L.** and Ehlmann, B. L. (2018). Aqueous processes from diverse hydrous minerals in the vicinity of Amazonian aged Lyot crater. *Journal of Geophysical Research: Planets*, 123, 16181648.

- Tian W., L. Wang, **L. Pan** and M. Y. Gong (2018) A giant felsic pyroclastic flow eruption in the Tarim Flood Basalt Province, *Acta Petrologica Sinica.* 34 (1): 63-74

- Buz, J., B. L. Ehlmann, **L. Pan**, and J. P. Grotzinger (2017), Mineralogy and stratigraphy of the Gale crater rim, wall, and floor units, *Journal of Geophysical Research: Planets*, 122, 10901118.

- **Pan, L.**, Ehlmann, B. L., Carter, J., Ernst, C. M. (2017) The stratigraphy and history of Marsńorthern lowlands through mineralogy of impact craters: A comprehensive survey. *Journal of Geophysical Research: Planets*, 122(9), 1824-1854. (*JGR-Planets* Editor's highlight, picked up by *The Planetary Mechanics Blog*)

- **Pan, L.** and B. L. Ehlmann (2014), Phyllosilicate and hydrated silica detections in the knobby terrains of Acidalia Planitia, northern plains, Mars, *Geophys. Res. Lett.* , 41, 18901898.

- Shangguan S.M., T. Wei, Y.G. Xu, P. Guan, **L. Pan** (2012) The eruption characteristic of the Tarim flood basalt., *Acta Petrologica Sinica.* 28 (4): 1261-1272

Conference abstracts

- Panning M. P., B. Knapmeyer-Ednrun, F. Bissig, R. Joshi, A. Khan, D. Kim, et al. (including **L. Pan**), 2021, Seismic Constraints on the Thickness and Structure of the Martian Crust from InSight. *Lunar and Planetary Science Conference*, the Woodlands, TX.

- Breton S., **L. Pan**, C. Quantin-Nataf, J. Flahaut, C. Brustel 2021, Tracing Martian volcanic activity using crater infilling rate. *Europlanet Science Congress*, 2021.

- **Pan L.**, C. Quantin-Nataf, L. Mandon, M. Martinot, Unmixing hyperspectral imaging datasets -a case study with martian meteorites. *AGU Fall Meeting*, 2020.

- Losen J., C. Perrin,S. Rodriguez, A. Jacob, A. Lucas, A. Spiga, N. Murdoch, R. D. Lorenz, I. Daubar, **L. Pan**, T. Kawamura, P. H. Lognonn, D. J. Banfield, M. Banks, R. F. Garcia, C. E. Newman, L. Ohja, R. Widmer-Schnidrig17, A. McEwen, W. B. Banerdt, One Martian Year of Dust Devil Tracks Around the InSight Landing Site, Mars: analysis of HiRISE images and Comparison with in-situ Atmospheric Data. *AGU Fall Meeting*, 2020.

- Breton S., C. Quantin-Nataf, **L. Pan**, 2020, Estimating crater obliteration rate through crater depth statistics. *Europlanet Science Congress*, Vol.14, EPSC2020-823, 2020.

- Lucas A., T. Kawamura, A. Mangeney, K. Onodera, B. Kenda, **L. Pan**, M. Drilleau, S. Menina, A. Jacob, A. Spiga, M. Knapmeyer, J. Clinton, S. Rodriguez, C. Perrin, P. Lognonn, 2020, Investigation on putative explanation for SEIS/InSight unknown events from rock avalanches and rockfalls and comparison with alpine cases. *Lunar and Planetary Science Conference*, the Woodlands, TX.

- Liu, Z., Y. Liu, **L. Pan**, J. Zhao, 2020, Geomorphology and mineralogy of sinuous ridges to the east of Tempe Terra, Mars. *Lunar and Planetary Science Conference*, the Woodlands, TX.

- Mandon L., A. Parkes Bowen, C. Quantin-Nataf , J. C. Bridges, J. Carter, **L. Pan** , P. Beck , E. Dehouck , M. Volat , N. Thomas , G. Cremonese , L. L. Tornabene, 2020, High-resolution characterization of the clay-bearing unit at oxia planum, the ExoMars 2020 landing site. *Lunar and Planetary Science Conference*, the Woodlands, TX.

