

VIVIENNE HELEN PAYNE

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Vivienne Payne is the Project Scientist for the Orbiting Carbon Observatory (OCO-2) mission. She currently serves as co-lead for the NASA Sounder Science Discipline Team and leads the Tropospheric Composition Group in the JPL Earth Science Section. Her research interests lie in remote sensing of the troposphere and ways in which satellite measurements can advance understanding of the Earth system.

Education

2001-2006	University of Oxford, DPhil “Retrieval of Water Vapor and Methane from the MIPAS Satellite Instrument”
1996-2001	University of Edinburgh, MPhys (Physics) First Class Honours

Professional Experience

2012-present	Research Scientist, Jet Propulsion Laboratory, California Institute of Technology
2022-present	Project Scientist , Orbiting Carbon Observatory 2 (OCO-2)
2021-2022	Deputy Project Scientist, Orbiting Carbon Observatory 2 (OCO-2)
2021-present	Co-lead, NASA Sounder Science Discipline
2019-present	Composition lead , Atmospheric Infrared Sounder (AIRS)
2014-present	Group Supervisor , Tropospheric Composition, Earth Science Section
2013-2021	OCO-2/OCO-3 Absorption Coefficient (ABSCO) team lead
2009-2012	Staff Scientist , Atmospheric and Environmental Research (AER)
2006-2008	Senior Research Associate , AER
2005	Research Associate , University of Colorado, Boulder

Service and Outside Activities

- **Associate Editor**, IEEE Trans. Geosci. Remote Sens., 2012-2020
- **Reviewer for Journals**: *J. Geophys. Res.*, *IEEE Trans. Geosci. Remote Sens.*, *J. Quant. Spec. Radiat. Transfer*, *Atmos. Meas. Tech.*, *Atmos. Chem. Phys.*, *J. Appl. Met. Clim.*, *Radio Science*
- **Reviewer for Grant Agencies**: NASA, DoE, NSF, NOW (Netherlands Science Council), NERC (National Environmental Research Council)
- **Reviewer for Conferences**: International Geoscience and Remote Sensing Symposium (IGARSS)

Mentoring activities

- Mentor in JPL Mentoring Program, 2018/2019

Supervision of postdoctoral researchers and students at JPL

- Madison Shogrin, Undergraduate intern (2019/2020)
- Ninos Hermis, Graduate intern (2016-2018)
- Wayana Dolan, Undergraduate intern (2015-2016)
- Hilke Oetjen, Postdoctoral Research Associate (2012-2014)

Mentorship of external postdoctoral researchers and students associated with ROSES projects

- Madison Shogrin, Graduate student, Colorado State University (2020-present)
- Julieta Juncosa Calahorrano, Graduate student, Colorado State University (2019-present)
- Juliet Zhu, Postdoctoral Research Associate, Colorado State University (2014-2017)

Funded proposals

NASA proposals funded as PI

- Sounder Discipline Team co-lead, Science of Terra, Aqua, Suomi-NPP and JPSS. (2021-2024)
- Impacts of fires on photochemistry: A new long-term record of peroxyacetyl nitrate (PAN) from AIRS, Science of Terra, Aqua, Suomi-NPP and JPSS. (2021-2024)
- New constraints on the impacts of fires on air quality and the nitrogen cycle from CrIS observations of PAN, Science of Terra, Aqua and Suomi-NPP. (2018-2021)
- Inter-calibration of microwave Sensors: Water vapor sounding channels and window channels over land, Precipitation Measurement Mission Science Team (2012-2015)
- Verification of spectroscopic input to the OCO-2 forward model and related error characterization, Orbiting Carbon Observatory 2 Science Team (2011-2014)
- Maintaining high quality spectroscopy for the Community Radiative Transfer Model (Enhancing Capability of Computational Earth System Models and NASA Data for Operation and Assessment), (2011-2014)
- Constraints on high-latitude regional methane fluxes through integration of satellite, aircraft and ground-based observations with models, Atmospheric Composition: Modeling and Analysis (2010-2013)
- Inter-calibration of microwave sensors for TRMM and GPM using a well-validated radiative transfer code, Precipitation Measurement Mission Science Team (2010-2013)

