

CHENG LI

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EDUCATION	Ph.D. Planetary Science, California Institute of Technology	2016
	B.S. Atmospheric Physics, Peking University	2011
RESEARCH POSITIONS	University of California, Berkeley	2019 –
	51 Pegasi b Postdoc Fellow	
	California Institute of Technology	2017 – 2019
	Postdoc Scholar, Juno mission team member	
	Jet Propulsion Laboratory	2016 – 2017
	NASA Postdoc Program Fellow	
AWARDS	51 Pegasi b Fellowship (Heising-Simons Foundation)	2019
	NASA Postdoc Program Fellowship (NPP)	2016
	NASA Earth and Space Science Fellowship	2015
	Student of Academic Excellence, Peking University	2010
	The Piang'an Insurance Inspirational Scholarship	2009
	The Junyuan Tang Undergraduate Scholarship	2008 – 2011
	The First Prize of the 23 rd National Olympiad in physics, Shanghai, China	2006
PUBLICITY	CNN: How much water does Jupiter really have? Here's what NASA's Juno mission found https://www.cnn.com/2020/02/19/world/juno-jupiter-water-mystery-scn/index.html	2020
	Popularmechanics.com: Here's how aliens might see Earth https://www.popularmechanics.com/space/solar-system/a28774057/how-aliens-might-see-earth/	2019
	Heising-Simons Foundation: New class of the 51 Pegasi b fellowship https://www.hsfoundation.org/fellow/cheng-li-ph-d/	2019
	Nature: Jupiter's secrets revealed by NASA probe https://www.nature.com/news/jupiter-s-secrets-revealed-by-nasa-probe-1.22027	2017
	Scientific American: Juno Reveals Jupiter's Deep Secrets https://www.scientificamerican.com/article/juno-reveals-jupiters-deep-secrets/	2015
	CBS: Storms the size of Earth on Saturn, explained http://www.cbsnews.com/news/storms-the-size-of-earth-on-saturn-explained/	2015

Afpbb.com: 土星の巨大嵐「大白斑」の謎を解明、米大学研究 2015
<http://www.afpbb.com/articles/-/3045309>

Sciencepost.fr: Les tempêtes géantes de Saturne sont enfin expliquées 2015
<https://sciencepost.fr/les-tempetes-geantes-de-saturne-sont-enfin-expliquees/>

Media.inaf.it: Saturno: è diluvio universal 2015
<https://www.media.inaf.it/2015/04/14/saturno-e-diluvio-universale/>

News.sciencenet.cn: 土星大气水分导致风暴累积后大爆发 2015
<http://news.sciencenet.cn/htmlpaper/201551513531928636440.shtm>

OPENSOURCE SOFTWARE

MADAL: Microwave Analysis and Data Assimilation Library Python, C++
<https://github.com/luminoctum/Jamrt-util>

HARP: High-performance Atmospheric Radiation Package Python/C++
<https://github.com/luminoctum/athena-harp>

SNAP: Simulating Non-hydrostatic Atmospheres on Planets Fortran/C++
<https://github.com/luminoctum/athena-crm>

PROFESSIONAL SERVICES

Presentation Judge: 2016 EGU OSPP / 2017 AGU OSPP
Session Chair: 2017 AGU / 2018 AGU / 2018 DPS
Referee: Nature Astronomy / Astronomy and Astrophysics / Journal of Fluid Mechanics / Icarus / Journal of Atmospheric Sciences
Grant Reviewer: 2017 NASA NESSF / 2018 NSF

MEMBERSHIP

American Geophysical Union / American Astronomical Society

RESEARCH EXPERIENCE

[1] Photochemical modeling of Titan’s atmosphere, discovering a stable layer near 500 km above surface

[2] Modeling moist convection in hydrogen atmospheres, explaining the periodicity of Saturn’s Giant storms.

[3] Mapping the global distribution of ammonia gas in Jupiter’s atmosphere using the observations from the Juno microwave radiometer.

[4] Theoretical calculation on the moist thermodynamics of an atmospheric laden with multiple condensing species

[5] Development of a new three-dimensional Cloud Resolving Model (CRM) for planetary atmospheres.

