

## **Curriculum Vitae: Shu-Peng Ben Ho**

### **National Oceanic and Atmospheric Administration**

NESDIS/STAR/SMCD

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### **EDUCATION**

Ph. D. (Atmospheric Science), 1998 -- University of Wisconsin-Madison

M.S., (Atmospheric Science), 1995 --University of Wisconsin-Madison

M.S., (Atmospheric Science), 1992, Rutgers-the State University of New Jersey

B.A., (Computer Science), 1987, Feng Chia University, Taichung, Taiwan

### **PROFESSIONAL EXPERIENCE**

2018- : NOAA/NESDIS/STAR Physical Scientist for GNSS RO science

2016- : UCAR/COSMIC Interim Lead Scientist

2014- : UCAR/COSMIC, Project scientist III

2008-2013: UCAR/COSMIC, Project scientist II

2005-2008: UCAR/COSMIC

2002-2005: NCAR/ACD, Project scientist I

2001-2002: NCAR/ACD, Associate Scientist III

1998-2001: Analytical Service & Materials, Inc., in affiliation of NASA Langley Research Center, Hampton, VA, Research Scientist

1993-1998: Department of Atmospheric and Oceanic, University of Wisconsin-Madison, Research Assistant

1990-1992: Department of Meteorology, Rutgers-the State University of New Jersey, Research Assistant

### **SPECIALIZED EXPERIENCES are highlighted in bold words below.**

#### 1) Knowledge of Radio Occultation System satellite operations

- I have extensive experience and knowledge of GPS RO satellite operations and scientific applications. I have published more than 55 GPS RO related papers in world-class journals since 2004.
- I have presented more than 70 conference papers in national and international GPS RO and atmospheric workshops and conferences.
- I have been the interim lead scientist of UCAR COSMIC program since 2014.

- I have led COSMIC scientific staffs and COSMIC operational team in data operation, validation, weather applications, climate applications and these results are presented and summarized in those 70 conference papers and 55 journal papers.
  - I am regularly invited by ACP, JGR, AMT, Remote sensing, J. of Climate, BAMS and many other world class journals to review GPS RO related journal papers
  - I am regularly invited by NASA as proposal review panel.
  - I was regularly invited as a speaker for national and international GPS RO related workshop and meetings.
  - I have organized at least 22 national and international GPS RO workshops, meetings, and special meetings.
  - I have received special COSMIC recognition award and special contribution award in 2007 and 2008, respectively.
  - **I have extensive experiences to develop an end-to-end inversion code to convert RO bending angle and refractivity profiles to tropospheric temperature and water vapor profiles.**
  - **I have also developed the combined retrievals to inverting the collocated active RO data and passive infrared and microwave measurements to obtain the optimal temperature and moisture profiles in both lower stratosphere and troposphere (see my proposals).**
- 2) Coordinate with international partners to transition multiple Radio Occultation (RO) sources into operations and NWP impacts
- I am frequently communicating with domestic and foreign partners on RO data validation, quality improvement, and their impacts on numerical weather prediction. These are demonstrated in the professional service section.
  - **I have extensive experiences in characterizing the uncertainty of bending angles or refractivity through local power spectral analysis. I have demonstrated as an internationally recognized leader in the RO data processing and the use of RO remote sensing for climate and weather applications. I lead the COSMIC team with scientists participating from JPL, EUM, DMI, WegC, GFZ, Harvard, ECMWF, NCDC, and NOAA to meet all data processing schedules, report deadlines, and research objectives for various projects. These collaborations have led to more than 30 papers published in well-known journals. Many of those papers were specifically summarizing the error characteristics of bending angle and refractivity in the lower stratosphere and troposphere and were used to improve the RO inversion algorithm.**
  - As an internationally recognized leader in the RO data processing and the use of RO remote sensing for climate and weather applications, I have been organizer/convener/steering committee for numerous national and international GPS RO scientific meetings and workshops (see “Scientific Community Service/Working Groups” section).

- I also have extended experiences on communicating with staff, and internal and external organizations. I have supervised more than 23 post-doc/university professor visitors, student visitors, and COSMIC scientific staffs and scientists. I am the interim lead scientist of UCAR COSMIC program. I am responsible for leading COSMIC climate working group, weather working group, and ionospheric working group for development of RO science data products using multiple RO missions.
  - **I have actively interacted with global NWP partners on quantifying the RO uncertainty and investigating the impacts of RO uncertainty on global weather forecast and hurricane predictions. Results were summarized in Ho et al., (2013, BAMS). Many related results were presented by co-authors and COSMIC weather team members and not detailed here.**
  - **I had led the COSMIC weather team to demonstrate impacts of COSMIC data in NCEP GFS/GSI through data assimilation.**
  - **I had worked with joint center and COSMIC weather team to include not only COSMIC but also KOMPSAT-5 into current NCEP operational data assimilation system.**
- 3) Determine atmospheric profiles through Radio Occultation data
- I have extensive knowledge of characterizing atmospheric profiles through satellite data. I have published more than 55 journal papers and presented more than 70 conference papers in this field.
  - I am frequently sought for national and international collaborations and proposal writing from the RO community and satellite remote sensing community
  - I am PI and co-PI for more than 20 GPS RO related proposals.
- 4) Knowledge of satellite meteorology and climatology
- I also have extensive knowledges of satellite meteorology and climatology. These are demonstrated in my publications and presentations. I have published close to 70 papers on satellite meteorology and climatology in well-known journals. I have also been invited as members and co-chair in several international scientific working groups in climate science.
  - I am also a contributing author of IPCC AR5 report, and a Science Team Member in World Climate Research Programme (WCRP) Global Stratospheric Processes and their Role in Climate (SPARC), Global Energy and Water Cycle Experiment (GEWEX) Radiation Panel (GRP) water vapor profile climate data record assessment, and International Radio Occultation Working Group (IROWG).
  - My papers have been cited by other papers for more than 2600 times (about 37 times per paper)
  - I have received UCAR Outstanding Accomplishment Award for Scientific and Technical Advancement (for the MOPITT project) in 2006.
  - I have been selected as “2017 Albert Nelson Marquis Lifetime Achievement Award winner for Who is who in American”.

