

JAMES G. HUDSON

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a) Professional Preparation:

Western Michigan University	Physics and Mathematics	B.A.	1968
University of Michigan	Physics	M.S.	1970
University of Nevada, Reno	Atmospheric Physics	Ph.D.	1976

EXPERIENCE RELATED TO PROPOSED PROJECT:

Hudson’s Ph.D. was on natural production of cloud condensation nuclei (CCN). He developed the continuous flow diffusion (CFD) cloud chamber and isothermal haze chamber (IHC) and five CCN spectrometers. He has been engaged in investigations of the microstructure of fogs, stratus clouds and cumulus clouds where he has estimated the levels of supersaturation. Sponsors have included NSF, ONR, ARO, NASA, and DOE.

Laboratory and aircraft CCN measurements have been related to the nuclear winter phenomenon including measurements from forest fires and oil fires, notably the 1991 Kuwait firers. NSF and NASA-sponsored work has included measurements of cloud interstitial and cloud droplet residue CCN, which determined which CCN actually form cloud droplets. This is important in understanding cloud albedo and precipitation. EPA and DOE- sponsored research attempted to determine the relative importance of natural and anthropogenic CCN. The two DRI CCN spectrometers have shown good agreement in both surface and aircraft operations. Airborne measurements in MAST (1994) showed that shiptrail clouds are indeed caused by CCN from ship smokestacks. He made airborne measurements in three Australian projects—NASA-sponsored SOCEX-1 (winter mid-1993) and SOCEX-2 (summer early-1995) and NSF-sponsored ACE-1 (late-1995). The SOCEX projects examined the phytoplankton-CCN connections while the ACE-1 atmospheric chemistry project also sought to characterize natural CCN. He participated in the SUCCESS project (1996) on the NASA DC-8 studying the impact of contrails on climate. In 2001 he made measurements aboard the NOAA hurricane hunter aircraft in CAMEX 4 where several penetrations of tropical cyclones showed unusually low and high CCN concentrations.

Recent work has involved physical characterization of CCN (volatility and hygroscopicity). Other aircraft projects have included SCMS--small cumulus microphysical study, to investigate the initiation of coalescence--1995; FIRE-3 and SHEBA 1998 (Arctic); INDOEX 1999 (contrasts between highly polluted and very clean air in the Indian Ocean; AIRS2 2003 (aircraft icing); RICO 2004-05 (warm rain initiation), MASE 2005 (polluted stratus), PASE 2007 (isolated mid-Pacific chemistry study), ICE-L 2007 (cloud ice production), and POST 2008 (clean and polluted California stratus). He has successfully participated in 31 aircraft field projects over the last three decades and numerous surface measurement programs; most recently the 2003 ARM-IOP in Oklahoma, SUPRECIP-2 2006 (winter northern California) and Korea 2004 and 2006.

1. PROFESSIONAL EXPERIENCE:

1990-present	Research Professor, Division of Atmospheric Sciences, Desert Research Institute
1981-90	Associate Research Professor, Atmospheric Sciences Center, Desert Research Institute

- 1976-81 Assistant Research Professor, Atmospheric Sciences Center, Desert Research Institute
- 1972-76 Laboratory Technologist Trainee, Atmospheric Sciences Center, Desert Research Institute
- 1970-72 Graduate Research Assistant, Atmospheric Sciences Center, Desert Research Institute
- 1968-70 Teaching Fellow, Physics Department, University of Michigan

Peer-Reviewed Journal Articles:

