

Fred J. Brechtel

VP of Research
Brechtel Manufacturing Inc.
1789 Addison Way
Hayward, CA 94544
fredj@brechtel.com
(office) 510.732.9723
(fax) 510.732.9153
(cell) 510.589.4564

Visiting Associate
California Institute of Technology
Dept. of Chemical Eng. MS 210-41
Pasadena, CA 91125
fredb@caltech.edu
(office) 626.395.3194
(fax) 626.796.2591
(lab) 626.395.4476

Research & Development Interests:

- New, affordable, high-quality, & miniaturized aerosol sizing, counting & composition technologies
- Speciated bulk & size-resolved chemical composition of aerosols
- Ground-based & aircraft (including UAV) measurements of aerosol properties
- Hygroscopic and cloud nucleating properties of aerosols

Degrees:

- Ph.D. in Atmospheric Science, College of Engineering, Colorado State University, September 1998.
- M.S. in Mechanical Engineering, University of California at Berkeley, 1992.
- B.S. in Mechanical Engineering, University of California at Berkeley, 1987.

Refereed Articles:

- [1] A. Sorooshian, S. Hersey, F. J. Brechtel, A. Corless, R. C. Flagan, and J. H. Seinfeld (2008). Rapid, Size-Resolved Aerosol Hygroscopic Growth Measurements: Differential Aerosol Sizing and Hygroscopicity Spectrometer Probe (DASH-SP), *Aerosol Sci. & Tech.*, *accepted.*
- [2] A. Sorooshian, M.L Lu, F. J. Brechtel, H. Jonsson, G. Feingold, R. C. Flagan, and J. H. Seinfeld (2007). On the source of organic acid aerosol layers above clouds, *Env. Science & Tech.*, 41,4647-4654.

- [3] J. Kim, C. H. Jung, B. C. Choi, S. N. Oh, F. Brechtel, S.C. Yoon, and S.W. Kim (2007), Number size distribution of atmospheric aerosols during ACE-Asia dust and precipitation events. *Atmos. Env.*, *41*, 4841-4855.
- [4] C. Fountoukis, A. Nenes, N. Meskhidze, R. Bahreini, W. C. Conant, H. Jonsson, S. Murphy, A. Sorooshian, V. Varutbangkul, F. Brechtel, R. C. Flagan, and J. H. Seinfeld (2007), Aerosol - cloud drop concentration closure for clouds sampled during the ICARTT 2004 campaign. *J. Geophys. Res.*, *112*, D10S30, doi:10.1029/2006JD007272.
- [5] L. I. Kleinman, P. H. Daum, Yin-Nan Lee, G. Senum, S. R. Springston, J. Wang, C. Berkowitz, J. Hubbe, R. A. Zaveri, F. J. Brechtel, J. Jayne, T. B. Onash, and D. Worsnop (2007), Aircraft observations of aerosol composition and ageing in New England and Mid-Atlantic States during the Summer 2002 NEAQS Field Campaign, *J. Geophys. Res.*, *112*,D09310, doi:10.1029/2006JD007786.
- [6] J. Kim, S.-C. Yoon, S.-W. Kim, F. Brechtel, A. Jefferson, E.G. Dutton, K.N. Bower, S. Cliff, and J.J. Schauer (2006), Chemical apportionment of shortwave direct aerosol radiative forcing at the Gosan super-site, Korea during ACE-Asia. *Atmos. Env.*, *40*: 6718-6729.
- [7] A. Sorooshian, F. J. Brechtel, Y. Ma, R. J. Weber, A. Corless, R. C. Flagan, and J. H. Seinfeld (2006). Modelling and Characterization of a Modified Particle-into-liquid-Sampler (PILS) Optimized for Aircraft Sampling, *Aerosol Sci. Technol.* *40*: 396-409.
- [8] A. Sorooshian, V. Varutbangkul, F. J. Brechtel, B. Ervens, G. Feingold, R. Bahreini, S. Murphy, J. S. Holloway, E. L. Atlas, G. Buzorius, H. Jonsson, R. C. Flagan, and J. H. Seinfeld, Oxalic acid in clear and cloudy atmospheres: Analysis of data from ICARTT 2004, *J. Geophys. Res.*, *111*,D23S45, doi:10.1029/2005JD006880.
- [9] V. Varutbangkul, F. J. Brechtel, R. Bahreini, N. L. Ng, M. D. Keywood, J. H. Kroll, R. C. Flagan, J. H. Seinfeld, A. Lee, and A. H. Goldstein, Hygroscopicity of secondary organic aerosols formed by oxidation of cycloalkenes, monoterpenes, sesquiterpenes, and related compounds, *Atmos. Chem. & Physics Discussions*, *6*, 1121-1177.
- [10] T. A. Rissman, T. M. VanReken, J. Wang, R. Gasparini, D. R. Collins, Yin-Nan Lee, H. H. Jonsson, F. J. Brechtel, R. C. Flagan, and J. H. Seinfeld, Characterization of cloud condensation nuclei (CCN) during the 2003 Atmospheric Radiation Measurement (ARM) Aerosol Intensive Observational Period (IOP) at the Southern Great Plains (SGP) Site in Oklahoma, *J. Geophys. Res.*, *111*, D05S11, doi:10.1029/2004JD005695.
- [11] S. R. Springston, L. I. Kleinman, F. J. Brechtel, Yin-Nan Lee, L. J. Nunnermacker, and J. Wang, Chemical Evolution Of An Isolated Power Plant Plume During The TexAQS 2000 Study, *Atmos. Env.*, *39*, 3431-3443, 2005.
- [12] H. Wex, A. Kiselev, F. Stratmann, J. Zoboki, and F. Brechtel, Measured and modelled equilibrium sizes of salt particles at relative humidities up to 99.1% and their impact on optical properties of atmospheric aerosol, *J. Geophys. Res.*, *110*,, D21212, doi:10.1029/2004JD005507, 2005.