- I have been selected as “2017 Marquis Who is who in American for 2017”.
- I have also been selected as “2017 Marquis Who is who in the World for 2017”.
- I am also invited as guest editor and senior editor for several new journals (i.e., Guest editor for the Special Issue for Advances in Meteorology, Member of the Editorial Board of International Journal of Atmospheric Sciences, and Senior Editor of the International Journal of Sciences)

## **PROFESSIONAL SERVICES**

### **Section 1: Institutional Service**

1. Supervisor of COSMIC student program, 2008
2. Director of the Student Program for 2011 COSMIC student trip and workshop, Taipei, Taiwan.
3. Chair of NCAR Asian Listening Meeting breakout section, 2008
4. Committee of NCAR Asian circle Meeting, 2009-present.
5. Panel member of NCAR Asian circle Meeting, 2010
6. Coordinator and moderator of the UCAR/COSMIC Science Seminar Series, 2009-present
7. Coordinator of the COSMIC science team meeting, 2013-present
8. NCAR SOARS steering committee, 2014-present

### **Section 2: Scientific Community Service/Working Groups**

1. Lead the international RO trend working group – round 1 comparison (2009-2010)
2. Lead the international RO trend working group – round 2 comparisons (2011-2012)
3. Member of the international RO trend working group and lead at COSMIC UCAR for – round 3 comparisons (2013-present)
4. Team leader for NOAA NCDC GPS RO climate data record (2010- present)
5. Member of the WCRP (World Climate Research Program) GEWEX Radiation Panel (GRP) water vapor profile climate data record assessment (2012- present).
6. Members of the NASA AURA science team for the TES instrument (2007-2011)
7. Member of the WCRP (World Climate Research Program) SPARC global temperature profile climate record assessment (2011- present).
8. Member of the International Radio Occultation Working Group (2011- present).
9. Member of U.S. Climate Variability and Predictability Program (CLIVAR) working group (2015-)
10. NASA ROSES proposal review panel (2015)
11. Regular reviewers of NASA, NSF, and other international proposals
12. Member of the U.S.A. federal Advisory Committee for the Sustained National Climate Assessment
13. Co-chair of the WCRP (World Climate Research Program) GEWEX Radiation Panel (GRP) water vapor profile climate data record assessment group (2017-present).
14. Member of GSICS (Global Space-based Inter-calibration System) (2018- present)

15. Committee of the NOAA satellite needs working group – representing NESDI S STAR (2019- )

### **Section 3: Organizer/Convertor/Steering Committee for Scientific Meetings and Workshops**

1. Organizer: Workshop on the Applications of GPS Radio Occultation to Climate, NCAR Foothills Laboratory, Building #1 Atrium Conference Room 3450 Mitchell Lane, Boulder, CO 80301 March 17-18, 2008.
2. Co-Organizer: Program Committee of COSMIC 2009 International Workshop
3. Organizer and Chair: COSMIC scientific applications section in the COSMIC/NCAR/UCAR retreat, 2009.
4. Section Chair: COSMIC scientific applications section in the COSMIC/NCAR/UCAR retreat, 2009.
5. Chair: COSMIC scientific applications section in the COSMIC/NCAR/UCAR retreat, 2009.
6. Organizer and Chair and panel member: the Science Opportunities for COSMIC-II, COSMIC/NCAR/UCAR retreat, 2010, Lake Shore Lodge and Conference Center, Estes Park, CO.
7. Organizer and Co-chair: COSMIC-NOAA climate meeting in AMS, 2008.
8. Organizer and Co-chair: COSMIC-NOAA climate meeting in AMS, 2009.
9. Organizer and Co-chair: COSMIC-NOAA climate meeting in AMS, 2010.
10. Chair: student poster competition of COSMIC international workshop, Boulder, CO, USA, October, 2009.
11. Organizer and Co-chair: UCAR/COSMIC workshop the RO inversion and climate workshop in Estes Park, CO, USA from 28th March to 3rd April 2012, together with the CGMS International Radio Occultation Working Group (IROWG).
12. Organizer: the climate section in the 5<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop & ICGPSRO, April, 2011, Taipei, Taiwan.
13. Converter: the climate section in the 5<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop & ICGPSRO, April, 2011, Taipei, Taiwan.
14. Co-Chair: Student poster competition of the 5<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop & ICGPSRO 2011, April, 2011, Taipei, Taiwan.
15. Co-Chair: for the COSMIC workshop of the GPS RO Data Processing for Climate Applications, Estes Park, CO, USA from 28th March to 3rd April 2012.
16. Organizer and Chair: Workshop Organizing Committee for the sixth COSMIC users' workshop, Boulder CO., 2012.
17. Chair: the sixth COSMIC users' workshop, Boulder, CO., 2012.
18. Converter: the climate section in the 2<sup>nd</sup> IROWG Workshop 28 March 3, April 2012, CO, U.S.A.
19. Converter/Moderator: section of Inventory and requirements on data records and reference data working group for the GEWEX water vapor assessment workshop, September, 25-28, 2012, Germany.
20. Co-Chair: the 8<sup>th</sup> COSMIC users' workshop, Climate Applications section, Boulder, CO, USA, October, 2014.