- Rodriguez S., C. Perrin, A. Jacob, T. Kawamura, A. Lucas, B. Kenda, A. Spiga, N. Murdoch, R. F Garcia, R. D Lorenz, I. Daubar, P. H. Lognonn, D. J. Banfield, L. Ohja, M. Banks, **L. Pan**, V. Ansan. 2019. Dust devils signature around the InSight landing site (Mars): analysis of HiRISE satellite images and SEIS seismic data. *American Geophysical Union*, San Fransisco, CA.

- Johnson C., A. Mittelholz, B. Langlais, C. T. Russell, V. Ansan, D. J. Banfield, P. J. Chi, M. O. Fillingim, F. Forget, H. F. Haviland, S. P. Joy, X. Liu, C. Michaut, **L. Pan**, A. Spiga, S. Stanley, M. A. Wieczorek, Y. Yu, S. E. Smrekar, W. B. Banerdt. 2019. Static and Time-Varying Magnetic Fields Recorded at the InSight Landing Sight. *American Geophysical Union*, San Fransisco, CA.

- **Pan, L.**, C. Quantin-Nataf, J. Carter, 2019, Hydrated silica in Martian fans and deltas. *Goldschmidt Conference*, Barcelona, Spain

- Mandon L., A. Parkes Bowen, C. Quantin-Nataf, J. C. Bridges, J. Carter, **L. Pan**, 2019, Spectral Diversity and Stratigraphy of the Clay-Bearing Unit at the ExoMars 2020 Landing Site Oxia Planum. *Ninth International Conference on Mars*, Pasadena, CA

- Quantin-Nataf C., J. Carter, L. Mandon, M. Balme, P. Fawdon, J. Davis, P. Thollot, E. Dehouck, **L. Pan**, M. Volat, C. Millot, S. Breton, D. Loizeau, J. Vago, ExoMars at Oxia Planum, Probing the Aqueous-related Noachian Environments. *Ninth International Conference on Mars*, Pasadena, CA

- **Pan, L.** , J. Carter, C. Quantin-Nataf, 2019, Hydrated silica in Martian fans and deltas. *Ninth International Conference on Mars*, Pasadena, CA

- Michaut C., B. Tauzin, **L. Pan**, C. Quantin-Nataf, M. Thiriet, D. Breuer, A. Plesa, Investigating the dichotomous structure of the martian crust and the origin of felsic rocks. *European Geoscience Union General Assembly 2019*, Vienna, Austria

- **Pan, L.** , C. Quantin-Nataf, C. Michaut, S. Breton, 2019, An impact origin for Chryse Planitia, Mars? *50th Lunar and Planetary Science Conference*, the Woodlands, TX

- Tauzin B., **L. Pan**, C. Michaut, C. Quantin-Nataf, N. Schmerr, C. Perrin, P. Lognonn, V. Ansan, 2019, Investigating the seismic and geological structure of the martian crust at the dichotomy boundary, *50th Lunar and Planetary Science Conference* , the Woodlands, TX

- Perrin C., S. Rodriguez, A. Jacob, A. Lucas, B. Kenda, A. Spiga, C. Newman, N. Murdoch, R. F. Garcia, R. D. Lorenz, I. Daubar, P. Lognonn, L. Ohja, M. E. Banks, **L. Pan**, V. Ansan, 2019 Searching for Geological Surface Changes Around the InSight Landing Site (Mars) from HiRISE Satellite Images, *50th Lunar and Planetary Science Conference* , the Woodlands, TX

- Breton S., C. Quantin-Nataf, **L. Pan**, T. Bodin, E. Bras, 2018, Crater depth statistics: constraining obliteration rates from secondary clusters of Mojave crater, *European Planetary Science Congress*, Berlin, Germany

- **Pan L.**, C. Quantin-Nataf, C. Michaut, 2018, The composition and stratigraphy of the northern lowlands and implications for InSight mission, 2018, *International Symposium on Lunar and Planetary Science*, Macau, China

- **Pan, L.** and Quantin-Nataf C., 2018, Regional Geological Context of the InSight Landing Site from Mineralogy and Stratigraphy, *49th Lunar and Planetary Science Conference* , the Woodlands, TX

- **Pan, L.**, B. L. Ehlmann, P. Asimow, J. Hu, R. Greenberger, 2018, An infrared spectroscopy study of impact shocked carbonates and implications for Mars, *49th Lunar and Planetary Science Conference* , the Woodlands, TX