- [13] T. Hennig, A. Massling, F. J. Brechtel and A. Wiedensohler, A Tandem DMA for highly temperature-stabilized hygroscopic particle growth measurements between 90% and 98% relative humidity, *J. Aerosol Sci.*, *36*, doi:10.1016/j.jaerosci.2005.01.005, 2005.
- [14] G. Buzorius, C. S. McNaughton, A. D. Clarke, D. S. Covert, B. Blomquist, K. Nielsen, and F. J. Brechtel, Secondary aerosol formation in continental outflow conditions during ACE-Asia. *J. Geophys. Res.*, *109*, D24203, doi:10.1029/2004JD004749, 2004.
- [15] R. Kahn, et al. Environmental Snapshots from ACE-Asia, *J. Geophys. Res.*, *109*, D19S14, doi:10.1029/2003JD004339, 2004.
- [16] J. Wang, S. A. Christopher, F. Brechtel, J.-Y. Kim, B. Schmid, J. Redemann, P. B. Russell, P. Quinn, and B. Holben, Geostationary Satellite Retrievals of Aerosol Optical Thickness during ACE-Asia, *J. Geophys. Res.*, *108*, 8657, doi: 10.1029/2003JD003580, 2003.
- [17] J. H. Seinfeld, G. R. Carmichael, R. Arimoto, W. C. Conant, F. J. Brechtel, et al., Regional Climatic and Atmospheric Chemical Effects of Asian Dust and Pollution, *Bulletin of the American Meteorological Society*, 367-380, March 2004.
- [18] C. S. McNaughton, et al., Spatial distribution and size evolution of particles in Asian outflow: Significance of primary and secondary particles during ACE-Asia and Trace-P, *J. Geophys. Res.*, *109*, D19S06, doi:10.1029/2003/JD003528.
- [19] R. J. Weber, D. Orsini, Y. Duan, K. Baumann, C. S. Kiang, W. Chameides, Y. N. Lee, F. Brechtel, P. Klotz, P. Jongejan, H. t. Brink, J. Slanina, P. Dasgupta, S. Hering, M. Stolzenburg, E. Edgerton, B. Hartsell, P. Solomon and R. Tanner, Intercomparison of near real-time monitors of PM_{2.5} nitrate and sulfate at the EPA Atlanta supersite. *J. Geophys. Res.*, *108*, doi:10.1029/2001JD001220, 2003.
- [20] G. Buzorius, A. Zelenyuk, F. Brechtel, and D. Imre, Simultaneous determination of individual ambient particle size, hygroscopicity and composition. *Geophys. Res. Lett.*, *29*, 1974, doi:10.1029/2001GL014221, 2002.
- [21] R. J. Weber, D. Orsini, Z. Yhuang, Y. N. Lee, P. J. Klotz, and F. J. Brechtel, A Particle-into-Liquid Collector for Rapid Measurement of Aerosol Bulk Chemical Composition. *Aerosol Science and Technology*, *35*, 718-727, 2001.
- [22] F. J. Brechtel and S. M. Kreidenweis, Predicting Particle Critical Supersaturation from Hygroscopic Growth Measurements In the Humidified TDMA. Part I: Theory and Sensitivity Studies. *Journal of the Atmospheric Sciences*, *57*, 1854-1871, 2000.
- [23] F. J. Brechtel and S. M. Kreidenweis, Predicting Particle Critical Supersaturation from Hygroscopic Growth Measurements In the Humidified TDMA. Part II: Laboratory and Ambient Studies. *Journal of the Atmospheric Sciences*, *57*, 1872-1887, 2000.
- [24] W. R. Leitch, J. W. Bottenheim, T. A. Biesenthal, S.-M. Li, P. S. K. Liu, K. Asalien, H. Dryfhout-Clark, F. Hopper, and F. J. Brechtel, A Case Study of Gas-to-Particle Conversion in an Eastern Canadian Forest. *J. Geophys. Res.*, *104*, 8095-8111, 2000.
- [25] R. J. Weber, P. H. McMurry, T. S. Bates, A. D. Clarke, D. S. Covert, F. J. Brechtel, and G. L. Kok, Intercomparison of Airborne and Surface-Based Measurements of