21. Section chair for RO climate application: the 3<sup>rd</sup> ICGPSRO conference, March, 9-11, 2016, Taipei, Taiwan.
22. Steering committee for the 10<sup>th</sup> FORMOSAT-3/COSMIC Data Users' Workshop and 6<sup>th</sup> International Radio Occultation Working Group (IROWG-6) Sep., 21-27, 2017, Estes Park, Colorado USA.

#### **Section 4: Journals**

1. Guest editor for the Special Issue for Advances in Meteorology
2. Editor for the Journal of Remote Sensing Special Issue "GPS/GNSS for Earth Science and Applications"
3. Editorial Board of International Journal of Atmospheric Sciences
4. Senior Editor of the International Journal of Sciences
5. Editorial board for the journal of Satellite Oceanography and Meteorology
6. Regular reviewer of manuscripts for journals and proposals

### **EDUCATION & OUTREACH**

#### **Section 1: Supervisory Experiences**

1. 2007-2008: supervisor of Dr. Wenying He, COSMIC/UCAR visiting scientist from Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China.
2. 2008-2012: supervisor of Xinjia Zhou, COSMIC/UCAR visiting scientist from Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China.
3. 2008-2011: supervisor of Dr. Patrick F. Callaghan, COSMIC/UCAR post-graduate scientist.
4. 2009-2010: supervisor of Professor Jie Xiang, ACD/NCAR, COSMIC/UCAR visiting scientist from Department of Atmospheric science, Nanjing University, Nanjing, China.
5. 2009-2010: supervisor of Dr. Junmei Zhang, COSMIC/UCAR visiting scientist from Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China.
6. 2009-2011: supervisor of Teresa VanHove, COSMIC/UCAR associate scientist.
7. 2010-2011: co-supervisor of Jerry Raj, Ph. D. student from the National Central University, Taiwan.
8. 2010-2012: supervisor of Wen-Hsin Teng, student visitor from the National Central University, Taiwan.
9. 2012-present: supervisor of Dr. Liang Peng, COSMIC/UCAR visiting scientist from Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China.
10. 2010-2012: co-supervisor of Dr. Barbara Scherllin-Pirscher, a NCAR ASP post-doctor scientist, who is originally from University of Graz, Austria.
11. 2010-2012: co-supervisor of Dr. Zhen Zang, NCAR COSMIC project scientist.
12. 2011-2013: co-supervisor of Mr. Riccardo Biondi, Ph. D. visitor from DMI.
13. 2012-2013: co-supervisor of Ms. Xu Xu, Associate Professor visitor from China
14. 2013: co-supervisor of Ms. Hsiao-chun Lin, a SOARS student from NCU, Taiwan.

15. 2014: co-supervisor of Ms. Therese Rieckh, a Ph. D student from WegC, Graz
16. 2014: co-supervisor of Mr. Ji-yian Chien, a graduate student from NCU, Taiwan.
17. 2014: co-supervisor of Dr. Xiaohua Xu, Professor from School of Geodesy & Geomatics, Wuhan University, China.
18. 2016: supervisor of Dr. Xingqin Fang, PS I of COSMIC/UCAR
19. 2014- : supervisor of Dr. Liang Peng, associate scientist II COSMIC/UCAR
20. 2016- : supervisor of Dr. Hui Liu, PS II of COSMIC/UCAR
21. 2016- : supervisor of Dr. Tae-kwon Wee, PS II of COSMIC/UCAR
22. 2016- : supervisor of Dr. Hailing Zhen, post-graduate scientist of COSMIC/UCAR
23. 2017- : supervisor of Dr. Iurii Cherniak, PS I scientist of COSMIC/UCAR
24. 2018- : supervisor of Mr. Xinjia Zhou, Research scientist of NESDIS/STAR
25. 2018- : supervisor of Dr. Loknath Adhikari, Research scientist of NESDIS/STAR
26. 2018- : supervisor of Dr. Stanislav Kireev, Research scientist of NESDIS/STAR
27. 2018- : supervisor of Dr. Khalil Ahmad, Research scientist of NESDIS/STAR
28. 2019- : supervisor of Dr. Yuxiang He, Research scientist of NESDIS/STAR
29. 2018- : supervisor of Dr. Erin Lynch, Post-doc scientist of CICS/University of Maryland
30. 2018- : supervisor of Dr. Bin Zhang, Research scientist of CICS/University of Maryland
31. 2018- : supervisor of Dr. Xi Shao, Research scientist of CICS/University of Maryland
32. 2019- : supervisor of Dr. Ling Liu, Research scientist of CICS/University of Maryland

## **Section 2: Hosting Scientific Visitor**

2010, July: Dr. Andrea Stenier, research scientist from WegC, Graz  
2012, July: Dr. Uli Foelsche, Associate Professor from WegC, Graz

## **PROFESSIONAL SOCIETY**

Member of the American Meteorological Society  
Member of the American Geophysical Union  
Member of American Association for the Advancement of Science

## **AWARDS AND RECOGNITIONS**

### **Section 1: External Awards and Recognitions**

1. Guest Editor of the Special Issue of GNSS RO for the journal of “Remote Sensing”
2. 2018: Selected as “Marquis Who is who Top scientist”.
3. May, 2017: Selected as “2017 Albert Nelson Marquis Lifetime Achievement Award winner for Who is who in American”.
4. June, 2017: Selected as “2017 Marquis Who is who in American for 2017”.
5. September, 2017: Selected as “2017 Marquis Who is who in the World for 2017”.

