Robert L. Herman

Research Scientist
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RELEVANT EXPERIENCE

Dr. Herman is the Principal Investigator of the JPL Laser Hygrometers for *in-situ* measurements of atmospheric water vapor. His scientific interests span atmospheric chemistry and clouds, satellite infrared remote sensing, satellite calibration and validation. He has over 25 years of experience as an aircraft instrument investigator, with additional experience in untethered balloons and Uninhabited Aerial Systems (UASs). He also has served mission formulation as proposal manager or member of the proposal team for numerous proposals.

EDUCATION:

- Ph.D., Geochemistry, California Institute of Technology, 1998.
- M.S., Geochemistry, California Institute of Technology, 1993.
- B.A., Chemistry, University of Chicago, with general honors, 1991.

PROFESSIONAL EXPERIENCE:

- Leads JPL Laser Hygrometer as PI in field campaigns and scientific interpretation.
    - Aircraft Hygrometer in support of NASA Advanced Air Vehicles Program
    - Aircraft Hygrometer in support of "Predictive Real-time Emissions Technologies Reducing Aircraft Induced Lines in the Sky" (PRE-TRAILS), Advanced Research Projects Agency-Energy (ARPA-E), Subcontractor to NGC
- Capture Lead for Societal Benefit Thrust Area in preparation for the upcoming NASEM Decadal Survey 2027.
- Technology Development for non-NASA defense-related project.

CURRENT POSITIONS:

2020 – present: TS/SCI (Top Secret/Sensitive Compartmented Information).
2001 – present: Research Scientist, JPL.
1999 – present: Principal Investigator, JPL Laser Hygrometers (JLH).

PREVIOUS POSITIONS:

2022 – 2023: Member of Science Team, CalCIS
2020 – 2021: Member of Science Team, NASA TROPESS.
2010 – 2021: Validation Lead, Tropospheric Emission Spectrometer (TES)
1999 – 2001: Scientist, Atmospheric Laser Spectroscopy Group, JPL, ALIAS-II instrument for Observations from the Middle Stratosphere (OMS) balloon payload and the JPL Laser Hygrometer for Airborne payload.
1998 – 1999: Caltech Postdoctoral Scholar, JPL.

SELECTED REFEREED PUBLICATIONS

Herman, R. L., Troy, R. F., Aaron, K. M., Sanders, I., Schwarm, K., Klobas, J. E., Swanson, A., Carpenter, A., Ozog, S., Chin, K., Christensen, L. E., Fu, D., Stachnik, R. A., and Vasudev, R.: JLH Mark2 – An Improved Opto-Mechanical Approach to Open-Path *in situ* Water Vapor Measurement in the Upper Troposphere / Lower Stratosphere, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2024-4019, 2025.

Shi, M., Worden, J., Bailey, A., Noone, D., Risi, C., Fu, R., Worden, S., **Herman, R.**, Payne, V., Pagano, T., Bowman, K., Bloom, A., Saatchi, S. S., Liu, J., and Fisher, J.: Amazonian terrestrial water balance inferred from satellite-observed water vapor isotopes, *Nature*

Communications, 13, 2686, 2022 (published May 13, 2022). https://doi.org/10.1038/s41467-022-30317-4.

Zeng, Z.-C., Addington, O., Pongetti, T. J., **Herman, R. L.**, Sung, K., Newman, S., Schneider, A., Borsdorff, T., Yung, Y. L., and Sander, S.: Measurements of atmospheric HDO/H_2O in southern California from CLARS-FTS, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 288, 2022, 108254, ISSN 0022-4073 (version of record June 7, 2022), https://doi.org/10.1016/j.jqsrt.2022.108254.

Fahlen, J. E., Brodrick, P. G., Thompson, D. R., **Herman, R. L.,** Hulley, G., Cawse-Nicholson, K., Green, R. O., Green, J. J., Hook, S. J., and Miller, C. E.: Joint VSWIR-TIR retrievals of earth's surface and atmosphere, Remote Sensing of Environment, 267, 112727, 2021, ISSN 0034-4257, https://doi.org/10.1016/j.rse.2021.112727.