Condensation Nuclei in the Remote Marine Troposphere During ACE 1. *Journal of Geophysical Research*, 104, 21,673-21,683, 1999.

- [26] F. J. Brechtel, S. M. Kreidenweis, and H. B. Swan, Air Mass Characteristics, Total Particle Concentration and Size Distributions at Macquarie Island, Tasmania, During the First Aerosol Characterization Experiment (ACE 1). *Journal of Geophysical Research*, 103, 16,351-16,367, 1998.
- [27] S. M. Kreidenweis, L. M. McInnes, and F. J. Brechtel, Observations of volatility and elemental composition at Macquarie Island during ACE 1. *Journal of Geophysical Research*, 103, 16,511-16,524, 1998.
- [28] R. J. Weber, P. H. McMurry, F. Eisele, L. Mauldin, D. Tanner, F. L. Eisele, F. J. Brechtel, S. M. Kreidenweis, G. L. Kok, R. D. Schillawski, and D. Baumgardner, A Study of New Particle Formation and Growth Involving Biogenic Trace Gas Species Measured During ACE 1. *Journal of Geophysical Research*, 103, 16,385-16,396, 1998.
- [29] D. M. Murphy, J. R. Anderson, P. K. Quinn, L. M. McInnes, F. J. Brechtel, S. M. Kreidenweis, A. M. Middlebrook, M. Posfai, D. S. Thompson, and P. R. Buseck, Submicron Sea Salt Particles and Aerosol Radiative Properties in the Remote Southern Ocean Marine Boundary Layer. *Nature*, 392, 62-65, 1998.
- [30] R. J. Vong, B. M. Baker, F. J. Brechtel, R. T. Collier, J. M. Harris, A. S. Kowalski, N. C. McDonald, and L. M. McInnes, Ionic and Trace Element Composition of Cloudwater Collected on the Olympic Peninsula of Washington State. *Atmospheric Environment*, 31, 1991-2001, 1997.
- [31] A. Wiedensohler, D. Orsini, D. S. Covert, D. Coffmann, W. Cantrell, M. Havlicek, F. J. Brechtel, L. M. Russell, R. J. Weber, J. Gras, J. G. Hudson, and M. Litchy, Intercomparison Study of the Size-Dependent Counting Efficiency of 26 Condensation Particle Counters. *Aerosol Science and Technology*, 27, 224-242, 1997.
- [32] S. K. Ho, F. J. Brechtel and T. K. Fowler, A Simplified Scaling Approach for Estimating the Neutron Induced Radioactivity of a SiC First Wall. *Fusion Technology*, 23, 321-330, 1993.

Conference Proceedings:

- [1] F. J. Brechtel, E. Andrews, P. Y. Chuang, A. Jefferson, G. Buzorius, C. H. Jung, J.-Y. Kim, S. Cliff, M. S. Bae, J. J. Schauer, K. Bower, P. Williams, H. Coe, J. A. Ogren, and S. Fuzzi, Optical scattering and absorption closure for dry and hydrated aerosol at the Gosan Supersite during ACE-Asia. Poster presented at the AAAR Annual Meeting, Austin, TX, October 2005.
- [2] V. Varutbangkul, R. Bahreini, N. L. Ng, M. Keywood, J. Kroll, F. J. Brechtel, R. C. Flagan, A. Lee, A. Goldstein, and J. H. Seinfeld, Hygroscopicity of Secondary Organic Aerosol Formed by Oxidation of Cycloalkenes, Monoterpenes, Sesquiterpenes and Related Compounds. Paper presented at the AAAR Annual Meeting, Austin, TX, October 2005.
- [3] A. Sorooshian, F. J. Brechtel, B. Ervens, G. Feingold, V. Varutbangkul, R. Bahreini, S.