6. March, 2014: Invited as the Lead guest editor for a special issue of the Scientific World Journal (impact factor = 1.73).
7. July, 2015: Selected in “Who is who in American” for the 2016 issue.
8. July, 2013: Selected in “Who is who in American” for the 2014 issue.
9. January, 2013: Invited visiting to the GPS Scientific Application Research Center in National Central University, Taiwan from 5 to 15 January, 2012.
10. Feb. 2013: Invited as the Lead Guest Editor of the Special Issues for Advances in Meteorology (impact factor = 1.24).
11. Member of international working groups, the World Climate Research Programme (WCRP) Global Energy and Water Cycle Experiment (GEWEX).
12. Member of international working groups, the World Climate Research Programme (WCRP) Global Stratospheric Processes and their Role in Climate (SPARC)
13. 2012- : Member of NASA Sounder science team
14. January, 2012: Invited visiting to the GPS Scientific Application Research Center in National Central University, Taiwan from 5 to 15 January, 2012.
15. February, 2014: Selected in “Who is who in American” for 2015 issue.
16. February, 2013: Selected in “Who is who in American” for 2014 issue.
17. February, 2012: Selected in “Who is who in American” for 2013 issue.
18. June, 2011: Selected in “Who is who in American” for 2012 issue.
19. May, 2011: invited to join the WCRP SPARC group.
20. March, 2011: invited to attend the World Climate Research Programme (WCRP) Global Energy and Water Cycle Experiment (GEWEX) Radiation Panel (GRP) workshop and the ESA Data User Element (DUE) programme’s global Vapour project in Frascati, Italy.
21. November, 2010: invited to be a Contributing Author for the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC WGI AR5).
22. June 2010: Invited visiting to the GPS Scientific Application Research Center in National Central University, Taiwan from June 5 to July 2, 2010.
23. March 2009: Invited to workshop on the “Assessment of Small Satellite Missions to “Meet the Needs of the Earth Sciences”, University of Colorado Laboratory for Atmospheric and Space Physics (LASP).
24. July 2009: Selected in “Who is who in American” for 2010 issue.
25. June 2008: Selected in “Who is who in American” for 2009 issue.
26. April 2007: Selected by “Who is who in the World” for 2008 issue.
27. May 2006: Selected in “Who is who in American” for 2007 issue.

## **Section 2: Internal Awards and Recognitions**

1. December 2006: UCAR Outstanding Accomplishment Award for Scientific and Technical Advancement (for the MOPITT project).
2. September 2006: Key Contributor to UCAR COSMIC Program Award  
Citation: the recognition of the key contributor to UCAR COSMIC Program
3. April 2007: Special Contribution to UCAR COSMIC Mission Award.  
Citation: the special recognition of the science contribution to COMSIC mission



4. October 2008: COSMIC Special Recognition Award for coordinating COSMIC Student Program.  
Citation: the special recognition for coordinating COSMIC student program
5. March 2016: 15 years of service in UCAR/NCAR
6. Jan. 2018: COSMIC Special Recognition Award for Interim Lead Scientist for COSMIC Program.  
Citation: the special recognition for leading COSMIC science team

## **EXTERNALLY FUNDED COLLABORATIONS**

1. Principal Investigator: Validation and Calibration of MSU/AMSU Measurements and Radiosonde Observations Using GPS RO Data for Improving Stratospheric and Tropospheric Temperature Trends, NOAA, NA07OAR4310224, POP: 08/01/07-07/31/10 (\$300K for three years, finished).
2. Principal Investigator: Satellite and Ground-Based Validation of TES Tropospheric CO Products, NASA, NNX07AB52G, POP: 01/15/07-01/14/10 (\$600K for three years, finished).
3. Co-Principal Investigator: A Climate Virtual Observatory (CVO): Online Data Fusion & Analysis for Climate Variability & Change, POP: 04/01/08-03/31/09 (\$350K for two years finished).
4. Co-Principal Investigator: UCAR-NOAA Collaborative Planning for an Operational Radio Occultation (RO) Mission, NOAA NESDIS, 2009-2011 (on going).
5. Co-Principal Investigator: Climate Trends and model Evaluation by Radio Occultation Trendeval: Analysis, Detection and Attribution of Atmospheric Climate Trend and Climate Model Evaluation based on Data Records from Radio Occultation, Research Project Proposal to the Austrian Science Fund, 2009-2011, POP: 07/01/10-06/30/12.
6. Principal Investigator: Construction of Consistent Microwave Sensor Temperature Records and Tropopause Height Climatology Using MSU/AMSU Measurements, GPS RO Data and Radiosonde Observations, NOAA, POP: 07/01/2009-06/30/2012 (\$600K for three years, from 2008 to 2011).
7. Co-Principal Investigator: Continued Operation of COSMIC in Support of Operational and Research for years 2011 -2015, NSF (on going).
8. Consultant: NASA FBAR project, 2010-2013 (on going).
9. Co-Principal Investigator: Applications and Construction of Climate Data Records

for Global Climate Change Studies, China-973 project, China, 2010-2014 (on going).