- **Pan, L.** and B. L. Ehlmann, 2017, Aqueous alteration revealed by diverse mineralogy at Amazonian aged Lyot crater, *48th Lunar and Planetary Science Conference*, the Woodlands, TX

- **Pan, L.** and B. L. Ehlmann, 2016, Aqueous alteration revealed by diverse mineralogy at Amazonian aged Lyot crater, Mars, *AGU* , San Francisco, CA

- **Pan, L.**, B. L. Ehlmann, J. Carter, C. M. Ernst, 2016, The Stratigraphy of the Northern Plains Inferred from Mineralogy of Impact Craters , *47th Lunar and Planetary Science Conference*, the Woodlands, TX

- **Pan, L.**, B. L. Ehlmann, J. Carter, C. M. Ernst. 2015, Insights into the Stratigraphy of Mars' Northern Plains from Impact Crater Mineralogy. *Bridging the Gap III: Impact Cratering In Nature, Experiments, and Modeling*, Freiburg, Germany

- **Pan L.**, B. L. Ehlmann, J. Carter, C. M. Ernst, 2015, Probing Mars' northern plains stratigraphy with impact craters , *Astrobiology Graduate Conference*, Madison, WI

- **Pan L.** , B. L. Ehlmann, J. Carter, C. M. Ernst, 2015, Probing the northern plains stratigraphy with impact craters , *46th Lunar and Planetary Science Conference*, the Woodlands, TX

- **Pan L.** and Ehlmann B. L., 2014, Geology of the Eastern Margin of Tempe Terra with Implications for Mars Dichotomy Modifications. , *8th International Conference on Mars*, Pasadena, CA

- **Pan L.**, B. L. Ehlmann, J. Carter, C. M. Ernst, 2014, Probing the northern plains stratigraphy with impact cratering , *8th International Conference on Mars*, Pasadena, CA

- **Pan L.**, and Ehlmann B. L., 2014, Aqueous alteration history of Mars northern plains. *Third Conference on Earth System Science*, Shanghai, China

- **Pan L.** and Ehlmann B. L., 2014, Possible formation mechanisms for phyllosilicates and hydrated silica in the knobby terrains of Acidalia Planitia , *45th Lunar and Planetary Science Conference*, the Woodlands, TX

- Parente M., A. M. Saranathan, S. Wiseman, B. L. Ehlmann, **L. Pan**, 2014, Denoising CRISM images: A new look , *45th Lunar and Planetary Science Conference*, the Woodlands, TX

- Ehlmann B. L., C. S. Edwards, **L. Pan**, 2014, Aqueous Minerals on Early Mars from CRISM, OMEGA, THEMIS and TES , *45th Lunar and Planetary Science Conference*, the Woodlands, TX

- **Pan L.** and Ehlmann B. L., 2013, Phyllosilicate and hydrated silica detections in the knobby terrains of Acidalia Planitia , *44th Lunar and Planetary Science Conference*, the Woodlands, TX

Research mentoring

- 2021-2022 co-supervising Master student Katrine Sandberg and Marie Kepp on Mars-related research

- 2019 Spring: Gang Bao, Master student, China Academy of Science. *Research project: Investigation of science targets in China's Mars rover landing regions.*

- 2019 Spring: Judyanne Dalmat, L3 student, ENS de Lyon. *Research project: Calibration of HiRISE color products to CRISM VNIR images.*
- 2015 Summer: Kelcey Logan, Polytechnic High School. *Research project: Geological context of Northern Plains impact craters in Mars Context Camera (CTX) mosaics.*

Teaching Experience

- 2021 Summer: USTC Planetary Science Summer School (Lecture on "Exploring planetary surfaces with remote sensing.")
- 2015 Fall: Ge114a Mineralogy. Teaching assistant. Leading mineral lab exercises, grading quizzes and problem sets
- 2015 Spring: Ge1 Introduction to Geology. Teaching assistant. Grading note cards, labs and problem sets, field trip to Owens Valley
- 2014 Spring: Ge157c Geological application of Remote Sensing. Teaching assistant. Leading lab exercises, grading problem sets, field trip to Death Valley