- Murphy, J. Holloway, E. Atlas, K. Anlauf, G. Buzorius, H. H. Jonsson, R. C. Flagan, J. H. Seinfeld, Oxalic Acid in Clear and Cloudy Atmospheres: Analysis of Data from ICARTT 2004. Poster presented at the AAAR Annual Meeting, Austin, TX, October 2005.
- [4] A. Sorooshian, F. J. Brechtel, V. Varutbangkul, R. Bahreini, S. Murphy, H. H. Jonsson, M. J. Kleeman, E. Atlas, J. Holloway, G. Feingold, B. Ervens, R. C. Flagan, J. H. Seinfeld, Airborne Aerosol Chemical Composition Measurements over Ohio and Surrounding Areas during ICARTT 2004. Paper presented at the ICARTT Data Workshop, Durham, NH, 2005.
- [5] A. Sorooshian, F. J. Brechtel, A. Corless, V. Varutbangkul, R. Bahreini, S. Murphy, H. Jonsson, G. Buzorius, R. C. Flagan, and J. H. Seinfeld, Observations of aerosol composition in a power plant plume with a Particle-Into-Liquid Sampler (PILS): Results from ICARTT 2004. Paper presented at UC Davis, 2005.
- [6] T. Hennig, A. Massling, F. J. Brechtel and A. Wiedensohler, Development of a system to measure hygroscopic growth of aerosol particles at relative humidities greater than 90%, Paper presented at the European Aerosol Conference, *J. Aerosol Sci., Supplement pages S837-S838*, 2004.
- [7] R. A. Zaveri, C. M. Berkowitz, J. M. Hubbe, S. R. Springston, F. J. Brechtel, T. B. Onasch, and J. T. Jayne, Nighttime Lagrangian Measurements of Aerosols and Oxidants in the Boston Urban Plume: Possible Evidence of Heterogeneous Loss of Ozone. Poster presented at the AAAR Conference, Atlanta, GA, Oct. 2004.
- [8] F. J. Brechtel, M. Hermann, A. Laskin and M. Iedema, Description and Characterization of a New Airborne Aerosol Inlet System. Paper presented at the AAAR Conference, Oct. 2003.
- [9] P. Chuang, F. J. Brechtel, and E. Andrews, Optical Closure at Gosan during ACE-Asia: Results and lessons learned. Paper presented at the AAAR Conference, Oct. 2003.
- [10] V. Varutbangkul, F. J. Brechtel, M. Keywood, R. Bahreini, S. Gao, R. C. Flagan, and J. H. Seinfeld, Hygroscopicity of Secondary Organic Aerosol Formed by Ozonolysis of Cycloalkenes, Monoterpenes, and Sesquiterpenes. Poster presented at the AAAR Conference, Oct. 2003.
- [11] J. Wang, S. A. Christopher, J.-Y. Kim, and F. Brechtel, Aerosol optical thickness retrievals from GMS5 during ACE-Asia. Paper presented at the American Meteorology Society annual meeting, 2003.
- [12] G. Buzorius, F. J. Brechtel, A. Zelenyuk, D. Imre, and W. M. Angevine, Observations of Recent New Particle Formation in Houston During TexAQS-2000. Poster presented at the American Meteorological Society Fourth Conference on Atmospheric Chemistry, Orlando, FL, Jan. 2002.
- [13] S. R. Springston, L. I. Kleinman, F. J. Brechtel, P. H. Daum, Y.-N. Lee, L. J. Nunnermacker, and J. Weinstein-Lloyd, Chemical Evolution of a Power Plan Plume. Poster presented at the American Meteorological Society Fourth Conference on

Atmospheric Chemistry, Orlando, FL, Jan. 2002.