10. Principal Investigator: RO-Calibrated AMSU Brightness Temperature CDR, NOAA, 2013 (sole source contract, \$10K/year, on going).
11. Co-Principal Investigator: Radio occultation based gridded climate data sets - RO-CLIM, SCOPE-CM (Sustained and coordinated processing of Environmental Satellite data for Climate Monitoring). 2013 (approved).
12. Co-Principal Investigator: Sustained generations of upper tropospheric humidity (UTH) from multi-sensors with multi-agency cooperation, SCOPE-CM (Sustained and coordinated processing of Environmental Satellite data for Climate Monitoring). 2013 (approved).
13. Principal Investigator: The Mean Layer Temperature – Troposphere & Stratosphere CDR, the Mean Layer Temperature - Lower Stratosphere CDR and the Tropopause Height Climatology, NCDC, NOAA, 2015 (\$100K/year, on going).
14. Principal Investigator: A New Reprocessing Scheme to Improve the Aqua AIRS Global Temperature and Water Vapor Retrievals in the Lower Troposphere and Stratosphere using GPS Radio Occultation Measurements, NASA ROSES 2013, 2013-2016 (approved).
15. Co-Principal Investigator: Continued Operation of COSMIC GPS Radio Occultation Constellation in Support of Research Applications in Atmospheric Sciences, NSF and NASA joint proposal (2.8M/yr from 2015-2020).
16. Principal Investigator: Generating the Enhanced Atmospheric and Hydrometeor Retrievals from the Combined Microwave Sounders and GPS RO Measurements, NOAA 2015, 2015-2017.
17. Co-Principal Investigator: The atmospheric Natural EXtreme evenTs REseArch, Monitoring and detection (NEXTREAM), 2015-2019.
18. International Scientific Advisory Partners: Convective storms and tropical cyclone detection improvements (VORTECS)”, FWF Austria and Taiwan Project (submitted).
19. Principal Investigator: UCP program development fund, 2015 (\$12K, approved).
20. Principal Investigator: The Mean Layer Temperature – Troposphere & Stratosphere CDR, the Mean Layer Temperature - Lower Stratosphere CDR and the Tropopause Height Climatology, NCDC, NOAA, 2016 (on going).
21. Principal Investigator: Calibration Inter-consistency study of SNPP/NASA ATMS,

POES/AMSU-A, and Metop-A/-B AMSU-A Observations using GPS Radio Occultation Data and Radiosonde Data for Re-construction of Stratospheric and Tropospheric Temperature Trends from 1980 to 2019, NASA inter-satellite consistency study, 2016-2019 (submitted).

22. Collaborator: A multi-mission and multi-processing-center observation ensemble of GPS radio occultation climate dataset, NASA DATA FOR OPERATION AND ASSESSMENT, 2017-2020 (submitted).
23. Principal Investigator: Integrated Multi-mission Upper Tropospheric Humidity Earth System Data Records for Climate Research, NASA ROSES: Making Earth System Data Records for Use in Research Environments, 2017-2022 (submitted).
24. Co-Principal Investigator: A Multi-Decadal Multi-Satellite Record of High Vertical Resolution Upper Troposphere Lower Stratosphere Temperature Products, NASA ROSES: Making Earth System Data Records for Use in Research Environments, 2017-2022 (submitted).
25. Principal Investigator: NOAA/NESDIS/COSMIC-2 project
26. Principal Investigator: NOAA/NESDIS/CWDP project
27. Collaborator: NOAA/NESDIS/EPS-SG project
28. Overseeing the NOAA Technology Maturation Program for RO data exploration project.
29. Principal Investigator: Exploitation of the New Approaches of using COSMIC-2 data in Numerical Weather Prediction in the Moist Troposphere, NOAA Technology Maturation Program: FY19 Projects to Support NESDIS Strategic Planning and Observing Systems Exploitation Activities (submitted).

## **PUBLICATIONS**

### **Section 1: Thesis**

1. **Shu-peng Ho**, An Expert System for Validation and Screening of Air Quality data. Master Thesis. Rutgers-the State University of New Jersey. 1992.
2. **Shu-peng Ho**, Atmospheric Profiles from Simultaneous Observations of Upwelling and Downwelling Spectral Radiance. Ph. D. Thesis, University of Wisconsin - Madison, March 1998.

### **Section 2: Referred Journal Articles**

**Total citation: 2989**

\* Written by students, science visitors, post-docs and supervised by Ho.

1. Steiner, A. K., F. Ladstädter, C. O. Ao, H. Gleisner, **S.-P. Ho**, D. Hunt, T. Schmidt, U. Foelsche, G. Kirchengast, Y.-H. Kuo, K. B. Lauritsen, A. J. Mannucci, C. Marquardt, J. K. Nielsen, W. Schreiner, M. Schwärz, S. Sokolovskyi, S. Syndergaard, A. von Engel, J. Wickert, Consistency and structural uncertainty of multi-mission GPS radio occultation records, AMT.
2. Schröder, M., R. Bennartz, **S.-P. Ho**, Using GPS RO data as on-orbit references to calibrate Temperature in the Lower Stratosphere obtained from Satellite Microwave Sounders: Recent Results, GEWEX News letter.
3. Von Engel, X., H. Gleisner, **S.-P. Ho**, A. Stanier, H. IPCC AR5 GPS RO section. (submitted).
4. Mears C., **S.-P. Ho**, J. Wang, H. Huelsing, and L. Peng, 2020: Total Column Water Vapor, [In "States of the Climate in 2018"]. *Bul. Amer. Meteor. Sci.*, **98** (8), S24-S25, doi:10.1175/2017BAMS State of the Climate (in press).
5. Vinay Kumar; S. B. Surendra Prasad; K. Krishna Reddy; S. K. Dhaka; R. K. Choudhary; M. Venkatarami Reddy; Shu-Peng Ho, 2019: Temperature perturbations in the troposphere and lower stratosphere over a semi-arid region during the 2010 solar eclipse, PAAG-D-19-00515.
6. Li, ying, G. Kirchengast, B. Scherllin-Pirscher, M. Schwaerz, J. K. Nielsen, T.-K. Wee, **S.-P. Ho**, and Y.-B. Yuan, A new algorithm for the retrieval of atmospheric profiles from GNSS radio occultation data in moist air and cross-evaluation among processing centers, Remote Sensing (accepted).
7. A. K. Steiner, F. Ladstädter, C. O. Ao, H. Gleisner, **S.-P. Ho**, D. Hunt, T. Schmidt, U. Foelsche, G. Kirchengast, Y.-H. Kuo, K. B. Lauritsen, A. J. Mannucci, C. Marquardt, J. K. Nielsen, W. Schreiner, M. Schwärz, S. Sokolovskyi, S. Syndergaard, A. von Engel, J. Wickert, Consistency and structural uncertainty of multi-mission GPS radio occultation records, AMT, 2019 (accepted).
8. Mears C., **S.-P. Ho**, J. Wang, H. Huelsing, and L. Peng, 2019: Total Column Water Vapor, [In "States of the Climate in 2019"]. *Bul. Amer. Meteor. Sci.*, **98** (8), S24-S25, doi:10.1175/2017BAMS State of the Climate.
9. Schröder, M., R. Bennartz, **S.-P. Ho** Using GPS RO data as on-orbit references to calibrate Temperature in the Lower Stratosphere obtained from Satellite Microwave Sounders: Recent Results, GEWEX News letter.
10. **Ho, S.-P.**, Achieving interoperability between Global Navigation Satellite System (GNSS) and GSICS: using GPS-RO as an on-orbit reference for Microwave