NASA proposals funded as Co-I

- Development and Analysis of new VOC retrievals from the CrIS sensors. PI: Dylan Millet, University of Minnesota (2021-2024)
- Follow the photochemistry: Harnessing new observations of PAN to learn how changes in emissions are impacting the global atmosphere, Aura Science Team. PI: Emily Fischer, Colorado State University (2020-2023)
- Isoprene Emissions and OH Recycling: New Constraints from Combined Space-Based Measurements of Isoprene, Formaldehyde, and NO₂, Aura Science Team. PI: Dylan Millet, University of Minnesota (2020-2023)
- Isoprene Measurements from Space: New Global Constraints on Emissions and Photochemistry from Synthesis of CrIS and OMI Data, Atmospheric Composition, Modeling and Analysis Program. PI: Dylan Millet, University of Minnesota (2017-2020)
- Decadal Record of Lower Tropospheric Methane from Satellite Measurements of Total Column and Free-Tropospheric Methane Concentrations, Atmospheric Composition, Modeling and Analysis Program. PI: John Worden, JPL (2017-2020)
- Refined Atmosphere Data Products from CrIS and ATMS, Suomi-NPP Science Team. PI: Jean-Luc Moncet, AER. (2014-2017)
- Fresh constraints on the global ozone budget through the analysis of new peroxyacetyl nitrate (PAN) observations from TES, Aura Science Team, PI: Emily Fischer, Colorado State University. (2013-2016)
- Use of GOSAT, TES and suborbital observations to constrain North American methane emissions in the Carbon Monitoring System, PI: Daniel Jacob, Harvard University. (2012-2014)
- New TES retrievals of Pollutants and Trace Gases for Air Quality and Tropospheric Chemistry Studies, PI: Mark Shephard, AER (2007-2010)

Other funded proposals

- Co-I on Analysis of Climate-Relevant Gas Absorption Properties from AWARE and Other ARM Spectral Measurements, DoE Atmospheric System Research Program. PI: Eli Mlawer, AER (2017-2020)
- PI on AIRS CO₂ algorithm maintenance project (2019-present)

Teaching and outreach

Instructor, NASA/JPL/KISS Center for Climate Sciences Summer School, Pasadena, CA
Guest lecturer, “Interpreting Satellite Observations of Atmospheric Composition”, Colorado State University
Guest lecturer, “Environmental Analytical Chemistry”, Illinois Institute of Technology
Speaker, “Jobs of the Future” symposium, California Lutheran University
Volunteer at “Ticket to Explore JPL”/JPL Open House annual public event
Instructor, ESA/ESRIN Summer School, Frascati, Italy

Awards and Fellowships

2020	Hans Liebe Lecturer in microwave spectroscopy as applied to remote sensing
2020	NASA Group Achievement Award for low-latency satellite processing during FIREX-AQ
2020	JPL Team Award, for successful delivery of high-quality Level 2 from the OCO-2 mission
2019	JPL Explorer Award (individual), for development of satellite retrievals of peroxyacetyl nitrate
2017	JPL Team Award, for supporting mission teams in the Earth Science Senior Review process
2017	JPL Team Award, for help in the development of the JPL Earth Science strategic plan
2017	JPL Team Award, for outstanding review of Earth Venture suborbital science proposals
2016	NASA Group Achievement Award for the OCO-2 Science Algorithm Team
2016	JPL Team Award, for implementing the baseline OCO-2 data processing algorithms
2015	JPL Team Award, for essential contributions to the success of the OCO-2 mission
2015	NASA Group Achievement Award for the Global Precipitation Measurement Mission
2015	JPL Team Award for Earth Science Senior Review proposal support
2014	NASA Group Achievement Award for the Aura Tropospheric Emission Spectrometer (TES)
2012, 2014	JPL Team Awards, for contributions to the launch and operations of OCO-2
2010	AER Employee of the Year.
2005	Rupert Ford Fund Fellowship (administered by the Royal Meteorological Society)
2001-2004	Natural Environmental Research Council (UK graduate studentship award)
1996-1997	Margaret Campbell Scott Entrance Bursary to study undergraduate physics.