Thompson, D. R., Brodrick, P. G., Bohn, N., Braverman, A., Carmon, N., Connelly, D., Fahlen, J., Green, R. O., **Herman, R. L.**, Hobbs, J., Johnson, M., Mahowald, N., Okin, G. S., Poulter, B., Serbin, S., Shiklomonov, A. N., Susiluoto, J., Turmon, M., Toward comprehensive uncertainty predictions for remote imaging spectroscopy, *Proc. SPIE 11504, Imaging Spectrometry XXIV: Applications, Sensors, and Processing*, 115040B (published 22 August 2020); https://doi.org/10.1117/12.2567732

Herman, R. L., Worden, J., Noone, D., Henze, D., Bowman, K., Cady-Pereira, K., Payne, V. H., Kulawik, S., and Fu, D.: Comparison of optimal estimation HDO/H_2O Retrievals from AIRS with ORACLES measurements, Atmos. Meas. Tech., 13, 1825–1834, 2020, https://doi.org/10.5194/amt-13-1825-2020.

Jiang, J. H., Yue, Q., Su, H., Kangaslahti, P., Lebsock, M., Reising, S., Schoeberl, M., Wu, L., and **Herman, R. L.**, "Simulation of remote sensing of clouds and humidity from space using a combined platform of radar and multifrequency microwave radiometers", *Earth and Space Science, 6*, 2019, https://doi.org/10.1029/2019EA000580.

Worden, J. R., Kulawik, S. S., Fu, D., Payne, V. H. , Lipton, A. E., Polonsky, I., He, Y., Cady-Pereira, K., Moncet, J.-L., **Herman, R. L.**, Irion, F. W., and Bowman, K. W., "Characterization and Evaluation of AIRS-Based Estimates of the Deuterium Content of Water Vapor", *Atmos. Meas. Tech.*, 12, 2331-2339, 2019, https://doi.org/10.5194/amt-12-2331-2019.

Fu, D., Kulawik, S. S., Miyazaki, K., Bowman, K. W., Worden, J. R., Eldering, A., Livesey, N. J., Teixeira, J., Irion, F. W., **Herman, R. L.**, Osterman, G. B., Liu, X., Levelt, P. F., Thompson, A. M., and Luo, M., "Retrievals of Tropospheric Ozone Profiles from the Synergism of AIRS and OMI: Methodology and Validation", *Atmos. Meas. Tech., 11*, 5587-5606, 2018, https://doi.org/10.5194/amt-11-5587-2018.

Herman, R. L., Ray, E. A., Rosenlof, K. H., Bedka, K. M., Schwartz, M. J., Read, W. G., Troy, R. F., Chin, K., Christensen, L. E., Fu, D., Stachnik, R. A., Bui, T. P., and Dean-Day, J. M., "Enhanced Stratospheric Water Vapor over the Summertime Continental United States and the Role of Overshooting Convection," *Atmos. Chem. Phys., 17*, 6113-6124, 2017, https://doi.org/10.5194/acp-17-6113-2017.

Kuai, L., Bowman, K. W., Worden, H. M., Herman, R. L., Kulawik, S. S., "Hydrological controls on the tropospheric ozone greenhouse gas effect," *Elem. Sci. Anth. 2017; 5:10*. DOI: http://doi.org/10.1525/elementa.208

Herman, R. L., Cherry, J. E., Young, J., Welker, J. M., Noone, D., Kulawik, S. S., and Worden, J., "Aircraft validation of Aura Tropospheric Emission Spectrometer retrievals of HDO / H_2O," *Atmos. Meas. Tech., 7*, 3127-3138, 2014, https://doi.org/10.5194/amt-7-3127-2014.

D. W. Fahey, R.-S. Gao, O. Möhler, H. Saathoff, C. Schiller, V. Ebert, M. Krämer, T. Peter, N. Amarouche, L. M. Avallone, R. Bauer, Z. Bozóki, L. E. Christensen, S. M. Davis, G. Durry, C. Dyroff, R. L. Herman, S. Hunsmann, S. Khaykin, P. Mackrodt, J. Meyer, J. B. Smith, N. Spelten, R. F. Troy, H. Vömel, S. Wagner, F. G. Weinhold, "The AquaVIT-1 Intercomparison of Atmospheric Water Vapor Measurement Techniques," *Atmos. Meas. Tech., 7*, 3177-3213, doi:10.5194/amt-7-3177-2014, 2014.

Froyd, K. D., Murphy, D. M., Lawson, P., Baumgardner, D., and **Herman, R. L.**, "Aerosols that form subvisible cirrus at the tropical tropopause," Atmos. Chem. Phys., 10, 209-18, 2010, https://doi.org/10.5194/acp-10-209-2010.