STUDENT ADVISING

[1] Harriet Brettle, Ph.D. student at Caltech (on Jupiter’s polar vortex)

[2] Oriël Humes, undergraduate student at Caltech (on QG dynamics)

[3] Jackson Briones, undergraduate student (on Juno MWR data processing)

- [4] Tianhao Le, Ph.D. student at Caltech (on cloud radiative transfer)
- [5] Ziwei Li, Ph.D. student at MIT (on quasi-geostrophic dynamics)
- [6] Huazhi Ge, Ph.D. student at UCSC (on cloud-resolving models)
- [7] Alexandra Klipfel, undergraduate student at Caltech (on Jupiter's polar vortex)

TEACHING

Lecturer on numerical models for Ge 194 (Juno and Cassini)	2017 / 10
Lecturer on applied statistics for Ge 194 (Juno and Cassini)	2017 / 10
Lecturer on Python Workshop for Caltech Graduate Student Council	2015 / 01
Teaching assistant for GE 150 (Planetary Atmosphere)	2014 / 12
Lecturer on Atmospheric Radiation for ESE 101 (Earth's Atmosphere)	2013 / 10
Teaching assistant for ESE 101 (Earth's Atmosphere)	2013 / 09
Teaching assistant for Ge 1 (Earth and Environment)	2013 / 05
Lecturer on Linux for Caltech Planetary Science Division Resource	2012 / 09
Seminars	

PUBLICATIONS

- [19] **Li, Cheng**, A. Ingersoll, S. Bolton, S. Levin, M. Janssen, S. Atreya, J. Lunine, P. Steffes, S. Brown, T. Guillot, M. Allison, J. Arballo, A. Bellotti, V. Adumitroaie, S. Gulkis, A. Hodges, L. Li, S. Misra, G. Orton, F. Oyafuso, D. Santos-Costa, H. Waite, Z. Zhang, The water abundance in Jupiter's equatorial zone, *Nature Astronomy*, doi::10.1038/s41550-020-1009-3 (2020)
- [18] Fan, S., **C. Li**, J. Li, S. Bartlett, J. Jiang, V. Natraj, D. Crisp, Y. Yung, Earth as an Exoplanet: A Two-dimensional alien map, *ApJ*, 888:L1 (2019)
- [17] Le, T., **C. Li**, V. Natraj, X. Zhang, X. Liu, Q. Yang, W. Wu, A. Braverman, J. Jiang, H. Su, V. Payne, Y. Yung. Evaluation of modeled hyperspectral infrared spectra against AIRS observations under all sky scenarios using a novel statistical approach, *JGR-atmosphere*, in revision (2019)
- [16] Fan, S., D. Shemansky, **C. Li**, P. Gao, Y. Yung. Retrieval of abundances of hydrocarbon and nitrile species in Titan's upper atmosphere, *ESS*, 6, 1057 (2019)
- [15] **Li, Cheng**, X. Chen. Simulating Non-hydrostatic Atmospheres on Planets (SNAP): formulation, validation, and application to the Jovian atmosphere, *ApJS*, 240,2 (2018)
- [14] **Li, Cheng**, T. Le, X. Zhang, Y. Yung, 2018. A High-performance Atmospheric Radiation Package: with applications to the radiative energy budgets of giant planets, *JQSRT*, 217,353-362 (2018)
- [13] Brown, Shannon, M. Janssen, V. Adumitroaie, S. Bolton, S. Gulkis, A. Ingersoll, S. Levin, **C. Li**, L. Li, J. Lunine, S. Misra, G. Orton, P. Steffes, F. Tabataba-Vakili, I. Kolmasova, M. Imai, O. Santolik, W. Kurth, G.

