YONG CHEN

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EDUCATION

Ph. D., 2005, University of California at Los Angeles, Major: Atmospheric Sciences
M. Sc., 1999, Peking University, Major: Atmospheric Physics and Atmospheric Environment
B. Sc., 1996, Peking University, Major: Atmospheric Sciences

DISSERTATION

Chen, Y., Three-Dimensional Monte Carlo and Diffusion Radiative Transfer Models Applied to Inhomogeneous Clouds and Surfaces, (2005). Advisor: Liou, Kuo-Nan.

PROFESSIONAL EXPERIENCES

September 2020 – Present, Physical Scientist, NOAA/NESDIS/STAR

February 2019 – September 2020, Senior Scientist, Gobal Science and Technology, Inc.

- Performing a comprehensive study on the feasibility of a cost effective ground processing system for a future hyperspectral infrared sounder in the geostationary orbit
- Analyzed hyperspectral infrared sound Cross-track Infrared Sounder (CrIS) thermal vacuum (TVAC) data to produce the calibration look-up-table for the Joint Polar Satellite System (JPSS) second satellite (JPSS-2)
- Developed state-of-art software to reprocess CrIS SDR version 2 during life-time mission for data record consistency for S-NPP and NOAA-20
- Implemented and evaluated CrIS Polarization Correction Algorithm in the operational JPSS ground processing system
- Improved Lunar Intrusion Detection Algorithm for the CrIS Sensor Data Record
- Evaluated the SNPP CrIS SDR reprocessing data products in terms of radiometric, spectral, as well as geometric accuracy. Led effects to transition the SNPP CrIS SDR Reprocessing Data Products to the Validated Maturity Level
- Leading effects to accelerate the data recovery of the S-NPP MWIR SDR data after the loss of the MWIR band on March 26
- Investigated major anomalies for CrIS SDR data on S-NPP and NOAA-20
- Checked and reviewed CrIS SDR products from IDPS SOL and Integration & Test (I&T) Deploy Regression Data.

July 2017 – February 2019, Associate Research Scientist, University of Maryland

- Assisting CrIS government team lead to manage and coordinate the CrIS team, and organizing and hosting regular science team meetings
- Leading the post-launch calibration and validation activities for CrIS on NOAA-20 to make sure the measurements and SDR data products meeting the requirements and maturity milestones

- Writing CrIS SDR algorithm discrepancy report, investigating CrIS measurements and SDR anomaly, finding the root causes, and providing solutions to improve SDR data quality
- Leading the activities for validation and development of the operational CrIS SDR software for both S-NPP and JPSS-1
- Preparing the readiness for calibrating and validating JPSS-1 CrIS SDR data

April 2014 – July 2017, Assistant Research Scientist, University of Maryland

- Analyzed CrIS thermal vacuum (TVAC) data to produce the calibration look-up-table, especially used TVAC gas cell data to produce Instrument Line Shape (ILS) parameters to correct the self-apodization effect, and used diagnostic mode data (DM) to derive the non-linearity coefficients to improve the radiometric FOV-to-FOV consistency
- Analyzed CrIS thermal vacuum (TVAC) data to produce the calibration look-up-table, especially used TVAC gas cell data to produce Instrument Line Shape (ILS) parameters to correct the self-apodization effect, and used diagnostic mode data (DM) to derive the non-linearity coefficients to improve the radiometric FOV-to-FOV consistency
- Generated CRTM transmittance coefficients for new satellite sensors
- Performed CrIS radiometric and spectral calibration and validation using innovative methods
- Acted as technical lead of CrIS SDR team, led the development of state-of-art processing, and calibration of CrIS SDR full spectral resolution data for weather and climate applications
- Developed state-of-art software to reprocess CrIS SDR during life-time mission for data record consistency
- Evaluated the CrIS reprocessed SDR in term of spectral, radiometric, and geometric long-term accuracy and stability

February 2013 – April 2014, Visiting Assistant Research Scientist, University of Maryland