Academic services

- **Reviewer for**: *J. Geophy. Res.: Planets*, *Icarus*, *Planet. Space Sci.*, *Euro. J. Min.*, *App. Clay Sci.*, *Remote Sensing*, *Sci. Bull. China*
- **Reviewer and panelist for**: NASA Solar System Workings (SSW)
- **Conference**: Served as session chair, 2019 Lunar and Planetary Science Conference; Volunteered as Dwornik award judge for LPSC 2018, 2019; OSPA judge for AGU 2020

Other publications

- **Book chapters**: Planetary Cryosphere (*in Chinese*). 2019. Edited by Yongyun Hu, written by Yongyun Hu, **Lu Pan**, Jun Yang, Yonggang Liu, Qiang Wei, Wenzhe Fa. (Primary author of Chapter 2: Introduction to Solar System & Chapter 5: Mars cryosphere).
- **Outreach article**: "Frozen on the red planet" (*in Chinese*). 2021. Published on the WeChat Official Accounts Platform "Chemistry & Planets"

Presentations

- **2019.7** InSight 15th Science Team Meeting, Paris, France
- **2019.7** Center for Star and Planet Formation, University of Copenhagen, Copenhagen, Denmark
- **2019.5** Earth Science Seminar, Nanjing University, Nanjing, China
- **2018.12** China University of Geosciences, Wuhan, China
- **2018.11** ExoMars 2020 mission 5th Landing Site Selection Workshop, Leicester, UK
- **2018.9** InSight 13th science team meeting, Graz, Austria
- **2017.9** InSight 11th science team meeting, Glendale, CA
- **2016.6** Earth system science seminar, China University of Geosciences, Wuhan, China
- **2016.4** Yuk Lunch seminar, Caltech, Pasadena, CA
- **2016.4** Mars Forum, Jet Propulsion Laboratory, Pasadena, CA
- **2015.8** Joint HiRISE-CaSSIS team meeting, Myvatn, Iceland
- **2015.3** CRISM team meeting, JHUAPL, Baltimore, DC

Outreach and Media

- **2021/4**: Astronomy on Tap: Copenhagen Chapter (Spectacular Earth) Public lecture on InSight mission and seismology.
- **2021/2**: Interview with Euronews on Tianwen-1 mission
- **2020/12**: Interview with journalist on NY Times article about Mars volcanism
- **2020/12/1**: Volunteer and quiz in Astronomy on Tap: Copenhagen Chapter (Terrestrial Tidings).
- **2020/10/30**: Volunteer and quiz in Astronomy on Tap: Copenhagen Chapter (Spooky Space).
- **2020/9/30**: Volunteer and quiz in Astronomy on Tap: Copenhagen Chapter (Peculiar Planets).
- **2018/12/20 & 2019/01/04** : Outreach talk on InSight mission to Mars in Elementary School affiliated with Wuhan University of Technology
- **2019/01/03** : Outreach talk on InSight mission to Mars in pre-school affiliated with Wuhan University of Technology
- **2018/12/28**: Outreach talk on InSight mission to Mars in Haikou Fengxiang pre-School
- **2017/12**: Interview with Euronews on InSight landing
- **2016/09**: Introduction to Geographical Information System, Caltech Library Lecture Series.
- **2016/05/23**: Community Science Event: ESS2: Earth's Systems, Caltech
- **2016/04/01**: Pasadena City College Tech Savvy event: Introduction to STEM for 6-9 grade girls
- **2015/05/18**: Community Science Event: ESS1: Earth's Place in the Universe, Caltech
- **2014/12/09**: Adat Ari El Day School Mars research lab tour

References

- **Dr. Bethany L. Ehlmann (ehlmann@caltech.edu)**: Professor, California Institute of Technology, PhD advisor
- **Dr. Cathy Quantin-Nataf (cathy.quantin-nataf@univ-lyon1.fr)**: Professor, University of Lyon, Université Claude Bernard Lyon 1, Postdoc advisor
- **Dr. Chloé Michaut (chloe.michaut@ens-lyon.fr)**: Professor, University of Lyon, École Normale Supérieur de Lyon, Collaborator
- **Dr. John Carter (john.carter@u-psud.fr)**: Associate Astronomer with *Conseil National des Astronomes et Physiciens* (CNAP), Institut d'Astrophysique Spatiale, Paris-Saclay University, Collaborator
- **Prof. Martin Bizarro (bizzarro@sund.ku.dk)**: Professor, Centre for Star and Planet Formation, GLOBE Institute, University of Copenhagen