- [14] L. I. Kleinman, P. H. Daum, F. J. Brechtel, Y.-N. Lee, L. J. Nunnermacker, S. R. Springston, and J. Weinstein-Lloyd, Efficiency of Ozone Production in the Houston Plume. Paper presented at the American Meteorological Society Fourth Conference on Atmospheric Chemistry, Orlando, FL, Jan. 2002.
- [15] L. I. Kleinman, P. H. Daum, F. J. Brechtel, Y.-N. Lee, L. J. Nunnermacker, S. R. Springston, and J. Weinstein-Lloyd, Ozone Production in the Philadelphia Urban Area During NE-OPS 99. Paper presented at the American Meteorological Society Fourth Conference on Atmospheric Chemistry, Orlando, FL, Jan. 2002.
- [16] J-H. Han, T. Onasch, S. Oatis, F. Brechtel, and D. Imre, Thermodynamics and Common Atmospheric Particles on the Nanoscale. Paper presented at the AAAR conference, Oct. 2002.
- [17] F. J. Brechtel, A. Zelenyuk, D. Imre, and G. Buzorius, First Simultaneous Particle Size, Hygroscopicity and Composition Measurements by Coupled HTDMA-MS. Paper presented at the AAAR conference, Portland, OR, Oct. 2001.
- [18] F. J. Brechtel, G. Buzorius, C.-H. Jung, J.-Y. Kim, S.-N. Oh, A. Zelenyuk, D. Imre, P. Chuang, and H. Swan, Aerosol Physical and Chemical Properties at Cheju Island, Korea During ACE-Asia. Poster presented at the ACE-Asia data workshop, Pasadena, CA, Oct. 2001.
- [19] F. J. Brechtel and G. Buzorius, Airborne Observations of Recent New Particle Formation Over Two Urban Areas in the U.S. *J. Aer. Sci.*, *32*, S115-116, 2001. Paper presented at the European Aerosol Conference, Leipzig, Germany.
- [20] F. J. Brechtel and G. Buzorius, Aerosol Size Distribution Measurements on-board the DOE G-1 Aircraft During TexAQS-2000. Paper presented at the TexAQS-2000 Data Workshop, Austin, TX, Aug. 2001.
- [21] G. Buzorius and F. J. Brechtel, Observations of New Particle Formation at a Tall-Building Site During TexAQS-2000. Paper presented at the TexAQS-2000 Data Workshop, Austin, TX, Aug. 2001.
- [22] F. J. Brechtel, L. J. Nunnermacker, and S. R. Springston, Aircraft Measurements of Particle Size Distributions Over the 4-50,000 nm Size Range During the Northeast Oxidant and Particulate Study. Poster presented at the annual AAAR meeting, St. Louis, MO, November, 2000.
- [23] F. J. Brechtel and S. M. Kreidenweis, Predicting Particle Critical Supersaturation from Hygroscopic Growth Measurements In the Humidified TDMA. Theoretical, Laboratory and Ambient Studies. Poster presented at the meeting of the American Geophysical Union, San Francisco, CA, December, 1999.
- [24] F. J. Brechtel, Particle Size-Distribution Measurements On-board the DOE G-1 Aircraft. Poster presented at the Atmospheric Chemistry Program meeting, Washington, DC, February, 1999.
- [25] F. J. Brechtel, A. Wiedensohler, D. S. Covert, R. Wernicke, F. Stratmann, W. Birmili,

- and S. M. Kreidenweis, Characterization of Aerosol Size Distribution Mode Parameters for Different Meteorological Conditions During ACE 1. Paper presented at the meeting of the American Geophysical Union, San Francisco, CA, December, 1997.
- [26] F. J. Brechtel, S. M. Kreidenweis, and L. M. McInnes, Observations of Aerosol Characteristics at Macquarie Island, Tasmania, During ACE 1. Paper presented at the meeting of the American Association for Aerosol Research, Denver, CO, October, 1997.
- [27] D. C. Rogers, and F. J. Brechtel, Size and Concentration Effects of Metal Bellows Pumps on Aerosol Samples. Poster presented at the meeting of the American Association for Aerosol Research, Denver, CO, October, 1997.
- [28] A. Wiedensohler, F. Brechtel, D.S. Covert, R. Wernicke, F. Stratmann, W. Birmili, and S. Kreidenweis, Representative Aerosol Size Distributions for Different Synoptic Weather Situations Over the Tasman Sea. *J. Aerosol Sci.*,28, S37-S38, 1997. Paper presented at the European Aerosol Conference.
- [29] F. J. Brechtel, S. M. Kreidenweis, A. Wiedensohler, R. Wernicke, F. Stratmann, D. S. Covert, D. Coffmann, and V. Kapustin, Observations of Aerosol Number Concentrations and Size Distributions at Surface Sites During ACE 1. Paper presented at the meeting of the American Geophysical Union, San Francisco, CA, December, 1996.
- [30] F. J. Brechtel, S. M. Kreidenweis, and L. M. McInnes, Observations of Aerosol Number Concentration, Size Distribution, Volatility and Chemistry at Macquarie Island, Tasmania, During ACE 1. Poster presented at the meeting of the American Geophysical Union, San Francisco, CA, December, 1996.
- [31] F. J. Brechtel and S. M. Kreidenweis, Observations of Aerosol Number Concentration, Size Distribution and Volatility at Macquarie Island, Tasmania, During ACE 1. Paper presented at the meeting of the American Association for Aerosol Research, Orlando, FL, October, 1996.
- [32] F. J. Brechtel, L. M. McInnes, and S. M. Kreidenweis, Observations of the Non-Volatile Chemical Composition of Aerosol at Macquarie Island, Tasmania, During ACE 1. Paper presented at the meeting of the American Association for Aerosol Research, Orlando, FL, October, 1996.
- [33] F. J. Brechtel, S. M. Kreidenweis, L. M. McInnes, and J. A. Ogren, Transport of Anthropogenic Aerosols and In-Situ Particle Production at a Remote Mid-Latitude Mountain Site. Paper presented at the meeting of the American Association for Aerosol Research, Pittsburgh, PA, October, 1995.
- [34] F. J. Brechtel, S. M. Kreidenweis, and J. A. Ogren, Preliminary Evidence for the Production of New Particulate Matter in the Atmosphere at a Mid-Latitude Remote Mountain Site. Paper presented at the IUGG Meeting, Boulder, CO, July, 1995.
- [35] F. J. Brechtel and S. M. Kreidenweis, A Preliminary Investigation of the Volatility of Aerosol in the Colorado Rocky Mountains. Poster presented at the meeting of the International Association for Aerosol Research, Los Angeles, CA, August, 1994.