- Member of the STAR CrIS SDR Team. Provide technical expertise to ensure that the post-launch calibration/validation activities provide high quality infrared data for operational applications including weather prediction forecasts
- Developed and maintained a system to monitor S-NPP CrIS real-time and long-term radiometric and spectral accuracy using forward model CRTM as well as Numerical Weather Prediction models output
- Detected Doppler shift of the spectral frequencies in CrIS SDR data due to Earth rotation by analyzing the asymmetry of the CrIS spectra between the positive and negative scan positions

January 2012 – February 2013, Research Scientist II, Colorado State University

- A core member of the CRTM team, responsible for strategic and programmatic decisions on the future direction of the CRTM
- Supported CRTM development for current and future satellite sensors
- Developed a shortwave infrared sea surface reflection model and non-local thermodynamic equilibrium effects model in CRTM to improve shortwave IR channels simulation

- Developed a monitoring system for CrIS and ATMS at pixel level by using CRTM and match-up atmospheric profiles from ECMWF forecast data
- Conducted data assimilation experiments and assessed microwave land emissivity impact in the National Centers for Environmental Prediction (NCEP) Global Forecast System (GFS)

March 2010 – December 2011, Research Scientist I, Colorado State University

- Developed a fast Stratospheric Sounding Unit (SSU) model in CRTM to support global stratospheric temperature studies over long periods from 1978 to 2006
- Developed the Planck weighted transmittance and correction of solar reflection for broadband infrared satellite channels
- Understood the discrepancy of CRTM performance between two different transmittance models, and provided guideline for CRTM users
- Conducted data assimilation experiments and assessed the impacts of the new components in CRTM on global forecasts
- Testing the scattering look-up-table in CRTM for cloudy and precipitation conditions

March 2006 – March 2010, NOAA Postdoctoral Fellow, Colorado State University

- Advanced the understanding of the CRTM forwarding model error characteristics under clear and cloudy conditions
- Developed a new transmittance model in CRTM to significantly improve the forward radiative transfer accuracy, as well as the water vapor Jacobian profile. The new model positively impacts the NOAA/NCEP global forecast system and has been operationally used in NOAA NCEP global data assimilation systems
- Implemented new radiative transfer components in CRTM

September 1999- December 2005, Graduate Research Assistant, University of California, Los Angeles

- Developed three-dimensional solar and thermal infrared radiative transfer models to improve the fundamental knowledge of the radiative transfer process in inhomogeneous clouds and mountainous surface. These models are ideal for uses in radiative transfer parameterization for clouds and aerosols, and the energy distribution over mountains in climate models. They also can be employed to validate other analytical models.
- Applied the particle scattering software finite-difference time domain (FDTD) to generate the look-up-table of scattering properties associated with irregular particle shapes for retrieval purpose

PEER-REVIEW PUBLICATIONS IN REVIEW

Tremblay, D., F. Iturbide-Sanchez, Y. Chen, L. Borg, J. Predina, X. Jin, D. Tobin, L. Strow, D. Mooney, D. Johnson, L. Suwinski, and H. Revercomb. Radiometric noise assessment of the Cross-track Infrared Sounder on the NOAA-20 satellite. *IEEE Transactions on Geoscience and Remote Sensing*, revsion, 2020.

Yang, W., F. Kogan, W. Guo, and Y. Chen. A novel re-compositing approach to create continuous and consistent cross-sensor/cross-production global NDVI datasets. *International Journal of Remote Sensing*, submitted, 2020.

Chen, Y., F. Iturbide-Sanchez, D. Tremblay, D. Tobin, and et al. Reprocessing of Suomi NPP CrIS Sensor Data Records to improve the radiometric and spectral long-term accuracy and stability. *IEEE Transactions on Geoscience and Remote Sensing*, submitted, 2020.

PEER-REVIEW PUBLICATIONS

Yang, W., H. Meng, R. Ferraro, and Y. Chen. Inter-Calibration of AMSU-A Window Channels. *Remote Sensing*, 12, 2988, doi:10.3390/rs12182988 (2020).