- Satellite sounders, GSICS News letter, doi: 10.25923/j01d-g110, Vol.13 No 1, 2019.
11. Yunheng Xue, Jun Li, W. Menzel Paul, Eva Borbas, **Shu-Peng Ho**, and Zhenglong Li, 2018: Impact of Sampling Biases on the Global Trend of Total Precipitable Water Derived from the Latest 10-Year Data of COSMIC, SSMIS and HIRS Observations, JGR (accepted).
  12. **Ho, S.-P.**, R. A. Anthes, C. O. Ao, S. Healy, A. Horanyi, D. Hunt, A. J. Mannucci, N. Pedatella, W. J. Randel, A. Simmons, A. Steiner, F. Xie, X. Yue, Z. Zeng, 2019: The COSMIC/FORMOSAT-3 Radio Occultation Mission after 12 years: Accomplishments, Remaining Challenges, and Potential Impacts of COSMIC-2, *Bul. Amer. Meteor. Sci.*, DOI: 10.1175/BAMS-D-18-0290.1.
  13. Schröder, M., M. Lockhoff, L. Shi, T. August, R. Bennartz, H. Brogniez, X. Calbet, F. Fell, J. Forsythe, A. Gambacorta, **S.-P. Ho**, E. R. Kursinski, A. Reale, T. Trent, Q. Yang, 2018: The GEWEX water vapor assessment: Overview and introduction to results and recommendations, *Remote Sens.* 2019, 11(3), 251, <https://doi.org/10.3390/rs11030251>.
  14. **Ho, S.-P.**, Anthes, R. A., Zhang, H., Chen, S., 2019: Improving the Impact of Radio Occultation Observations on Numerical Forecasts of Tropical Cyclones, JCSDA Quarterly Newsletter, No. 62, Winter 2019, pp11-17. doi:10.25923/w2dh-ep66.
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5. John C. Gille, David P. Edwards, Juying Warner, Merritt N. Deeter, Gene L. Francis, **Shu-peng Ho** and Daniel Ziskin, SPIE's third International Asia-Pacific Symposium on Remote Sensing of the Atmosphere, Environment, and Space, 23-27 October 2002, Hangzhou, China. (proceeding)
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### **Section 5: Other Referred Articles**

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## INVITED TALKS

1. **Ho, S.-P.**, A New Reprocessing Scheme to Improve the Aqua AIRS Global Temperature and Water Vapor Retrievals in the Lower Troposphere and Stratosphere using GPS Radio Occultation Measurements, the 4th ICGPSRO 2018, April 18~20, Taipei, Taiwan.
2. **Ho, S.-P.**, New Climate Data Records that Can be Derived from GPS RO Data: Planetary Boundary Layer Heights and Upper Troposphere Humidity, 7, Feb., National Climate Data Center, Asheville NC, 2014.
3. **Ho, S.-P.**, GPS RO-MSU calibration and data record, 2008: NOAA-NIST Workshop on Calibration for Climate-Quality Time Series, Camp Springs, MD, Jan 14, 2008.
4. **Ho, S.-P.**, Validation and Calibration of Microwave Sounders' Lower Stratosphere Temperature Trend using GPS RO Data, COSMIC/FORMAST-3, 4, Dec. Taipei, Taiwan, 2006.
5. **Ho, S.-P.**, Climatological Validation of Microwave Lower Stratosphere Temperature using GPS RO Data, invited seminar given in National Central University, May 8, 2006, Taiwan.
6. **Ho, S.-P.**, Validation and Calibration of MSU/AMSU Measurements using GPS RO Data for Improving Stratospheric Temperature Trend Analysis, invited seminar given in National Technical institute, May 10, Taiwan, 2006.
7. **Ho, S.-P.**, Comparability and reproducibility of RO data, Workshop on the Applications of GPS Radio Occultation to Climate, NCAR Foothills Laboratory, Building #1 Atrium Conference Room 3450 Mitchell Lane, Boulder, CO 80301 March 17-18, 2008.
8. **Ho, S.-P.**, Validation of Microwave Sounders' Lower Stratosphere Temperature Trend using GPS RO Data, NOAA-COSMIC climate meeting, 14th Symposium on Meteorological Observation and Instrumentation, San Antonio, TX 14-18 January 2007.