- Hospodarsky, D. Gurnett, J. Connerney. Detection of lightning sferics on Jupiter from Pole to Pole, *Nature*, 558, 87-90 (2018)
- [12] **Li, Cheng**, A. Ingersoll, F. Oyafuso. Moist adiabats with multiple condensing species: A new theory with application to giant planet atmospheres, *JAS*, 75(4),1063-1072 (2018)
- [11] **Li, Cheng**. Disrupting the atmospheric beat, *Nature Astronomy*, 1.11:753 (2017)
- [10] Ingersoll, A.P., V. Adumitroaie, M. Allison, S. Atreya, A. Bellotti, S. Bolton, S. Brown, S. Gulkis, M. Janssen, S. Levin, **C. Li**, L. Li, J. Lunine, G. Orton, F. Oyafuso, P. Steffes. Implications of the ammonia distribution on Jupiter from 1 to 100 bars as measured by the Juno microwave radiometer. *GRL*, 44,7576-7685 (2017)
- [9] **Li, Cheng**, A.P. Ingersoll, M.A. Janssen, S.M. Levin, S.T. Bolton, V. Adumitroaie, M.D. Allison, J. Arballo, A.A. Bellotti, S.T. Brown, S. Ewald, L. Jewell, S. Misra, G.S. Orton, F.A. Oyafuso, P.G. Steffes, R. Williamson. The distribution of ammonia on Jupiter from inversion of Juno Microwave Radiometer data. *GRL*, 44(11) (2017)
- [8] Orton, G.S., T. Momary, A. Ingersoll, A. Adriani, C. Hanssen, M. Janssen, J. Arballo, S. Atreya, S. Bolton, S. Brown, M. Caplinger, D. Grassi, **C. Li**, S. Levin, M. Moriconi, A. Mura, G. Sindoni. Multiple-Wavelength Sensing of Jupiter During the Juno Mission's First Perijove Passage. *GRL*, 44(10) (2017)
- [7] Bolton, S.J., A. Adriani, V. Adumitroaie, J. Anderson, S. Atreya, J. Bloxham, S. Brown, J. E.P. Connerney, E. DeJong, W. Folkner, D. Gautier, S. Gulkis, T. Guillot, C. Hansen, W.B. Hubbard, L. Iess, A. Ingersoll, M. Janssen, J. Jorgensen, Y. Kaspi, S. Levin, **C. Li**, J. Lunine, Y. Miguel, A. Mura, G. Orton, T. Owen, M. Ravine, E. Smith, P. Steffes, E. Stone, D. Stevenson, R. Thorne, J. Waite, D. Durante, R. W. Ebert, T.K. Greathouse, V. Hue, M. Parisi, J. R. Szalay, R. Wilson. Jupiter's interior and deep atmosphere: the first close polar pass with the Juno spacecraft. *Science*, 356(6340) (2017)
- [6] Janssen, M.A., J. Oswald, S. Brown, S. Gulkis, S. Levin, S. Bolton, M. Allison, S. Atreya, D. Gautier, A. Ingersoll, J. Lunine, G. Orton, T. Owen, P. Steffes, V. Adumitroaie, A. Bellotti, L. Jewell, **C. Li**, et al. MWR: Microwave radiometer for the Juno Mission to Jupiter. *SSR*, 1-17 (2017)
- [5] Trammell, H., L. Li, X. Jiang, Y. Pan, M. Smith, E. Bering III, S. Horst, A. Vasavada, A. Ingersoll, M. Janssen, R. West, C. Porco, **C. Li**, A. Simon, K. Baines, 2016. Vortices in Saturn's Northern Hemisphere (2008-2015) observed by Cassini ISS. *JGR - Planets*, 121.9, 1814-1826 (2016)
- [4] **Li, Cheng**, A. Ingersoll. Moist convection in hydrogen atmospheres and the frequency of Saturn's giant storms, *Nature Geoscience*, 8, 398-403 (2015)

- [3] **Li, Cheng**, X. Zhang, P. Gao, Y. Yung. Vertical distribution of C₃-hydrocarbons in the stratosphere of Titan, *ApJL*, 803, L19 (2015)
- [2] Gao, P., R. Y. Hu, T. Robinson, **C Li**, Y. Yung. Stabilization of CO₂ atmosphere on exoplanets around M dwarf stars, *ApJ*, 806, 249 (2015)
- [1] **Li, Cheng**, X. Zhang, J. Kammer, M. Liang, R. Shia, Y. Yung. A non-monotonic eddy diffusivity profile of Titan's atmosphere revealed by Cassini observations. *PSS*, 104, Part A(0), 48-58 (2014)