Zou, C., L. Zhou, L. Lin, N. Sun, Y. Chen, L. Flynn, B. Zhang, and et al. The Reprocessed Suomi NPP Satellite Observations. *Remote Sensing*, 12, 2891, doi:10.3390/rs12182891 (2020).

Chen, Y., D. A. Tremblay, L. Wang, and F. Iturbide-Sanchez, Improved Lunar Intrusion Detection Algorithm for the CrIS Sensor Data Record, *IEEE Transact. Geosci. Remote Sensing,* doi:10.1109/TGRS.2019.2944003 (2020).

Wang, L., and Y. Chen, Inter-Comparing SNPP and NOAA-20 CrIS toward measurement consistency and climate data records, *IEEE Journal of Selected Tropics in Applied Earth Observations and Remote Sensing,* 12, 2024-2013, doi:10.1109/JSTARS.2019.2891701 (2019).

Xu H, Y. Chen, and L. Wang, Cross-track infrared sounder spectral gap filling toward improving intercalibration uncertainties, *IEEE Transact. Geosci. Remote Sensing,* doi:10.1109/TGRS.2018.2857833 (2019).

Han Y, and Y. Chen, Calibration Algorithm for Cross-track Infrared Sounder full spectral resolution measurements, *IEEE Transact. Geosci. Remote Sensing,* doi:10.1109/TGRS.2017.2757940 (2018).

Chen, Y., Y. Han, and F. Weng, Characterization of long-term stability of Suomi NPP Cross-Track Infrared Sounder (CrIS) spectral calibration, *IEEE Transact. Geosci. Remote Sensing,* 55, 1147-1159. doi:10.1109/TGRS.2016.2620438, (2017).

Wang, L., Y. Chen, and Y. Han, Impacts of field of view configurations of Cross-track Infrared Sounder on clear-sky observations, *Appl. Opt.,* 55, 7113-7119. doi: 10.1364/AO.55.007113 (2016).

Wang, L., Y. Han, X. Jin, Y. Chen, and D. A. Tremblay, Radiometric consistency assessment of hyperspectral infrared sounders, *Atmos. Meas. Tech.,* 8, 4831-4844. doi: 10.5194/amt-4831-2015 (2015).

Han, Y., L. Suwinski, D. Tobin, and Y. Chen, Effect of self-apodization correction on Cross-track Infrared Sounder radiance noise, *Appl. Opt.,* 54, 10114-10122. doi: 10.1364/AO.54.010114 (2015).

Chen, Y., F. Weng, and Y. Han, SI traceable algorithm for characterizing hyperspectral infrared sounder CrIS noise, *Appl. Opt.,* 54, 7889–7894. doi: 10.1364/AO.54.007889 (2015).

Han, Y., et al., Suomi NPP CrIS measurements, sensor data record algorithm, calibration and validation activities, and record data quality, *J. Geophys. Res.,* 118, doi:10.1002/2013JD020344 (2013).

Wang, L., D. A. Tremblay, Y. Han, M. Esplin, D. E. Hagan, J. Predina, L. Suwinski, X. Jin, and Y. Chen, Geolocation assessment for CrIS sensor data records, *J. Geophys. Res.,* 118, 12,690-12,704, doi:10.1002/2013JD020376 (2013).

Chen, Y., Y. Han, P. van Delst, and F. Weng, Assessment of shortwave infrared sea surface reflection and non-local thermodynamic equilibrium effects in Community Radiative

Transfer Model Using IASI Data, *J. Atmos. Oceanic. Technol.,* 30, 2152-2160. doi: 10.1175/JTECH-D-12-00267.1 (2013).

Chen, Y., Y. Han, and F. Weng, Detection of Earth-rotation Doppler shift from Suomi National Polar-Orbiting Partnership Cross-track Infrared Sounder, *Appl. Opt.,* 52, 6250–6257. doi: 10.1364/AO.52.006250 (2013).

Qi, C., Y. Chen, H. Liu, C. Wu，and D. Yin, Calibration and validation of Infrared Atmospheric Sounder onboard FY3B Satellite, *IEEE Transact. Geosci. Remote Sensing,* 50, 4903-4914, doi: 10.1109/TGRS.2012.2204268 (2012).