Invited Talks

July 2020, Hans Liebe Lecture, Radio Science conference, Montreal, Canada (virtual)

“Evaluating microwave spectroscopy using ground-based radiometers”

May 2020, Planetary Boundary Layer Incubation workshop, Washington DC (virtual)

“Passive remote sensing of the planetary boundary layer from the infrared”

November 2018, Cal State Los Angeles, Department of Geosciences and Environment seminar

“Spaceborne remote sensing of trace gases in Earth’s atmosphere”

September 2018, International Conference on High Resolution Molecular Spectroscopy, Bilbao, Spain

“Spectroscopy for remote sensing of greenhouse gases: Recent progress and outstanding challenges”

June 2018, High Resolution Transmission molecular absorption (HITRAN) conference, Cambridge, MA

“Spectroscopy for remote sensing of tropospheric composition: Perspectives from Aura-TES and OCO-2”

February 2017, Colorado State University, Department of Atmospheric Sciences seminar

“Remote Sensing of tropospheric composition in the thermal infrared”

April 2017, AIRS Science Team Meeting, Pasadena, CA

“Atmospheric composition in the past, present and future: A view from the NASA infrared sounders”

October 2017, University of Oxford, Atmospheric, Oceanic and Planetary Physics seminar

“Looking back, looking forward: Long-term records of atmospheric composition from NASA thermal infrared sounders”

June 2016, Joint Workshop on uncertainties at 183 GHz, Paris, France

“Uncertainties in the spectroscopy of the 183 GHz line”

Refereed Publications

2022

- Wells, K. C., Millet, D. B., **Payne, V. H.**, Vigouroux, C., Aquino, C. A. B., de Maziere, M., de Gouw, J. A., Graus, M., Kurosu, T., Warneke, C. and Wisthaler, A.: Next-generation isoprene measurements from space: Detecting daily variability at high resolution. Accepted to *J. Geophys. Res.*, Feb. 2021.
- Hegarty, J. D., Cady-Pereira, K. E., **Payne, V. H.**, Kulawik, S. S., Worden, J. R., Kantchev, V., Worden, H. M., McKain, K., Pittman, J. V., Commane, R., Daube Jr., B. C., and Kort, E. A.: Validation and Error Estimation of AIRS MUSES CO Profiles with HIPPO, ATom and NOAA GML Aircraft Observations, *Atmos. Meas. Tech.* 5, 205–223, 2022, <https://doi.org/10.5194/amt-15-205-2022>

2021

- Juncosa Calahorrano, J., **Payne, V. H.**, Kulawik, S. S., Flocke, F., Campos, T., and Fischer, E. V.: Evolution of PAN in wildfire smoke plumes detected by the Cross-Track Infrared Sounder (CrIS) over the western US during summer 2018, *Geophys. Res. Lett.*, 48 (23), e 2021GL093405, 10.1029/2021GL093405
- Payne, V. H.**, Kulawik, S. S., Fischer, E. V., Brewer, J. F., Huey, L. G., Miyazaki, K., Worden, J. R., Bowman, K. W., Hints, E. J., Moore, F., Elkins, J. W., and Juncosa Calahorrano, J.: Satellite measurements of peroxyacetyl nitrate from the Cross-Track Infrared Sounder: Comparison with ATom aircraft measurements, *Atmos. Meas. Tech. Discuss.* [preprint], <https://doi.org/10.5194/amt-2021-353>, in review, 2021.
- Kulawik, S. S., J. R. Worden, **V. H. Payne**, D. Fu, S. C. Wofsy, C. Sweeney, B. C. Daube Jr., A. Lipton, I. Polonsky, Y. He, K. E. Cady-Pereira, E. J. Dlugokencky, D. J. Jacob and Y. Yin: Evaluation of single-footprint AIRS CH₄ profile retrieval uncertainties using aircraft profile measurements, *Atmos. Meas. Tech.* 14, 335–354, <https://doi.org/10.5194/amt-14-335-2021>, 2021.
- Buchholz, R. R., H. M. Worden, M. Park, G. Francis, M. N. Deeter, D. P. Edwards, L. K. Emmons, B. Gaubert, J. Gille, S. Martinez-Alonso, W. Tang, R. Kumar, J. R. Drummond, C. Clerbaux, M. George, P-F. Coheur, D. Hurtmans, K. W. Bowman, M. Luo, **V. H. Payne**, J. R. Worden, M. Chin, R. C. Levy, J. Warner, Z. Wei, S. S. Kulawik: Air pollution trends measured from Terra: CO and AOD over industrial, fire-prone and background regions, *Remote Sensing of Environment*, vol. 256, 112275, <https://doi.org/10.1016/j.rse.2020.112275>, 2021
- Natraj, V., Luo, M., Blavier, J.-F., **Payne, V. H.**, Posselt, D. J., Sander, S. P., Zeng, Z.-C., Neu, J. L., Tremblay, D., Wu, L., Roman, J. A., Wu, Y.-H., and Dorsky, L. I.: Simulated Multispectral Temperature and Atmospheric Composition Retrievals for the JPL GEO-IR Sounder, accepted to *Atmos. Meas. Tech.* [preprint], <https://doi.org/10.5194/amt-2021-290>, 2021.

