

## Curriculum Vitae

### Chuntao Liu

Department of Physical and Environmental Sciences  
Texas A&M University – Corpus Christi  
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### Education

PhD of Atmospheric Science, May, 2003 University of Wyoming  
Master of Atmospheric Science, Dec, 2000 University of Wyoming  
Master of Meteorology, June 1996 Lanzhou University, Gansu, China  
Bachelor of Meteorology, June 1993 Lanzhou University, Gansu, China

### Professional Appointments

Assistant professor, 2013-current, Dept. of Phys. Env. Sci., Texas A&M-Corpus Christi  
Adjunct research associate professor, 2013-current, Dept. of Atmos. Sci., University of Utah  
Research associate professor, 2010-2013, Dept. of Atmos. Sci., University of Utah  
Research assistant professor, 2006-2009, Department of Meteorology, University of Utah  
Research associate, Jun 2003-Jun 2006, Department of Meteorology, University of Utah  
Research assistant, Aug 2000-May 2003, University of Wyoming  
Research associate, Aug 2001-Nov 2001, Aug 2002-Nov 2002, McMurdo station, Antarctica  
Research assistant, Aug 1998-July 2000, University of Wyoming  
Research scientist, Aug 1996-July 1998, Chinese Academy of meteorological Science

### Publications (40+ Peer reviewed Journal articles, H-Index 17)

#### 2015

- Chen, B., and C. Liu, 2015: Shallow organized warm precipitation systems in tropics, *J. Climate*, submitted
- Liu, C., and E. Zipser, 2015: The global distribution of largest, deepest and strongest precipitation systems, *Geophys. Res. Lett.*, **42**, doi:10.1002/2015GL063776.
- Peterson, M., C. Liu, D. Mach, W. Deierling, C. Kalb, 2015: A method of estimating electric fields above electrified clouds from passive microwave observations, *J. Atmos. and Ocean Tech.*, accepted.
- Hamada, A., Y. N. Takayabu, C. Liu, and E. Zipser, 2015: Robust differences in rainfall characteristics and related environments between extreme rainfall and extreme convective events extracted from TRMM PR measurements, *Nature Comm.*, 6:6213, doi:10.1038/ncomms7213.
- Liu, C., S. Shige, Y. Takayabu, and E. Zipser, 2015: Latent heating contribution from precipitation systems with different sizes, depths and intensities in tropics, *J. Climate*, **28**,186-203.

#### 2014

- Liu, C., and E. Zipser, 2014: differences between the surface precipitation estimates from the TRMM precipitation radar and passive microwave radiometer version 7 products, *J. Hydrometeor.*, **15**, 2157-2175.

- Yokoyama, C., E. J. Zipser, C. Liu, 2014: TRMM-observed shallow vs. deep convection in the eastern pacific related to large scale circulations in reanalysis datasets, *J. Climate*, **27**, 5575-5592.
- Wall, C., E. J. Zipser, C. Liu, 2014: An investigation of the aerosol indirect effect on convective intensity using satellite observations, *J. Atmos. Sci.*, **71**, 430-447.

## 2013

- Wall, C., C. Liu, and E. Zipser, 2013: A climatology of tropical congestus using CloudSat, *J. Geophys. Res.*, **118**, 6478-6492, doi:10.1002/jgrd.50455.
- Zhou, Y., W. K. M. Lau, and C. Liu, 2013: Rain characteristics and large scale environments of precipitation objects with extreme rain volumes from TRMM observations, *J. Geophys. Res.*, **118**, 9673-9689, doi:10.1002/jgrd.50776.
- Peterson, M., and C. Liu, 2013: Characteristics of lightning flashes with exceptional illuminated areas, durations, and optical powers and surrounding storm properties in the tropics and inner subtropics, *J. Geophys. Res.*, **118**, 1-14, doi:10.1002/jgrd.50715.
- Liu C., and E. Zipser, 2013: Regional variation of morphology of the organized convection in the tropics and subtropics, Part I: regional variation, *J. Geophys. Res.*, **118**, 453-466, doi:10.1029/2012JD018409.
- Liu, C., and E. Zipser, 2013: Why does radar reflectivity tend to increase downward toward the ocean surface, but decrease downward toward the land surface?, *J. Geophys. Res.*, **118**, 135-148, doi:10.1029/2012JD018134.