Chen, Y., Y. Han, and F. Weng, Comparison of two transmittance algorithms in the Community Radiative Transfer Model: Application to AVHRR, *J. Geophys. Res.,* 117, D06206, doi:10.1029/2011JD016656 (2012).

Chen, Y., F. Weng, Y. Han, and Q. Liu, Planck weighted transmittance and correction of solar reflection for broadband infrared satellite channels, *J. Atmos. Oceanic Technol.*, 29, 382–396. doi:10.1175/JTECH-D-11-00102.1 (2012).

Chen, Y., Y. Han, Q. Liu, P. van Delst, and F. Weng, Community Radiative Transfer Model for Stratospheric Sounding Unit channels, *J. Atmos. Oceanic. Technol., 28,* 767-778, doi: 10.1175/2010JECHA1509.1 (2011).

Kulie, M. S., R. Bennartz, T. J. Greenwald, Y. Chen, and F. Weng, Uncertainties in active and passive microwave remote sensing of frozen precipitation, *J. Atmos. Sci.*, 67, 3471-3487, doi: 10.1175/2010JAS3520.1 (2010).

Suranjana, S., et al., The NCEP Climate Forecast System Reanalysis. *Bull. Amer. Meteor. Soc.*, 91, 1015–1057, doi: 10.1175/2010BAMS3001.1 (2010).

Chen, Y., Y. Han, P. Van Delst, and F. Weng, On water vapor Jacobian in fast radiative transfer model, *J. Geophys. Res.,* 115, D12303, doi:10.1029/2009JD013379 (2010).

Liu Q., X. Liang, Y. Han, P. van Delst, Y. Chen, A. Ignatov, and F. Weng, Effect of out-of-band response in NOAA-16 AVHRR Channel 3B on top-of-atmosphere radiances calculated with the Community Radiative Transfer Model. *J. Atmos. Oceanic. Technol.,* 26, 1968-1972, doi: 10.1175/2009JTECHA1259.1 (2009).

Chen, Y., F. Weng, Y. Han, and Q. Liu, Validation of the Community Radiative Transfer Model (CRTM) by using CloudSat data. *J. Goephys. Res.*, 113, D00A03, doi:10.1029/2007JD009561 (2008).

Chen, Y., A. Hall, and K. N. Liou, Application of three-dimensional solar radiative transfer to mountains. *J. Goephys. Res.*, 111, D21111, doi:10.1029/2006JD007163 (2006).

Chen Y., and K. N. Liou, A Monte Carlo method for 3D thermal infrared radiative transfer. *J. Quant. Spectrosc. Radiat. Transfer,* 101*,* 166 – 178, (2006).

Chen, Y., K. N. Liou, and Y. Gu, An efficient diffusion approximation for 3D radiative transfer parameterization: application to cloudy atmospheres. *J. Quant. Spectrosc. Radiat. Transfer*, 92, 189–200, (2005).

Ou, S.C., Y. Chen, K. N. Liou, M. Cosh, and W. Brutsaert, Satellite remote sensing of land surface temperature: Application of the atmospheric correction method and split-window technique to data of ARM-SGP site. *Int. J. Rem. Sensing,* 23, 5177-5192, (2002).

Yao, Z., W. Li, Y. Zhu, B. Zhao, and Y. Chen, Remote sensing of precipitation on the Tibetan Plateau using the TRMM Microwave Imager. *J. Appli, Meteor.,* 40, 1381-1392, (2001).

Zhao, B., Z. Yao, W. Li, J. Yuan, Y. Chen, H. Gao, and Y. Zhu, Rainfall retrieval and flooding monitoring in China using TRMM Microwave Imager (TMI). J. Meteorol. Soc. JPN.*,* 79, 301-315, (2001).

PEER-REVIEW PUBLICATIONS IN CHINESE

Li, W., Y. Chen, Y. Zhu, and B. Zhao, Retrieval of rain over land by using TRMM/TMI measurements. *ACTA METEOROLOGICA SINICA,* 59, (2001).