2020

- Wells, K. C., D. B. Millet, **V. H. Payne**, N. J. Deventer, J. A. de Gouw, M. Graus, C. Warneke, A. Wisthaler and J. D. Fuentes: Global measurements of isoprene from space: Constraints on emissions and atmospheric oxidation, *Nature*, 585, 225-233, 2020
- Payne, V. H.**, B. J. Drouin, F. Oyafo, L. Kuai, B. M. Fisher, K. Sung, D. Nemchick, T. Crawford, M. Smyth, D. Crisp, E. Adkins, J. T. Hodges, D. A. Long, E. J. Mlawer, A. Merrelli, E. Lunney and C. W. O'Dell, Absorption Coefficient (ABSCO) Tables for the Orbiting Carbon Observatories: Version 5.1. *Journal of*

Quantitative Spectroscopy and Radiative Transfer, 255, 107217,
<https://doi.org/10.1016/j.jqsrt.2020.107217>, 2020.

- Hobbs, J., B. J. Drouin, F. Oyafuso, **V. H. Payne**, M. R. Gunson, J. McDuffie, E. J. Mlawer: Spectroscopy uncertainty impacts on OCO-2/3 retrievals of XCO₂, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 257, 107630, <https://doi.org/10.1016/j.jqsrt.2020.107360>
- Herman, R. L., J. R. Worden, D. Noone, D. Henze, K. W. Bowman, D. Fu, S. S. Kulawik and **V. H. Payne**, Comparison of optimal estimation HDO/H₂O retrievals from AIRS with ORACLES measurements, *Atmos. Meas. Tech.*, 13, 1825–1834, <https://doi.org/10.5194/amt-13-1825-2020>, 2020.
- von Clarmann, T., Degenstein, D. A., Livesey, N. J., Bender, S., Braverman, A., Butz, A., Compernolle, S., Damadeo, R., Dueck, S., Eriksson, P., Funke, B., Johnson, M. C., Kasai, Y., Keppens, A., Kleinert, A., Kramarova, N. A., Laeng, A., **Payne, V. H.**, Rozanov, A., Sato, T. O., Schneider, M., Sheese, P., Sofieva, V., Stiller, G. P., von Savigny, C., and Zawada, D.: Estimating and Reporting Uncertainties in Remotely Sensed Atmospheric Composition and Temperature, *Atmos. Meas. Tech.*, 13, 4393–4436, <https://doi.org/10.5194/amt-13-4393-2020>, 2020.
- Miyazaki, K., Bowman, K., Sekiya, T., Eskes, H., Boersma, F., Worden, H., Livesey, N., **Payne, V. H.**, Sudo, K., Kanaya, Y., Takigawa, M., and Ogochi, K.: An updated tropospheric chemistry reanalysis and emission estimates, TCR-2, for 2005–2018, *Earth Syst. Sci. Data*, <https://doi.org/10.5194/essd-12-2223-2020>