## 2012

- Ferraro, R., and coauthors, 2012: An evaluation of microwave land surface emissivities over the continental United States to benefit GPM-era precipitation algorithms, IEEE, transactions on geoscience and remote sensing, 0196-2892.
- Liu, C., D. Cecil, and E. J. Zipser, 2012: Relationships between lightning flash rates and radar reflectivity vertical structures in thunderstorms over the tropics and subtropics. *J. Geophys. Res.*, doi:10.1029/2011JD017123.
- Wall, C. L., E. J. Zipser, and C. Liu, 2012: A regional climatology of monsoonal precipitation in the southwestern US using TRMM, *J. Hydrometeor.*, **13**, 310-323.

## 2011

- Liu, C., D. Cecil, and E. J. Zipser, 2011: Relationships between lightning flash rates and passive microwave brightness temperatures at 85 and 37 GHz over the tropics and subtropics. *J. Geophys. Res.*, **116**, D23108, doi:10.1029/2011JD016463.
- Peterson, M., and C. Liu, 2011: Global statistics of lightning in anvil and stratiform regions over tropics and subtropics observed by TRMM. *J. Geophys. Res.* **116**, D23201, doi:10.1029/2011JD015908.
- Liu, C., 2011: Rainfall contribution from precipitation systems with different sizes, intensities and durations, *J. Hydrometeor.*, **12**, 394-412.
- Jiang, H., C. Liu, and E. J. Zipser, 2011: A TRMM-based tropical cyclone cloud and precipitation feature database, *J. Appl. Meteor. Climat.*, **50**, 1255-1274.
- Robinson, F. J., S. C. Sherwood, D. Gerstle, C. Liu, and D. J. Kishcha, 2011: Exploring the land-ocean contrast in convective vigor using islands, *J. Atmos. Sci.*, **68**, 602-618.

## 2010

- Xu, W., E. J. Zipser, C. Liu, and J. Jiang, 2010: On the relationships between lightning frequency and thundercloud parameters of regional precipitation systems, *J. Geophys. Res.*, **115**, D12203, doi:10.1029/2009JD013385.

- Gopalan, K., N.-Y. Wang, R. Ferraro, and C. Liu, 2010: Status of version 7 of the TRMM 2a12 land precipitation algorithm, *J. Tech.*, **27**, 1343-1354.
- Li, X., W. K. Tao, T. Matshu, C. Liu and H. Masunaga, 2010: Improving a spectral bin microphysical scheme using TRMM satellite observations, *Quart. J. Roy. Meteor. Soc.*, **647**, 382-399.
- Liu, C., E. Williams, E. J. Zipser, and G. Burns, 2010: Diurnal variations of global thunderstorms and electrified shower clouds and their contribution to the global electrical circuit, *J. Atmos. Sci.*, **67**, 309-323.
- Xu, W., E. J. Zipser, and C. Liu, 2009: Rainfall characteristics and Convective properties of Mei-Yu precipitation systems over south China and Taiwan, Part I: TRMM observations, *Mon. Wea. Rev.*, **137**, 4261-4275.

## 2009

- Liu, C., and E. J. Zipser, 2009: Implication of the day vs. night differences of water vapor, carbon monoxide and thin cloud observations near tropical tropopause, *J. Geophys. Res.*, **114**, D09303, doi:10.1029/2008JD011524.
- Wang, N.-Y., C. Liu, R. Ferraro, D. Wolff, E. J. Zipser, C. Kummerow, 2009: The TRMM 2A12 land precipitation product – status and future plans, *J. Meteor. Soc. Japan*, **87A**, 237-253.
- Liu, C., and E.J.Zipser, 2009: "Warm rain" in the tropics: Seasonal and regional distribution based on 9 years of TRMM data. *J. Climate*, **22**, DOI: 10.1175/2008JCLI2641.1, 767-779.

## 2008

- Zhang, Y., S. A. Klein, C. Liu, B. Tian, R. T. Marchand, J. M. Haynes, R. B. McCoy, Y. Zhang, and T. P. Ackerman, 2008: On the diurnal cycle of deep convection, high-level cloud and upper troposphere water vapor in the Multi-scale Modeling Framework, *J. Geophys. Res.*, **113**, D16105, doi:10.1029/2008JD009905.
- Liu, C., E.J.Zipser, G.G. Mace, and S. Benson, 2008: Implications of the differences between daytime and nighttime CloudSat observations over the tropics. *J. Geophys. Res.*, **113**, D00A04, doi:10.1029/2008JD009783.
- Liu, C., E.J.Zipser, D.J.Cecil, S.W.Nesbitt, and S. Sherwood, 2008: A cloud and precipitation feature database from 9 years of TRMM observations. *J. Appl. Meteor. Climate*, **47**, 2712-2728. DOI:10.1175/2008JAMC1890.1
- Liu, C., and E.J.Zipser, 2008: Diurnal cycles of precipitation, clouds, and lightning in the tropics from 9 years of TRMM observations. *Geophys. Res. Letters*, **35**, L04819, doi:10.1029/2007GL032437.