Zhu, Y., W. Li, and Y. Chen, Study of total precipitable water by GMS-5. *Chinese Quart. J. Appli. Meteor.,* 9, 8-14, (1998).

OTHER PUBLICATIONS (BOOK/CHAPTER, CONFERERNCE PROCEEDING, TECHICAL REPORTS)

Liu, Q., X. Liu, Y. Chen, N. Nalli, and C. Tan, Fast radiative transfer algorithms for real-time sounder applications. In "*Reference Module in Earth Systems and Environmental Sciences*", DOI: 10.1016/B978-0-12-409548-9.10391-4, (2017).

Liou, K. N., Y. Gu, W. Lee, Y. Chen, and P. Yang, Some unsolved problems in atmospheric radiative transfer: Implication on climate research in the Asia-Pacific Region. In "*Recent Progress in Atmospheric Sciences: Applications to the Asia-Pacific region*", World Scientific Publishing Co., Singapore, 307-325, (2008).

Liu, T. C., X. Xiong, X. Shao, Y. Chen, A. Wu, T. Chang. A. Shrestha, Long term stability monitor of Aqua MODIS thermal emissive bands through radiative transfer modeling. Proc. SPIE 11501, Earth Observing Systems XXV, 115011K, 20 August 2020, doi:10.1117/12.2568052

Chen, Y., L. Wang, F. Weng, and C. Cao, Reprocessing of S-NPP CrIS Sensor Data Records and Impacts on Radiometric and Spectral Long- term Accuracy and Stability. GSICS Quarterly Newsletter, Vol. 11, No. 2 (Sept. 2017): 10-12. doi: 10.7289/V5R78CFR.

Chen, Y., Y. Han, and F. Weng, Reprocessing of Suomi NPP CrIS sensor data records and impacts on radiometric and spectral long-term accuracy and stability. 2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 23-28 July 2017, doi: 10.1109/IGARSS.2017.8127922

Han, Y., Y. Chen, X. Jin, D. Tremblay, and L. Wang, Cross Track Infrared Sounder (CrIS) sensor data record (SDR) user's guide, version 1.0, NOAA Technical Report NESDIS 143, pp45, (2013).

Chen, Y., and Y. Han, Evaluation of different calibration approaches for S-NPP CrIS full spectral resolution SDR processing, *IEEE Geoscience and Remote Sensing Symposium,* 2127-2130, doi:10.1109/IGARSS.2015.7326223 (2015).

Han, Y., Y. Chen, X. Xiong, and X. Jin, S-NPP CrIS full resolution SDR processing and data quality assessment, the 95th AMS Annual Meeting, January 4-8, 2015, Phoenix, Arizona, J18.5,(2015).https://ams.confex.com/ams/95Annual/webprogram/Manuscript/Paper261524/ams2015-J18.5_extendedAbstract-submitted.pdf

Chen, Y., Y. Han, D. Tremblay, L. Wang, X. Jin, and F. Weng, CrIS full resolution processing and validation system for JPSS, the 19th International TOVS Study Conference (ITSC-19), March 26 to April 1, 2014, Jeju Island, South Korea, 1p.06, (2014). http://cimss.ssec.wisc.edu/itwg/itsc/itsc19/program/papers/1p_06_chen.pdf

Tremblay D., Y. Han, Y. Chen, X. Jin, L. Wang, and Q. Liu, CrIS SDR calibration and validation status and NOAA-STAR related activities, *SPIE Proceedings 8528*, doi: 10.1117/12.981340 (2012).

Liang, X., A. Ignatov, Q. Liu, <u>Y. Chen</u>, D. Groff, X. Xiong, C. Cao, E. Borbas, and S. Hook, Improvements to radiometric consistency between AVHRR, MODIS, and VIIRS in SST bands using MICROS online near-real time system, *SPIE Proceedings 8528*, doi: 10.1117/12.979597 (2012).