- [36] F. J. Brechtel and R. J. Vong, Design of an Active Cloudwater Sampler to Determine Cloud Droplet Size-Dependent Chemistry. Poster presented at the meeting of the American Association for Aerosol Research, Oak Brook, IL, October, 1993.

Technical Reports:

- [1] F. J. Brechtel, Description and Assessment of a New Aerosol Inlet System for the DOE G-1 Research Aircraft. Final technical report submitted to Brookhaven National Laboratory under contract 0000058843, Aug. 2003.
- [2] F. J. Brechtel, S. M. Kreidenweis, L. M. McInnes, and H. B. Swan, Observations of Aerosol Characteristics at Macquarie Island, Tasmania, During ACE 1. Colorado State University Department of Atmospheric Science Technical Report Number 633, May, 1997.
- [3] F. J. Brechtel, A Comparative Study of the International Thermonuclear Reactor Technology Phase Divertor Design and a Hypothetical Ceramic Divertor Constructed from Silicon Carbide Doped with Beryllium Oxide. Master's Thesis, U. C. Berkeley Fusion Engineering and Environmental & Safety Group, 1992.
- [4] F. J. Brechtel, A Review of Gas Turbine Power. U. C. Berkeley Fusion Engineering and Environmental & Safety Group, internal publication, UC-BFE-023, 1991.

Honors and Awards:

- Invited Researcher Institute for Tropospheric Research, Leipzig, Germany 1996, 2000, 2001, 2002, 2003
- EPA STAR Graduate Student Fellowship 1995-1998
- NASA Global Climate Change Fellowship 1994
- Colorado State Fellowship 1993-1994
- NASA Space Grant Fellowship 1992-1993
- Alumni Scholarship U.C. Berkeley 1983, 1987

Major Funding Sources:

- **"Development of a Compact Aerosol Instrumentation Suite for Unmanned Aerial Vehicles"**, NOAA-OAR Phase-II SBIR, PI, 2007-2009.
- **"A Broad Spectrum Mobility Analyzer for Aerosol Number Size Distribution Measurements"**, National Science Foundation Phase-II SBIR, PI, 2007-2009.
- **"Development of a Compact Aerosol Instrumentation Suite for Unmanned Aerial Vehicles"**, NOAA-OAR Phase-I SBIR, PI, 2006-2007.

- **"A Broad Spectrum Mobility Analyzer for Aerosol Number Size Distribution Measurements"**, National Science Foundation Phase-I SBIR, PI, 2006.
- **"Development of a Low Pressure-Drop Flow Control System for the NOAA Cessna Research Aircraft"**, NOAA PMEL, PI, Nov. 2005.
- **"A Versatile Droplet Sizing Spectrometer for Aerosol Hygroscopic Growth Measurements from Research Aircraft"**, Office of Naval Research Phase-II SBIR, PI, 2004-2008.
- **"Development of a Particle Into Liquid Sampler for the NOAA Cessna Research Aircraft"**, NOAA PMEL, PI, Jan.-April 2005.
- **"Development of a Particle Into Liquid Sampler for the CIRPAS Twin Otter Research Aircraft"**, California Institute of Technology, PI, Jan.-Aug. 2004.
- **"Development of an Electrical Mobility Sizer for the NOAA CMDL Research Aircraft"**, NOAA CMDL, PI, Sept. 2003-Dec. 2004.
- **"Establishing the Linkages between Particle Physical, Chemical, and Optical Properties at the Kosan Supersite during Aerosol Characterization Experiment (ACE-Asia)"**, National Science Foundation, PI, Aug. 2003 - July 2005.
- **"A Versatile Droplet Sizing Spectrometer for Aerosol Hygroscopic Growth Measurements from Research Aircraft"**, Office of Naval Research Phase-I SBIR, PI, 2003.
- **"Construction and Testing of a New Airborne Aircraft Particle Inlet System for the Gulfstream-1"**, Pacific Northwest National Laboratory, PI, 2002.
- **"Design and Evaluation of a New Airborne Aircraft Particle Inlet System for Quantitative Sampling of Particulate Organics"**, Brookhaven National Laboratory, PI, 2002-2003.
- **"Chemistry and Microphysics of the Troposphere: Ambient Aerosol Size Distribution and Size-Resolved Water Uptake Measurements during ACP Field Campaigns"**, Atmospheric Chemistry Program, Dept. of Energy Grant # EE-484-EECA, Principal Investigator, 2000-2004.
- **"Multiple Humidity Tandem Differential Mobility Analyzer"**, Brookhaven National Laboratory Laboratory Directed Research and Development Program #00-25B, PI, 2001-2003.
- **"Aerosol Measurements at Cheju Island During ACE-Asia: Aerosol Number Size Distributions, Particle Hygroscopicity, and Individual Particle Size and Chemical Composition"**, NOAA Global Change Research Program # ACE-BNL, PI, 2000-2001.