## Before 2008

- Liu, C., E. J. Zipser, T. J. Garrett, J. Jiang, H. Su, 2007: How do the water vapor and carbon monoxide "tape recorders" start near the tropical tropopause? *Geophys. Res. Lett.*, **34**, L09804, doi:10.1029/2006GL029234.
- Liu, C., 2007: Geographical and seasonal distribution of tropical tropopause thin clouds and their relation to deep convection and water vapor viewed from satellite measurements, *J. Geophys. Res.*, **112**, D09205, doi:10.1029/2006JD007479.
- Liu, C., E. Zipser, and S. W. Nesbitt, 2007: Global distribution of tropical deep convection: Different perspectives using infrared and radar as the primary data source, *J. Climate*, **20**, 489-503.
- Zipser, E., C. Liu, D. Cecil, S. W. Nesbitt, and S. Yorty, 2006: where are the most intense thunderstorms on Earth?, *Bull. Am. Meteorol. Res.*, **87**, 1057-1071.

- Garrett, T., J. Dean-Day, C. Liu, B. K. Barnett, G. G. Mace, D. G. Baumgardner, C. R. Webster, T. Paul Bui, and W. R. Read, 2006: A redistribution of water due to pileus cloud formation near the tropopause, *Atmos. Chem. Phys.*, **6**, no5, 1185-1200.
- Liu, C., and E. Zipser, 2005: Global distribution of convection penetrating the tropical tropopause, *J. Geophys. Res.*, doi:10.1029/2005JD00006063.
- Liu, C., and L. Cheng, 1999: Parameterization of Mobilization and Transport of Sand-Dust during Black Storm and Mesoscale Numerical Experiments. *ACTA. Meteor. SINICA*, Vol. **13**, No.3, 316-330.
- Wang P., C. Liu, 1998: Numerical study of Mesoscale structure of Number 6 tropical depression in 1996, *ACTA. Meteor. SINICA*, **56** (3), 296-311 (in Chinese).
- Liu, C., L. Cheng, 1997: Study of Transport of Sand-Dust during Black Storm using Mesoscale Numerical model. *ACTA Meteor. SINICA*, **55**, 726-738. (in Chinese), 1997.
- Cheng, L., and C. Liu, 1996: Mesoscale Numerical Experiments of Developing Mechanism for the "93.5" Black Storm and Parameterization of Sand-Dust Transport. *J. Hydrometeo. Ecolo.* No. **4**, 55-72.

### **Selected conference presentations**

- Liu, C., (invited presentation) Convection from 16+ Years of TRMM Observations: Phenomenon, Variations, and Relationships to Large-Scale Environments, AGU fall meeting, San Francisco, December 2014.
- Liu, C., Early Results of Precipitation Features from Half Year of the GPM Observations, AGU fall meeting, San Francisco, December 2014.
- Peterson, M., and C. Liu, Comparison of Satellite-Based Radar and Passive Microwave Estimates of Global Wilson Current Source, AGU fall meeting, San Francisco, December 2014.
- Liu, C., Measure precipitation from space: past, current, and future, TAMUCC brown bag Seminar, Corpus Christi, November 2014
- Liu, C., Development of GPM precipitation feature database, PMM science team meeting, Baltimore, August 2014
- Liu, C., Latent heating contribution from precipitation systems of different sizes, depths and intensities: variations during MJO, LH workshop, Baltimore, August 2014
- Liu, C., Latent heating contribution from precipitation systems of different sizes, depths and intensities, Seminar at NCAR, Boulder, July 2014
- Liu, C., Counting storms from space: studies of cloud and precipitation using satellite observations, Seminar at Peking University, June 2014
- Peterson, M., and C. Liu, A tale of two thunderstorms: statistical variations in lightning activity between thunderstorms with similar properties, AMS annual meeting, Atlanta, January 2014
- Liu, C., Research using University of Utah precipitation and cloud feature database, PMM science team meeting, Annapolis, March, 2013
- Liu, C., Vertical structure of latent heating in the different types of precipitation features. PMM science team meeting, Annapolis, March, 2013
- Liu, C., Counting storms from space: studies of cloud and precipitation using satellite observations. University of Washington, (invited presentation), April, 2013.
- Liu, C., Studies of cloud and precipitation using satellite observations. Texas A&M University at College station, (invited presentation), September, 2013.
- Liu, C., Online access of regional climatology of cloud and precipitation from 14 years of TRMM and 5 years of CloudSat observations, PMM workgroup, November, College Park, MD, 2013.