2019

- Fu, D., Millet, D. B., Wells, K., **Payne, V. H.**, Yu, S., Guenther, A. and Eldering, A.: Direct measurements of isoprene from infrared satellite observations, *Nature Communications*, 10, Article number 3811 (2019) <https://doi.org/10.1038/s41467-019-11835-0>.
- Sung, K., E. Wishnow, T. Crawford, D. Nemchick, B. J. Drouin, S. Yu, **V. H. Payne** and J. Jiang, FT-IR measurements of O₂ collision-induced absorption in the 565–700 nm region using a high pressure gas absorption cell, *J. Quant. Spectrosc. Radiat. Transfer*, 235, 232–243, 2019
- Shi, H., Z. Jiang, B. Zhao, Z. Li, Y. Chen, Y. Gu, J. H. Jiang, M. Lee, K-N. Liou, J. L. Neu, **V. H. Payne**, H. Su, Y. Wang, M. Witek and J. Worden: Modeling study of the air quality impact of record-breaking Southern California wildfires in December 2017. *J. Geophys. Res: Atmos.*, 124, doi:10.1029/2019JD030472, 2019.
- Mlawer, E. J., D. D. Turner, S. N. Paine, L. Palchetti, G. Bianchini, **V. H. Payne**, K. E. Cady-Pereira, R. L. Pernak, M. Alvarado, D. Gombos, J. S. Delamere, M. G. Mlynyczak, J. C. Mast, Analysis of water vapor absorption in the far-infrared and sub-millimeter regions using surface radiometric measurements from extremely dry locations, *J. Geophys. Res. Atmos.*, doi:10.1029/2018JD029508, 2019.
- Worden, J. R., S. S. Kulawik, D. Fu, **V. H. Payne**, A. E. Lipton, I. Polonsky, Y. He, K. Cady-Pereira, J-L. Moncet, R. L. Herman, F. W. Irion and K. W. Bowman, Characterization and Evaluation of AIRS-based estimates of the deuterium content of water vapor, *Atmos. Meas. Tech.*, 2, 2331–2339, <https://doi.org/10.5194/amt-12-2331-2019>, 2019.

2018

- Fischer, E. V., L. Zhu, L., **V. H. Payne**, J. R. Worden, Z. Jiang, S. S. Kulawik, S. Brey, A. Hecobian, D. Gombos, K. Cady-Pereira and F. Flocke: The Contribution of Fires to TES Observations of Free Tropospheric PAN over North America in July, *Atmos. Chem. Phys.*, 18, 5639–5653, <https://doi.org/10.5194/acp-2017-1025>
- O'Dell, C. W., Eldering, A., Wennberg, P. O., Crisp, D., Gunson, M. R., Fisher, B., Frankenberg, C., Kiel, M., Lindqvist, H., Mandrake, L., Merrelli, A., Natraj, V., Nelson, R. R., Osterman, G. B., **Payne, V. H.**, Taylor, T. R., Wunch, D., Drouin, B. J., Oyafuso, F., Chang, A., McDuffie, J., Smyth, M., Baker, D. F., Basu, S., Chevallier, F., Crowell, S. M. R., Feng, L., Palmer, P. I., Dubey, M., García, O. E., Griffith, D. W. T., Hase, F., Iraci, L. T., Kivi, R., Morino, I., Notholt, J., Ohyama, H., Petri, C., Roehl, C. M., Sha, M. K., Strong, K., Sussmann, R., Te, Y., Uchino, O., and Velazco, V. A.: Improved Retrievals of Carbon Dioxide from the Orbiting Carbon Observatory-2 with the version 8 ACOS algorithm, *Atmos. Meas. Tech.*, <https://doi.org/10.5194/amt-2018-257>, 2018.