- **”Aerosol Properties as a Function of Temperature, Composition, and Size”**, Atmospheric Chemistry Program, Dept. of Energy Grant # EE-483-EECA, Co-PI, 2000-2004.
- **”Development of a Versatile Aircraft Mass Spectrometer for Organic Aerosol Analysis”**, DOE SBIR with Aerodyne Research Inc., Co-PI, 2000-2003.
- **”Chemistry and Microphysics of the Troposphere: Nanoparticle Size Distribution”**, Atmospheric Chemistry Program, Dept. of Energy Grant # EE-484-EECA, Principal Investigator (original awardee Rodney Weber), 1998-2000.

Post-Doctoral Research Associates Supervised:

- Gintautas Buzorius (Twin Scanning Electrical Mobility Sizer, Texas 2000, ACE Asia, RH Scanning HTDMA)
- Timothy Onasch (joint with Dan Imre)(Nano-HTDMA)
- Jeong-Ho Han (joint with Dan Imre) (Nano-HTDMA)

Major Field Research Experience:

- **GOMACCS-TeXAQS**, Houston, TX, August 2006: Deployment of airborne particle-into-liquid sampler on CIRPAS Twin Otter aircraft and ambient chemical composition measurements.
- **ICARRT**, Cleveland, OH, July 2004: Deployment of new airborne particle-into-liquid sampler on CIRPAS Twin Otter aircraft and ambient chemical composition measurements.
- **Northeast Aerosol and Oxidant Study**, Worcester, MA, July-Aug. 2002: Deployment of new aircraft inlet system and airborne electrical mobility size distribution measurements.
- **Aerosol Characterization Experiment - Asia**, Cheju Island, Korea, March-May 2001: Supersite Coordinator. Conducted measurements of ambient size distributions, size-resolved water uptake, and coupled humidified-DMA/Time-of-Flight Mass Spectrometry on Asian dust aerosols. Convener of supersite session at ACE data workshops, Pasadena, CA and Boulder, CO.
- **Texas Air Quality Study 2000**, Houston, TX July-Sept. 2000: Performed airborne and ground-based (tall building) scanning size distribution measurements under urban-polluted conditions during EPA-sponsored supersite study.
- **Northeast Oxidants and Particulate Study**, Philadelphia, July-August 1999: Performed measurements of 4-800 nm particle size distributions during DOE research aircraft flights over Philadelphia.

- **EPA Atlanta-1999 Supersite Experiment**, August 1999: Participated in first field deployment of semi-continuous sub-2.5 μm Particle-Into-Liquid Sampler (PILS) for ambient particle chemical composition measurements in collaboration with Georgia Institute of Technology.
- **Hohenspeissenberg Aerosol Formation Experiment**, May-June 1999: Conducted measurements of ambient 3-10 nm particle size distributions in rural Germany using a modified pulse-height ultrafine condensation particle counter in collaboration with the Institute for Tropospheric Research, Leipzig, Germany.
- **First Aerosol Characterization Experiment**, Nov.-Dec. 1995: Conducted atmospheric aerosol size distribution and chemical composition measurements on MacQuarie Island, Tasmania during ACE 1 in collaboration with NOAA, the CSIRO Division of Atmospheric Research, the Australian Antarctic Research Expedition, and the National Institute for Water and Atmospheric Research, New Zealand.
- **ACE 1 Condensation Particle Counter Calibration Workshop**, Aug. 1995: Calibrated 26 TSI condensation particle counters for use during ACE 1.
- **Niwot Ridge Aerosol Monitoring Study**, Dec. 1994-Aug. 1995: Conducted ambient aerosol size distribution, light scattering, chemical composition, and volatility tandem differential mobility analyzer measurements at the University of Colorado Mountain Research Station on Niwot Ridge, CO in collaboration with investigators at NOAA.
- **Cloud and Aerosol Characterization Experiment**, Jan.-May 1993: Conducted measurements of size-dependent cloud droplet chemical composition and eddy flux of cloud droplets to a forest canopy at Cheeka Peak, WA in collaboration with the University of Washington.