- Liu, C., estimate global lightning from radar and microwave observations, AGU fall meeting, San Francisco, December 2013.
- Liu, C., What can we learn from differences between precipitation estimates from the radar and radiometer algorithms, San, Francisco, 2012
- Liu, C., and E. Zipser, Regional variation of morphology of organized convection over tropics and subtropics, Tokyo, 4<sup>th</sup> TRMM international conferences, 2012
- Liu, C., Event based dataset from TRMM and A-Train and their applications in the studies of tropical convection, AMS annual meeting, New Orleans (Invited presentation), 2012
- Liu, C., Correlations between lightning and characteristics of convective cells in tropical and subtropical thunderstorms, Brownbag seminar, Earth Research Center, University of Alabama-Huntsville (invited presentation). 2011
- Liu, C., Why does maximum radar reflectivity tend to increase downward toward the ocean surface, but tend to decrease downward toward the land surface? AGU fall meeting, San Francisco, 2011.
- Liu, C., Improvement of TRMM V7 product from precipitation feature perspective, TRMM science team meeting, Denver, 2011.
- Liu, C., Correlations between lightning and radar characteristics of convective cells in thunderstorms, AMS Radar conference, Pittsburg, 2011.
- Liu, C., The role of deep convection in the tropical tropopause layer, AGU fall meeting (invited presentation), 2010.
- Liu, C., Troposphere-stratosphere exchange over tropics – perspective from multi-satellite observations (invited presentation), NCAR ACP, Boulder, 2010
- Liu, C. and E. Zipser, Mesteries of the last minutes of rain drops: slopes of maximum radar reflectivity profiles below freezing level in precipitation systems, AMS microphysics conference, Portland, 2010.
- Liu, C. and E. Zipser, correlation between lightning and characteristics of convective cells in tropical thunderstorms, AMS tropical meteorology conference, Tucson, 2010.
- Liu, C., and E. Zipser, Rainfall contributions from precipitation systems with different sizes, intensities and durations over the tropics and subtropics, GPM science team meeting, Seattle, 2010.
- Liu, C. Precipitation Feature database - past and future, GPM science team meeting, Salt Lake City, 2009.
- Liu, C., Diurnal cycles of water vapor, clouds and deep convection near the tropical tropopause, AGU Chapman conference – water vapor, Kona, 2008.
- Liu, C., H. Jiang, E. Zipser, and E. F. Stocker, Online applications of the University of Utah TRMM precipitation features database, TRMM Science meeting, Fort Collins, 2008.
- Liu, C., and E. Zipser, Comparisons of Cloudsat and TRMM precipitation features, AMS tropical meteorology conferences, Orlando, 2008
- Liu, C., and E. Zipser, The importance of the “warm rain” contribution to tropical precipitation based on 9 years of TRMM statistics, 3<sup>rd</sup> International TRMM conferences, Las Vegas, 2008
- Liu, C., Comparisons between CloudSat and TRMM cloud and precipitation features, AGU fall meeting, San Fransisco, 2007
- Liu, C., Geographical and seasonal distribuion of TTL thin clouds and their relation to deep convection and TTL H<sub>2</sub>O viewed from satellite measurements, AGU fall meeting, San Fransisco, 2006.
- Liu, C., E. Zipser, S.W. Nesbitt, E. Stocker, Global distribution of deep convection: Why do PR and VIRS give difference perspectives?, 4<sup>th</sup> TRMM Science Conference, Monterey, 2006.

- Liu, C., and E. Zipser, Diurnal cycle of tropical deep convection and anvil clouds: Global distribution using 6 years of TRMM radar and IR data. 27th Conference on Hurricanes and Tropical Meteorology, Monterey, 2006.
- Liu, C., and E. Zipser, Global distribution of convection penetrating the tropical tropopause, 32nd Conference on Radar Meteorology, Albuquerque, 2005
- Liu, C., E. Zipser, S. Nesbitt, D. Cecil and E. Stocker, 2004, University of Utah TRMM precipitation feature database and applications, 2nd TRMM International Science Conference, Kyoto, 2004.

### **Funds and grants**

Funded:

PI:

NASA: Precipitation features in the GPM era: Development of a long record of the precipitation feature database using multiple satellite observations. Total 218K, Sep. 2013-August-2016.

Rockwell Collins: Geographical and seasonal distributions of radar profile, Sep. 2010 –Current, Annual renewal at 100K/yr.

University of Utah: Maintaining the Precipitation Feature database, Total 50K, Sep 2013-August 2015.