2017

- K. E. Cady-Pereira, **V. H. Payne**, J. L. Neu, K. W. Bowman, K. Miyazaki, E.A. Marais, S. S. Kulawik, Z. A. Tzompa-Sosa, J. D. Hegarty, Seasonal and Spatial Changes in Trace Gases over Megacities from AURA TES Observations, *Atmos. Chem. Phys.*, 17, 9379-9398, <https://doi.org/10.5194/acp-17-9379-2017>, 2017
- V. H. Payne**, J. L., Neu, and H. M., Worden, Satellite observations for understanding the drivers of variability and trends in tropospheric ozone, *J. Geophys. Res. Atmos.*, 122, doi:10.1002/2017JD026737, 2017
- V. H. Payne**, E. V. Fischer, J. R. Worden, Z. Jiang, L. Zhu, T. P. Kurosu, S. S. Kulawik: Spatial variability in tropospheric peroxyacetyl nitrate in the tropics from infrared satellite observations in 2005 and 2006, *Atmos. Chem. Phys.*, 17, 6341-6351, doi:10.5194/acp-17-6341-2017, 2017.
- F. Oyafuso, **V. H. Payne**, B. J. Drouin, V. M. Devi, D. C. Benner, K. Sung, I.E. Gordon, R. Kochanov, Y. Tan, D. Crisp, E. J. Mlawer and A. Guillaume, High-accuracy absorption coefficients for the OCO-2 mission: Validation of updated carbon dioxide cross-sections using atmospheric spectra, *J. Quant. Spectrosc. Radiat. Transfer*, doi:10.1016/j.jqsrt.2017.06.12
- M. Huang, G. R. Carmichael, R. B. Pierce, D. S. Jo, R. J. Park, J. Flemming, L. K. Emmons, K. W. Bowman, D. K. Henze, Y. Davila, K. Sudo, J. E. Jonson, M. T. Lund, G. Janssens-Maenhout, F. J. Dentener, T. J. Keating, H. Oetjen, and **V. H. Payne**: Impact of Intercontinental Pollution Transport on North American Ozone Air Pollution: An HTAP Phase II Multi-model Study, *Atmos. Chem. Phys.*, 17, 5721-5750, <https://doi.org/10.5194/acp-17-5721-2017>, 2017
- S. S. Kulawik, C. O'Dell, **V. H. Payne**, L. Kuai, H. Worden, C. Sweeney, S. C. Biraud, L. Iraci, E. Yates, T. Tanaka, Lower-tropospheric CO₂ from near-infrared ACOS-GOSAT observations, *Atmos. Chem. Phys.*, 17, 5407-5438, <https://doi.org/10.5194/acp-17-5407-2017>, 2017
- L. Zhu, E. V. Fischer, **V. H. Payne**, T. W. Walker, J. R. Worden, Z. Jiang and S. S. Kulawik, PAN in the eastern Pacific free troposphere: A satellite view of the sources, seasonality, internannual variability and timeline for trend detection, *J. Geophys. Res.*, doi:10.1002/2016JD025868, 2017
- A. Eldering, C. O'Dell, P. Wennberg, D. Crisp, M. Gunson, C. Viatte, C. Avis, A. Braverman, R. Castano, A. Chang, L. Chapsky, C. Cheng, B. Connor, L. Dang, G. Doran, B. Fisher, C. Frankenberg, D. Fu, R. Granat, J. Hobbs, R. Lee, L. Mandrake, J. McDuffie, C. Miller, V. Myers, V. Natraj, D. O'Brien, G. Osterman, F. Oyafuso, **V. H. Payne**, H. Pollock, I. Polonsky, C. Roehl, R. Rosenberg, F. Schwandner, M. Smyth, V. Tang, T. Taylor, C. To, D. Wunch, and J. Yoshimizu, The Orbiting Carbon Observatory-2: First 18 months of Science Data Products, *Atmos. Meas. Tech.*, 10, 549-563, doi:10.5194/amt-2016-247, 2017
- B. J. Drouin, D. C. Benner, L. R. Brown, M. Cich, T. Crawford, V. M. Devi, A. Guillaume, J. T. Hodges, E. J. Mlawer, D. Robichaud, F. Oyafuso, **V. H. Payne**, K. Sung, E. Wishnow and S. Yu, Multispectrum analysis of the oxygen A-band, *J. Quant. Spectrosc. Radiat. Transfer*, doi:10.1016/j.jqsrt.2016.03.037, 2017