**MANUSCRIPT
IN
PREPARATION**

- [1] **Li, Cheng**, H. Brettle, A. Ingersoll, The formation and maintenance of Jovian polar vortices (expected, 2019/12)
- [2] **Li, Cheng** and the Juno team. How deep is the Great Red Spot? (expected, 2019/12)
- [3] **Li, Cheng**, M. Janssen, A. Ingersoll, Aftermath of the Giant Saturn Storm of 2010-2011 as observed by the Cassini RADAR 2.2-cm radiometer (expected, 2020/2)

**SELECTED
SEMINARS**

- C. Li** and the Juno team, Microwave observations of the giant planets - Cassini/Radar and Juno/MWR, JpGU 2019, Chiba, Japan (**Invited**) 2019/05
- C. Li** and the Juno team, The thermal structure of Jupiter's troposphere revealed by the Juno microwave radiometer, EGU 2019, Vienna 2019/04
- C. Li**, Modeling of Cyclonic Vortices at the Poles of Jupiter, 22nd AOFD, Maine 2019/03
- C. Li**, 3D mapping of Jupiter's ammonia distribution, U Michigan (**Invited**) 2018/10
- C. Li**, The unsolved questions raised by Juno/MWR, Harvard (**Invited**) 2018/07
- C. Li**, L. Schoon, M. Shete, N. Nakamura, Rossby wave Penetration and Breaking – insights from a rotating tank experiment, U Chicago Rossby palooza 2018/06
- C. Li**, A whole new Jupiter, UC Santa Cruz (**Invited**) 2018/02
- C. Li**, The first year of Juno observing Jupiter's atmosphere, UC Berkeley CIPS seminar (**Invited**) 2018/01
- C. Li** & A. Ingersoll, Shallow water modeling of Jovian polar jets and vortices, 50th DPS, Provo 2017/10
- C. Li** & M. Janssen, Aftermath of the Giant Saturn Storm of 2010-2011 as observed by the Cassini RADAR 2.2-cm radiometer, Cassini PSG meeting 2017/09
- 2017/08

C. Li & the Juno/MWR science team, Preliminary results on Jupiter's atmosphere using the Juno Microwave Radiometer, 14 th AOGS, Singapore (Invited)	2017/06
C. Li & A. Ingersoll, Shallow water modeling of Jovian polar jets and vortices, 21 st AOFD, Portland	2017/04
C. Li & the Juno/MWR science team, Jupiter's global ammonia distribution, EGU 2017, Vienna	2017/03
C. Li , Juno's discovery of Jupiter's atmosphere: a beta version, Dix Planetary Science Seminar, Caltech (Invited)	2016/12
C. Li & the Juno/MWR science team, Ammonia in Jupiter's troposphere: first result from Juno Microwave Radiometer, 49 th AGU Fall Meeting, San Francisco	2016/01
C. Li , Water, ammonia and the 30-year cycle of Saturn's storm, Macau University of Science and Technology (Invited)	2015/12
C. Li , A story of Saturn's giant storms, Peking University (Invited)	
C. Li & A. Ingersoll, Saturn's giant storms: Moist convection in hydrogen atmospheres, 48 th AGU Fall Meeting, San Francisco (Invited)	2015/12
C. Li , Estimating water, ammonia and dynamics with inversions of Juno microwave data, Juno Science Meeting, JHU/APL	2015/11
C. Li & A. Ingersoll, Revisiting the Galileo Probe result by a stretched atmospheric model, 47 th DPS, Washington D.C.	2015/11
C. Li , Saturn's Giant Storms: Moist Convection in Hydrogen Atmospheres, Cassini PSG Meeting, Caltech/JPL	2015/10
C. Li & Y. Yung, Towards a complete understanding of hydrocarbon chemistry in the stratosphere of Titan: from C-1 to C-3, 46 th DPS, Tucson	2014/10
C. Li & A. Ingersoll, Moist convection in hydrogen atmospheres and the frequency of Saturn's giant storms, 47 th AGU Fall Meeting, San Francisco	2014/12
C. Li & A. Ingersoll, Modeling Saturn's giant storms, 45 th DPS, Denver	2013/10
C. Li & Y. Yung, Revision of photochemical modeling of Titan's atmosphere, 44 th DPS, Reno	2012/10
C. Li & A. Ingersoll, Exploring the Giant Saturnian Storm in 2010: A Model of Moist Convection, 45 th AGU Fall Meeting, San Francisco	2012/12