- Noble, S., and J.G. Hudson, 2015: MODIS comparisons with northeast Pacific in situ stratocumulus microphysics. *J. Geophys. Res., Atmos.* 120, doi:10.1002/2014JD022785.
- Hudson, J.G., S. Noble, and S. Tabor, 2015: Cloud supersaturations from CCN spectra Hoppel minima. *J. Geophys. Res., Atmos.*, 120, Issue 8, 27 April, 3436–3452, doi:10.1002/2014JD022669.
- Hudson, J.G., and S. Noble, 2014: Low altitude summer/winter microphysics, dynamics and CCN spectra of northeastern Caribbean small cumuli; and comparisons with stratus. *J. Geophys. Res., Atmos.* 119, Issue 9, 16 May, 5445–5463, doi:10.1002/2013JD021442.
- Koracin, D., C. Dorman, J. Lewis, J. Hudson, E. Wilcox, and A. Torregrosa, 2014: Marine fog: A review. *Atmos. Res.* 143, 142-175.
- Hudson, J.G., and S. Noble, 2014: Reply to comment by Yangang Liu et al. on “Cloud droplet spectral width relationship to CCN spectra and vertical velocity,” *J. Geophys. Res.*, 119, issue 4, 27 February, 1878-1882, doi: 10.1002/2013JD020559.
- Hudson, J.G., and S. Noble, 2014: CCN and vertical velocity influences on droplet concentrations and supersaturations in clean and polluted stratus clouds. *J. Atmos. Sci.*, 71, 312-331. DOI: 10.1175/JAS-D-13-086.1
- Clarke, A.D., S. Freitag, R. Simpson, J.G. Hudson, S. Howell, V. Brekhovskikh, T. Campos, V. Kapustin, 2013: Free troposphere as the dominant source of CCN in the equatorial Pacific boundary layer: Long-range transport and teleconnections. *Atmos. Chem. Phys.* 13 (15):7511-7529.
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- Hudson, J.G., S. Noble and V. Jha, 2012: Cloud droplet spectral width relationship to CCN spectra and vertical velocity. *J. Geophys. Res.*, Vol. 117, D11211, doi:10.1029/2012JD017546, 2012.
- Bandy, A., I.C. Faloona, B.W. Blomquist, B.J. Huebert, A.D. Clarke, S.G. Howell, R.L. Mauldin, C.A. Cantrell, J.G. Hudson, B.G. Heikes, J.T. Merrill, Y. Wang, D.W. O’Sullivan, W. Nadler, D.D. Davis, 2011: Pacific Atmospheric Sulfur Experiment (PASE): dynamics and chemistry of the south Pacific tropical trade wind regime. *J. Atmos. Chem.* 2011, [Volume 68, Number 1](#), Pages 5-25, DOI: 10.1007/s10874-012-9215-8
- Kim, J.H., S.S. Yum, S. Shim, S.-C. Yoon, J.G. Hudson, J. Park, and S.-J. Lee, 2011: On aerosol hygroscopicity, cloud condensation nuclei (CCN) spectra and critical supersaturation measured at two remote islands of Korea between 2006 and 2009. *Atmos. Chem. Phys.*, 11, 12627–12645, doi:10.5194/acp-11-12627-2011.

- Hudson, J.G., S. Noble, and V. Jha, 2011: On the relative role of sea salt cloud condensation nuclei (CCN). *J. Atmos. Chem.* **Volume 68, Number 1**, Pages 71-88, DOI: 10.1007/s10874-011-9210-5.
- Thornton, D.C., A.R. Bandy, and J.G. Hudson, 2011: Fast sulfur dioxide measurements correlated with cloud condensation nuclei spectra in the marine boundary layer. *Atmos. Chem. Phys.*, **11**, 11511–11519, 2011, doi:10.5194/acp-11-11511-2011.
- Hudson, J.G., V. Jha, and S. Noble, 2011: Drizzle correlations with giant nuclei. *Geophys. Res. Lett.*, **38**, L05808, doi:10.1029/2010GL046207.
- Hudson, J.G., S. Noble and V. Jha, 2010: Stratus cloud supersaturations. *Geophys. Res. Lett.*, **37**, L21813, doi:10.1029/2010GL045197.
- Hudson, J.G., S. Noble and V. Jha, 2010: Comparisons of CCN with supercooled clouds. *J. Atmos. Sci.*, **67**, No. 9, 3006–3018.
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Conference Presentations:

- Noble, S. and J.G. Hudson, 2016: Bimodal CCN and cloud microphysics. XVII International Conference on Clouds and Precipitation (ICCP), Manchester, England, July 25-29.
- Hudson, J.G., and S. Noble, 2016: Cloud processing effects on CCN and cloud microphysics. XVII International Conference on Clouds and Precipitation (ICCP), Manchester, England, July 25-29.
- Hudson, J. G., Noble, S. R., 2016: Bimodal CCN and Cloud Microphysics, AAAR Annual Meeting: Portland, OR, October 17-21, 2016
- Hudson, J. G., Noble, S. R., 2016: Cloud-Processed Bimodal CCN and Effects on Cloud Microphysics, AGU Fall Meeting: San Francisco, CA, December 12-16, 2016
- Noble, S. R., Hudson, J. G., 2016: Stratus Cloud Radiative Effects from Cloud Processed Bimodal CCN Distributions, AGU Fall Meeting: San Francisco, CA, December 12-16, 2016
- Hudson, J.G., S. Noble, and S. Tabor, 2015: Cloud processed CCN affect cloud microphysics. AGU Fall Meeting, San Francisco, CA, December 12-16.
- Tabor, S., J.G. Hudson, and S. Noble, 2015: Alterations of cloud microphysics due to cloud processed CCN: comparisons between surface aerosol and clouds. AGU Fall Meeting, San Francisco, CA, December 12-16.
- Noble, S., and J.G. Hudson, 2015: Climate effects of cloud modified CCN-cloud interactions. AGU Fall Meeting, San Francisco, CA, December 12-16.
- Hudson, J.G., S. Noble, and S. Tabor, 2015: Bimodal CCN spectra. International Union of Geodesy and Geophysics (IUGG), Prague, Czech Republic, June 22-July 2.

- Hudson, J.G., S. Noble, and S. Tabor, 2015: Southern and Northern Hemisphere cloud processing. International Union of Geodesy and Geophysics (IUGG), Prague, Czech Republic, June 22-July 2.
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