2016

- W. Berg, S. Bilanow, R. Chen, S. Datta, D. Draper, H. Ebrahimi, S. Farrar, W. L. Jones, R. Kroodsma, D. McKague, **V. H. Payne**, J. Wang, T. Wilheit and J. X. Yang, Intercalibration of the GPM microwave Radiometer Constellation, *Journal of Atmospheric and Oceanic Technology*, <http://dx.doi.org/10.1175/JTECH-D-16-0100.1>, published online 13th October 2016
- H. Oetjen, **V. H. Payne**, J. L. Neu, S. S. Kulawik, D. P. Edwards, A. Eldering, H. M. Worden and J. Worden, A joint data record of tropospheric ozone profiles from Aura-TES and MetOp-IASI, *Atmos. Chem. Phys.*, 16, 10229-10239, doi:10.5194/acp-16-10229-2016, August 2016
- W. Dolan, **V. H. Payne**, S. S. Kulawik and K. W. Bowman, Satellite observations of ethylene (C₂H₄) from the Aura Tropospheric Emission Spectrometer: A scoping study, *Atmos. Env.*, 141, 388-393, July 2016
- Z. Jiang, J. R. Worden, **V. H. Payne**, L. Zhu, E. Fischer, T. Walker, and D. B. A. Jones (2016), Ozone export from East Asia: The role of PAN, *J. Geophys. Res. Atmos.*, 121, 6555-6563, doi:10.1002/2016JD024952, June 2016
- D. C. Benner, V. M. Devi, K. Sung, L. R. Brown, C. E. Miller, **V. H. Payne**, B. J. Drouin, S. Yu, T. J. Crawford, A. W. Mantz, M. A. H. Smith and R. R. Gamache, Line parameters including temperature dependences of air- and self-broadened line shapes of ¹²C¹⁶O₂: 2.06 micron region, *J. Mol. Spec.*, 326, 21-47, September 2016

- V. M. Devi, D. C. Benner, K. Sung, L. R. Brown, T. J. Crawford, C. E. Miller, B. J. Drouin, **V. H. Payne**, S. Yu, M. A. H. Smith, A. W. Mantz and R. R. Gamache, Line parameters including temperature dependences of air- and self-broadened line shapes of $^{12}\text{C}^{16}\text{O}_2$: 1.6 micron region, *J. Quant. Spectrosc. Radiat. Transfer*, 177, 117-144, July 2016
- B. Connor, H. Boesch, J. McDuffie, T. Taylor, D. Fu, C. Frankenberg, C. O'Dell, **V. H. Payne**, M. Gunson, R. Pollock, J. Hobbs, F. Oyafuso and Y. Jiang, Quantification of uncertainties in OCO-2 measurements of XCO₂: Simulations and linear error analysis, *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2016-128, 16th June 2016
- H. Brogniez, S. English, J-F. Mahouf, A. Behrendt, W. Berg, S. A. Boukabara, S. A. Buehler, P. Chambon, A. Gambacorta, A. Geer, W. Ingram, E. R. Kursinski, M. Matricardi, T. A. Odintsova, **V. H. Payne**, P. Thorne, M. Yu Tretyakov and J. Wang, A review of sources of systematic errors and uncertainties in observations and simulations at 183 GHz, *Atmos. Meas. Tech.*, 9, 2207-2221, doi:10.5194/amt-0-2207-2016, 18th May 2016

2015

- L. Zhu, E. V. Fischer, **V. H. Payne**, J. R. Worden, Z. Jiang, TES observations of the interannual variability of PAN over Northern Eurasia and the Relationship to Springtime Fires, *Geophys. Res. Lett.*, doi:10.1002/2015GL065328 (15th September 2015)
- J. R. Worden, A. J. Turner, A. A. Bloom, S. S. Kulawik, J. Liu, M. Lee, R. Weidner, K. Bowman, C. Frankenberg, R. Parker, and **V. H. Payne**, Quantifying lower tropospheric methane concentrations using near-IR and thermal IR satellite measurements: comparison to the GEOS-Chem model, *Atmos. Meas. Tech.*, 8, 3851-3882 (25th August 2015)
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