Professional Experience:

- 02/02- **Research Scientist, Brechtel Mfg. Inc.,**
 Present Development of new hygroscopic growth measurement technology. Developed new aircraft sampling inlet system for DOE and other research aircraft. Collaboration with Institute for Tropospheric Research on new hygroscopic growth measurements. Analysis of aerosol observations from Gosan Supersite during ACE-Asia.
- 11/02- **Visiting Associate, California Institute of Technology**
 Present Assist in performance of smog chamber studies at Caltech. Development of new aerosol measurement technologies.

- 10/98 - 2/02 **Associate Scientist, Environmental Sciences Department, Atmospheric Sciences Division, Brookhaven National Laboratory**
 Developed new Twin-DMA-based scanning size distribution measurement system for DOE aircraft. Deployed instrumentation on-board aircraft and at ground-based stations during field studies in Philadelphia, Houston and Korea. Developed new size-resolved scanning water uptake system and performed first simultaneous measurements of particle size, hygroscopic growth and chemical composition with integrated HTDMA/Mass Spec system.
- 8/93 - 9/98 **Research Associate**, Colorado State University
 Supervisor: Sonia Kreidenweis. Completed Ph.D. in Atmospheric Chemistry. Teaching assistant for graduate level Atmospheric Inorganic and Organic Chemistry course (AT 621).
- 7/91 - 7/92 **Graduate Student Researcher**, Oregon State University, Corvallis, OR.
 Supervisor: Richard Vong. Deployed FSSP, PVM and sonic anemometer during NSF-sponsored cloud droplet deposition study at Cheeka Peak Observatory.
- 8/90 - 12/91 **Graduate Student Researcher**, University of California at Berkeley
 Supervisor: Ken Fowler. Performed supercomputer simulations of fusion reactor neutron activation and critical heat transfer analyses.
- 2/88 - 8/90 **Research and Design Mechanical Engineer**, Varian Associates Radiation Division, Palo Alto, CA. Managed prototype collimator development project. Developed prototype radiation focusing aperture for cancer therapy equipment.
- 6/86 - 8/86 **Laboratory Technician**, Stanford University, Stanford, CA.
 Managed ultra-high vacuum and RF brazing system development project.
- 6/85-8/85 **Mechanical Technician**, Electrofusion Corp., Fremont, CA.
 6/83-8/83 Hot forming of Be metal for use as satellite support struts;
 6/81-8/81 ultra-high vacuum leak detection of electron beam welded
 6/80-8/80 parts; chemical etching and cleaning of various metals.
- 6/84-7/84 **Apprentice Machinist**, B and H Machining, Redwood City, CA.
 Machined alumina ceramics to precision tolerances.
- 6/82-8/82 **Apprentice Machinist**, Sieger Engineering, So. San Francisco, CA.
 Machined steels to precision tolerances.
- 9/85-5/86 **Study Group Leader**, Student Learning Center, UC Berkeley
 9/87-12/87 Undergraduate calculus instructor. Managed project implementing new educational techniques.

Professional Memberships:

- American Meteorological Society. Member 2001-present.
- American Geophysical Union. Member 1995-present.
- American Association for Aerosol Research. Member 1994-present.
- American Chemical Society. Member 1997-present.

Experimental Expertise:

- Extensive ground and aircraft-based experience measuring aerosol size and concentration using the Differential Mobility Analyzer (DMA), Ultrafine and Condensation Particle Counters (UCPC & CPC), Aerosol Generation Systems, Humidified Tandem Differential Mobility Analyzer (HTDMA), Cloud Condensation Nucleus Counter (CCNC), PCASP-100, FSSP-100, Particulate Volume Monitor (PVM-100), and PC-based data acquisition hardware and software.
- Characterization of aerosol chemical composition using Semi-Continuous Particle-into-Liquid Sampler (PILS), Micro-Orifice Uniform Deposit Impactor (MOUDI), Berner Low-Pressure Impactor, bulk filter samplers, annular gas denuders, and size-segregating cloud droplet samplers. Droplet and aerosol eddy flux measurements using simultaneous sonic anemometer, FSSP and PVM observations.

Personal Information:

- Born 8/12/65, Oakland, California
- Fluent in German and Spanish
- Citizenship: U.S.A.