9. **Ho, S.-P.**, Construction of Consistent Temperature Records using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, NOAA-COSMIC climate meeting in AMS, New Orleans, LA., 20-24 January 2008.
10. **Ho, S.-P.**, Applications of COSMIC RO to Climate Studies, NRC-CES meeting, Boulder, CO, Sep.22-23, 2008.
11. **Ho, S.-P.** “Enhancement of the AIRS Troposphere and Stratosphere Temperature Climate Data Records using Global Positioning System Radio Occultation Data”, tele-conference presentation to JPL, Feb. 17 2010.
12. **Ho, S.-P.**, Construction of a Consistent Microwave Sensor Temperature Record in the Lower Stratosphere Using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, 2010 Workshop on Climate Data Records from Satellite Microwave Radiometry, March 22-24, 2010 at the NOAA Science Center, in Silver Spring, MD.
13. **Ho S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Construction of a Consistent Microwave Sensor Temperature Record in the Lower Stratosphere Using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, June 17, 2010, Center Weather Bureau, Taipei.
14. **Ho, S.-P.**, et al., Current Developments on the Applications of COSMIC from the Troposphere to Stratosphere and the Potential Impacts of COSMIC-2 Data, invited seminar given in Department of Atmospheric Science, National Central University, Jan. 29, 2013, Taiwan.
15. **Ho, S.-P.**, et al., Current Developments on the Applications of COSMIC from the Troposphere to Stratosphere and the Potential Impacts of COSMIC-2 Data, invited seminar given in Research Center for Environmental Changes, Academia Sinica, Jan. 31, 2013, Taiwan.
16. **Ho, S.-P.**, Using COSMIC GPS RO Data to Study Atmospheric Trends and Modes of Variability above, within, and below Clouds, invited seminar given in Jet Propulsion Lab, California Institute of Technology, Aug. 28, 2015, CA., USA.

**NATIOANL and INTERNATIONAL CONFERENCES  
PRESENTATIONS (presenting author only for the last 5 years)**

1. **Ho, S.-P.**, Liang Peng, Rick Anthes, Ying-Hwa Kuo, Planetary Boundary Layer Heights from COSMIC and CALIOP over Ocean, AMS, Atlanta, GA., 2-6, Feb., 2014.

2. **Ho, S.-P.**, Liang Peng, Rick Anthes, Ying-Hwa Kuo, Estimation of Planetary Boundary Layer Heights from COSMIC, CLIPSO, and High Resolution Radiosondes during the VOCALS-REx, AMS, Atlanta, GA., 2-6, Feb., 2014.
3. **Ho, S.-P.**, Liang Peng, Calibration of Temperature Troposphere / Stratosphere from Advanced Microwave Sounding Unit using High Quality Radiosonde Data Identified by Radio Occultation Data, the 5<sup>th</sup> international workshop on Occultation for Probing Atmosphere and climate, Graz, Austria, Sep. 8-11, 2013.
4. **Ho, S.-P.**, Ying-Hwa Kuo and Zhen Zeng, Validation of Microwave Lower Stratosphere Temperature using CHAMP GPS RO Data, Formosat-3/COSMIC data user Workshop, Oct 17, Boulder. CO, 2006.
5. **Ho, S.-P.**, D. P. Edwards, Improvements of the Retrievals of Carbon Monoxide in the Planetary Boundary Layer using Combined Infrared and Solar Measurements : A Simulation Study, NCAR AIR Quality work shop, Boulder, CO., 2006.
6. **Ho, S.-P.**, D. P. Edwards, A Simulation Study to investigate the possible Retrievals of Carbon Monoxide in the Planetary Boundary Layer using Combined Infrared and Near Infrared Measurements, 3 - 17 August 2006, San Diego, California USA.
7. **Ho, S.-P.**, Y.-H. Kuo and Z. Zhen, Validation of Lower Stratosphere Temperature from AMSU/MSU Measurements using GPS RO data, COSMIC meeting in AMS, San Antonio, TX 14-18 January 2007.
8. **Ho, S.-P.**, Y.-H. Kuo and Z. Zhen, Validation of Microwave Sounders' Lower Stratosphere Temperature Trend using GPS RO Data, 14th Symposium on Meteorological Observation and Instrumentation, San Antonio, TX 14-18 January 2007.
9. **Ho, S.-P.**, D. Edwards, J. C. Gille, Validation of TES CO profiles using MOPTT CO Products, ACD NCAR report, Jan. 9, 2007.
10. **Ho, S.-P.**, D. Edwards, Validation of TES CO profiles using MOPTT CO Products, AURA validation meeting, Boulder CO., Oct. 2006.
11. **Ho, S.-P.**, Applications of COSMIC Radio Occultation Data to Climate Monitoring: Early Results, NOAA, Camp Springs, MD, July 13, 2007.
12. **Ho, S.-P.**, Applications of COSMIC Radio Occultation Data to Climate Monitoring: Early Results, the 3<sup>rd</sup> international workshop on Occultation for Probing Atmosphere and climate, Graz, Austria, Sep. 17-21, 2007.
13. **Ho, S.-P.**, Inter-comparisons of Refractivity and Dry Temperature Derived from different Data Center, COSMIC-workshop, Boulder, CO., Oct. 22-24, 2007.