Liu, Q., P. van Delst, <u>Y. Chen</u>, D. Groff, Y. Han, A. Collard, F. Weng, S. Boukabara, and J. Derber, Community Radiative Transfer Model for radiance assimilation and applications, *IEEE Geoscience and Remote Sensing Symposium,* 3700-3703, doi:10.1109/IGARSS.2012.6350612 (2012).

Liang, D., F. Weng, <u>Y. Chen</u>, and T. Zhu, Assessments of F18 Special Sensor Microwave Imager/Sounder measurements for weather and climate applications, *IEEE Geoscience and Remote Sensing Symposium,* 875-878, doi:10.1109/IGARSS.2012.6351421 (2012).

Liu, Q., F. Weng, Y. Han, and <u>Y. Chen</u>, Microwave and infrared radiances assimilation for weather forecasting, *IEEE Geoscience and Remote Sensing Symposium*, 355-358, doi:10.1109/IGARSS.2008.4779001 (2008).

Liu, Q., F. Weng, Y. Han, and <u>Y. Chen</u>, Community Radiative transfer model for scattering transfer and applications, *IEEE Geoscience and Remote Sensing Symposium*, 1193-1196, doi:10.1109/IGARSS.2008.4779942 (2008).

<u>Chen, Y.</u>, W. Li, Y. Zhu, and B. Zhao, Study on precipitation in Huai River basin area by SSM/I and TRMM data. *Technical proceedings of the tenth international ATOVS study conference,* Boulder, Colorado, 72-81, (1999).

AWARDS

- October 2009, certificate from NOAA/NESDIS/STAR/SMCD, In recognition of exemplary performance and achievement in support of improving the accuracy of weather forecasts by developing new and powerful radiative transfer models and techniques to assimilate advanced satellite data
- January 2011, certificate from NOAA/NCEP, In recognition of valuable contribution for the implementation of the Climate Forecast System
- May 2014, certificate from NOAA/NESDIS/STAR, Innovation Award to CrIS SDR team for developing a state-of-art system for processing, calibrating, and monitoring Suomi NPP CrIS SDR data to support weather and climate applications
- November 2015, best proceedings paper award from International TOVS Study Conference (ITSC) for CrIS full resolution processing and validation system for JPSS
- June 2016, certificate from NOAA/NESDIS/STAR, Individual Technology Award for developing a state-of-art system for processing, calibrating and validating Cross-track Infrared Sounder (CrIS) full spectral resolution data for weather and climate applications
- August 2017, certificate from NOAA/NESDIS/STAR, JPSS STAR Program Award for developing a state-of-the-art system for reprocessing, calibrating and validating CrIS life-mission data, and for significantly improving CrIS SDR data quality in operational system.
- September 2019, certificate from JPSS Program Office, JPSS Internal Awards for significant contributions for the recovery of the S-NPP CrIS MWIR data

RESEARCH PROJECTS

- CICS Title: Scientific Support for Joint Polar Satellite System (JPSS) CrIS, VIIRS and OMPS Calibration, Project Dates: 07/01/2014-06/30/2017, Task Leader, Amount: $2,314,691
- CICS Title: CrIS Cloud Detection Using Double CO_2 Channels in GSI, Project Dates: 07/01/2015-06/30/2016, Task Leader, Amount: $6,000
- CICS Title: Scientific Support for Joint Polar Satellite System (JPSS) CrIS Calibration and Validation, Project Dates: 07/01/2017-03/31/2018, Task Leader, Amount: $515,063
- CICS Title: Enhance the Integrated Calibration and Validation System (ICVS) and Community Radiative Transfer Model (CRTM) for GOES-16 ABI Applications, Project Dates: 07/01/2017-06/30/2018, Task Leader, Amount: $188,000
- CICS Title: Trace Gases Retrievals, Validation and Reprocessing using Satellite Data from CrIS on S-NPP and JPSS-1, Project Dates: 07/01/2017-06/30/2018, Task Leader, Amount: $169,997
- CICS Title: Scientific Support for Joint Polar Satellite System (JPSS) CrIS Calibration and Validation, Project Dates: 07/01/2018-06/30/2019, Task Leader, Amount: $500,000