NASA: Characteristics of various types of precipitation systems and their rainfall contributions observed by space-borne radar and microwave radiometers. Total 220K, Apr. 2011 – Mar. 2014

NASA: Population of precipitation systems observed by space-borne radar and microwave radiometers. Total 220K, Apr. 2008 – Mar. 2011

Co-PI

NASA: From TRMM to GPM: Quantitative comparison and diagnostic evaluation of precipitation algorithms in a wide variety of meteorological regimes. Total 320K, Jan 2010 - Dec. 2013

Pending:

NSF: Improving Connections between Gravity Waves and Convection in the NCAR Coupled Earth System Model (CESM), total budget 47K, 06/2015-05/2018, one month Co-PI time/Year at Texas A&M-Corpus Christi.

NSF: Understanding the contributions from thunderstorms and electrified shower clouds to the global electric circuit, total budget 476K, 09/2015-08/2018, two month PI time/year at Texas A&M-Corpus Christi.

NASA: Global and regional variance in size and convective intensity of precipitation systems from space borne radar and passive microwave observations, total budget 250K, 09/2015-08/2018, one month PI time/year at Texas A&M –Corpus Christi.

NASA: Climate indicators of water storage near the coast of Gulf Mexico, total budget 450K, 05/2015-04/2018, one month Co-PI time/year.

### **Members**

AGU and AMS

NASA Global Precipitation Mission (GPM) science team

NCAR Convective transport of active species in the tropics (CONTRAST) science team

### **Synergistic Activities**

- Field program participation
  - 2001-2002 Ozone observations at McMurdo Station, Antarctica (research associate)
  - 2010 NASA Genesis and Rapid Intensification Processes (GRIP, field scientist)

2013 NSF Convective Transport of Active species in tropics (CONTRAST, science team member)

- NASA Precipitation Science. Since 2003 participating in understanding the properties of storms and estimation of surface precipitation from space-borne radar and passive microwave radiometry. Principal role on this project has been to validate the precipitation retrieval algorithms and maintain a large objective-based precipitation feature database. Main focus has been in understanding the various precipitation systems over different regions and under different weather regimes. Also I maintain a website distributing the precipitation feature database at: <http://trmm.chpc.utah.edu/> and <http://atmos.tamucc.edu/trmm/>. In most recent years, I am interested in understanding the different properties of thunderstorms over various regions using 17+ years of TRMM data. Currently a science team member of NASA Global Precipitation Mission (GPM) program.
- Service to community as editor and referees  
Currently serving as associate editor for Journal of Geophysical Research-Atmosphere  
Referee for peer review:  
Journals: J. Atmos. Sci., J. Climate, J. Hydrometeorology, J. Appl. Meteor. Climat., Mon. Wea. Rev., J. Atmos. Ocean. Tech., J. Geophys. Res., Geophys. Res. Lett., Q. J. R. Meteor., Atmos. Chem. Phys., J. Climate, ANGIO, Adv. Atmos. Sci., Atmos. Sci. Lett., J. Remote Sensing, etc.  
Proposals and panel reviews: NSF, NASA, DOE, NGS

#### **Collaborators & Other Affiliations**

- Collaborators and co-editors in past 48 months  
Joe Turk (NASA JPL), Gail Jackson (NASA), Laura Pan (NCAR), Dan Cecil (UAH), Steve Nesbitt (U of Ill.), William Lau (NASA), Yaping Zhou (NASA), William Randel (NCAR), Chie Yokoyama (U of Tokyo), Haiyan Jiang (FIU), Yukari Takayabu (U of Tokyo), Ralph Ferraro (NOAA), Chidong Zhang (U of Miami), Nai-Yu Wang (NOAA), Edward Zipser (UU)
- Graduate and postdoctoral advisors  
Ph.D advisor: Dr. Gabor Vali, University of Wyoming, 2000-2003  
PostDoc mentor: Dr. Edward J. Zipser, University of Utah, 2003-2013
- Thesis advisor and postgraduate-scholar sponsor  
Baohua Chen, PostDoc, (2014-)  
Michael Peterson, Ph.D, expecting 2014 (Chair)  
Michael Peterson, M.S., 2011 (Chair)  
Sarah Bang, M.S., 2013; Weixin Xu, Ph.d, 2011; Lis Cohen, M.S., 2009; Yang Zhao, M.S., 2009; Paul Staten, M.S., 2008

#### **Courses taught**

General Physics I, Texas A&M Corpus Christi, 2015  
Programming in Earth Sciences, Texas A&M Corpus Christi, 2014  
Severe Weather, Texas A&M-Corpus Christi, 204, 2015  
Radar and Mesoscale Meteorology, University of Utah, 2010, 2012