14. **Ho, S.-P.**, Applications of COSMIC Radio Occultation Data to Climate Monitoring: Early Results, AMS, New Orleans, LA., 20-24 January 2008.
15. **Ho, S.-P.**, Construction of Consistent Temperature Records using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, COSMIC meeting in AMS, New Orleans, LA., 20-24 January 2008.
16. **Ho, S.-P.**, Ying-Hwa Kuo, Wenying He, Doug Hunt, Chris Rocken, William Schreiner, and Sergey Sokolovskiy, Global Comparisons of Water Vapor Profiles in the Lower Troposphere from COSMIC Radio Occultation, in situ Observations, and ECMWF Analysis, 4<sup>th</sup> Asian Space Conference, Taipei, Taiwan, 1-3, October, 2008.
17. **Ho, S.-P.**, Ying-Hwa Kuo, Doug Hunt, Chris Rocken, William Schreiner, and Sergey Sokolovskiy, and Jens Wickert, Anthony J. Mannucci, Quantitative Estimation of the Reproducibility of GPS RO Data for Climate Research, 4<sup>th</sup> Asian Space Conference, Taipei, Taiwan, 1-3, October, 2008.
18. **Ho, S.-P.**, Tele-conference presentation: JPL talk about the “Enhancement of the AIRS Troposphere and Stratosphere Temperature Climate Data Records using Global Positioning System Radio Occultation Data”, April, 2010.
19. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Doug Hunt, Cheng-Zhi Zou. Construction of a Consistent Microwave Sensor Temperature Record in the Lower Stratosphere Using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, 2010 Workshop on Climate Data Records from Satellite Microwave Radiometry, March 22-24 2010 at NOAA Science Center in Silver Spring, MD (invited).
20. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Doug Hunt, Cheng-Zhi Zou, Construction of a Consistent Microwave Sensor Temperature Record in the Lower Stratosphere Using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, joint 2010 CWB Weather Analysis and Forecasting and COAA 5<sup>th</sup> International Ocean-Atmosphere Conference, June 28-30, 2010, Center Weather Bureau, Taipei, Taiwan.
21. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Construction of a Consistent Microwave Sensor Temperature Record in the Lower Stratosphere Using Global Positioning System Radio Occultation Data and Microwave Sounding Measurements, June 17, 2010, Center Weather Bureau, Taipei (invited).
22. **Ho, S.-P.**, Using SI-traceable Global Positioning System Radio Occultation Measurements for Climate Monitoring, National Central University, Department of Atmospheric Science, and GPS ARC, June 22, Jhongli, Taiwan (invited).
23. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Climate Calibration Observatory in Orbit: Calibration and Validation of Measurements of AMSU and AIRS using Global

- Positioning System Radio Occultation Observations, September, 6-10, OPAC-4, Graz, Austria.
24. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Assessment of Systematic Biases of Radiosonde Temperature and Moisture Measurements using Global Positioning System Radio Occultation from COSMIC, September, 6-10, OPAC-4, Graz, Austria.
  25. **Ho, S.-P.**, Construction of Consistent Microwave Sensor Temperature Records and Tropopause Height Climatology using MSU/AMSU Measurements, GPS RO Data, and Radiosonde Observations, Climate Data Records Program Review meeting, August 4-5, 2010 in Asheville, NC.
  26. **Ho, S.-P.**, Construction of Consistent Microwave Sensor Temperature Records and Tropopause Height Climatology using MSU/AMSU Measurements, GPS RO Data, and Radiosonde Observations, ARC/SDS Program Review meeting, September, 14-16, 2010 in Asheville, NC.
  27. **Ho, S.-P.**, Assessment of Systematic Biases of Radiosonde Moisture Measurements using Global Positioning System Radio Occultation from COSMIC, GEWEX/ESA DUE GlobVapour workshop on long term water vapour data sets and their quality assessment, 8 – 10 March 2011 - ESA/ESRIN, Frascati, Italy (invited).
  28. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Assessment of Systematic Biases of Radiosonde Moisture Measurements using Global Positioning System Radio Occultation from COSMIC, 91st American Meteorological Society Annual Meeting, Seattle, WA, USA.
  29. **Ho, S.-P.**, Xinjia Zhou, Ying-Hwa Kuo, Climate Calibration Observatory in Orbit: Using COSMIC RO Data to Calibrate and Validate the AIRS and AMSU Troposphere and Stratosphere Temperature Climate Data Records, 91st American Meteorological Society Annual Meeting, Seattle, WA, USA.
  30. **Ho, S.-P.**, Y.-H. Kuo, X.-J. Zhou, and P. Callaghan, 2011: Long Term Assessment of Radiosonde Temperature Systematic Biases using COSMIC, CHAMP, and GRACE from 2001 to 2010. The 5<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop & ICGPSRO, April 12-14, 2011, Taipei, Taiwan.
  31. **Ho, S.-P.**, et al., Summaries of GPS RO Inversion Procedures in the Upper Troposphere and Middle Stratosphere among Operational Centers and Structural Uncertainties in the Multiple Center Comparisons, 2<sup>nd</sup> IROWG Workshop 28 March 3, April 2012, Estes Park, CO, U.S.A.
  32. **Ho, S.-P.**, et al., Reproducibility of GPS Radio Occultation Data for Climate Monitoring: Profile-to-Profile Inter-comparison of CHAMP Climate Records 2002 to 2008 from Six Data Centers, The 6<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop, September 31-Oct. 2, 2012, Boulder CO., U.S.A.

33. **Ho, S.-P.**, et al., Global Assessment of Radiosonde Systematic Temperature Biases in the lower Stratosphere using COSMIC, CHAMP, and GRACE from 2001 to 2010, The 6<sup>th</sup> FORMOSAT-3/COSMIC Data Users Workshop, September 31-Oct. 2, 2012, Boulder CO., U.S.A.
34. **Ho, S.-P.**, et al., Calibration of Temperature Troposphere / Stratosphere from Advanced Microwave Sounding Unit using High Quality Radiosonde Data Identified by Radio Occultation Data, 92<sup>nd</sup> American Meteorological Society Annual Meeting, Jan. 6-10, Austin, TX, USA.
35. **Ho, S.-P.**, et al., Current Developments on the Applications of COSMIC from the Troposphere to Stratosphere and the Potential Impacts of COSMIC-2 Data, invited seminar given in Department of Atmospheric Science, National Central University, Jan. 29, 2013, Taiwan.
36. **Ho, S.-P.**, et al., Current Developments on the Applications of COSMIC from the Troposphere to Stratosphere and the Potential Impacts of COSMIC-2 Data, invited seminar given in Research Center for Environmental Changes, Academia Sinica, Jan. 31, 2013, Taiwan.