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EDUCATION:

Ph.D., Environmental Engineering Science April 1994
California Institute of Technology, Pasadena, CA
Thesis: Alternative Models for Air Pollutant Effects on Visibility
Advisor: Dr. Glen R. Cass

M.S., Environmental Engineering Science June 1989
California Institute of Technology, Pasadena, CA

B.E., Chemical Engineering (Summa Cum Laude) June 1988
Cooper Union for the Advancement of Science and Art, New York, NY

EXPERIENCE:

PROJECT SCIENTIST, OCO-3 January 2013 – present
DEPUTY PROJECT SCIENTIST, OCO-2 July 2010 – present
SECTION MANAGER July 2008 – Jan 2011
DEPUTY SECTION MANAGER March 2007 – July 2008
GROUP SUPERVISOR (3283) May 2006 – Dec 2007
RESEARCH SCIENTIST August 2002 – May 2006
SCIENTIST October 1999
Jet Propulsion Laboratory, California Institute of Technology to July 2002

- Providing key science leadership and oversight as OCO-2 Deputy Project Scientist and OCO-3 Project Scientist
- Managed ~60 scientists Atmospheric Science section
- Deputy PI, Tropospheric Emission Spectrometer on EOS Aura until end of 2010
- Working on new mission concept studies for future atmospheric composition measurements
- Co-led team creating advanced mission simulation/OSSE tools
- Served as lead of SH₂OUT mission concept development for future ESSP call
- Co-led Blue Horizon Atmospheric Composition mission design
- Primary lead on TES cloud algorithm development and validation
- Produced aerosol characterization from ATMOS and MkIV data using custom technique.
- Supported AIRS validation efforts for upper tropospheric water vapor and clouds

ADJUNCT ASSISTANT PROFESSOR and BJERKNES FELLOW August 1997
University of California, Los Angeles, Atmospheric Sciences to present

- Developing techniques for remote sensing of aerosols with high spectral resolution data in collaboration with JPL NASA scientists.
- Mentored two students through completion of PhD
- Created new upper level undergraduate course 'Air and Water Pollution'.
- Updated graduate level class 'Aerosol, Cloud, and Precipitation Microphysics'.
- Participated in SCOS '97 field study, measuring aerosol size distributions in collaboration with scientists making OH radical measurements.
- Continued collaboration with students since October 1999.

ASSISTANT PROFESSOR April 1994
University of Iowa, Civil and Environmental Engineering to July 1997

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- Developed an active research program in air pollution and aerosol characterization including field measurements in Idaho, denuder studies, and analysis of visibility trends.
- Taught a wide variety classes at the undergraduate and graduate level, in air pollution, aerosols, and environmental engineering laboratory techniques.
- Supervised seven graduate students to the completion of Master's degrees.

PUBLICATIONS:

69. Crisp et al., The ACOS CO₂ retrieval algorithm - Part II: Global X-CO₂ data characterization. *Atmospheric Measurement Techniques* 2012, 5 (4), 687-707.
68. Doeringer, D.; **Eldering, A.**; Boone, C. D.; Abad, G. G.; Bernath, P. F., Observation of sulfate aerosols and SO₂ from the Sarychev volcanic eruption using data from the Atmospheric Chemistry Experiment (ACE). *Journal of Geophysical Research-Atmospheres* 2012, 117.
67. Fishman et al., The United States' Next Generation Of Atmospheric Composition And Coastal Ecosystem Measurements NASA's Geostationary Coastal and Air Pollution Events (GEO-CAPE) Mission. *Bulletin of the American Meteorological Society* 2012, 93 (10), 1547+.
66. O'Dell, C. W.; Connor, B.; Bosch, H.; O'Brien, D.; Frankenberg, C.; Castano, R.; Christi, M.; Crisp, D.; **Eldering, A.**; Fisher, B.; Gunson, M.; McDuffie, J.; Miller, C. E.; Natraj, V.; Oyafuso, F.; Polonsky, I.; Smyth, M.; Taylor, T.; Toon, G. C.; Wennberg, P. O.; Wunch, D., The ACOS CO₂ retrieval algorithm - Part 1: Description and validation against synthetic observations. *Atmospheric Measurement Techniques* 2012, 5 (1), 99-121.
65. Natraj, V.; Liu, X.; Kulawik, S.; Chance, K.; Chatfield, R.; Edwards, D. P.; **Eldering, A.**; Francis, G.; Kurosu, T.; Pickering, K.; Spurr, R.; Worden, H., Multi-spectral sensitivity studies for the retrieval of tropospheric and lowermost tropospheric ozone from simulated clear-sky GEO-CAPE measurements. *Atmospheric Environment* 2011, 45 (39), 7151-7165.
64. Waliser, D.; Kim, J.; Xue, Y.; Chao, Y.; **Eldering, A.**; Fovell, R.; Hall, A.; Li, Q.; Liou, K. N.; McWilliams, J.; Kapnick, S.; Vasic, R.; De Sale, F.; Yu, Y., Simulating cold season snowpack: Impacts of snow albedo and multi-layer snow physics. *Climatic Change* 2011, 109, 95-117.
63. Wunch et al., A method for evaluating bias in global measurements of CO₂ total columns from space. *Atmospheric Chemistry and Physics* 2011, 11 (23), 12317-12337.
62. Lee, J. et al (2011) Relating tropical ocean clouds to moist processes using water vapor isotope measurements, *Atm. Chem, Phy.*, doi:10.5194/acp-11-741-2011
61. Zoogman, P et al (2011) Ozone air quality measurement requirements for a geostationary satellite mission, *Atm. Env.*, doi:10.1016/j.atmosenv.2011.05.058, doi:10.5194/acp-11-741-2011
60. Liang, C. K., **A. Eldering**, A. Gettelman, B. Tian, S. Wong, E. J. Fetzer, and K. N. Liou (2011), Record of tropical interannual variability of temperature and water vapor from a combined AIRS-MLS data set, *J. Geophys. Res.*, 116, D06103, doi:10.1029/2010JD014841.
59. Zhang, Z., D. J. Jacob, X. Liu, J. A. Logan, K. Chance, **A. Eldering**, and B. R. Bojkov (2010) Intercomparison methods for satellite measurements of atmospheric composition: application to tropospheric ozone from TES and OMI, *Atmospheric Chemistry and Physics*, 10 . pp. 1417-1456.
58. Boxe, C. S., Worden, J. R., Bowman, K. W., Kulawik, S. S., Neu, J. L., Ford, W. C., Osterman, G. B., Herman, R. L., **Eldering, A.**, Tarasick, D. W., Thompson, A. M., Doughty, D. C., Hoffmann, M. R. and Oltmans, S. J. (2010) Validation of northern latitude Tropospheric Emission Spectrometer stare ozone profiles with ARC-IONS sondes during ARCTAS: sensitivity, bias and error analysis. *Atmospheric Chemistry and Physics*, 10 . pp. 9901-9914.
57. Schreier, M.M, B. H. Kahn, **A. Eldering**, D. A. Elliott, E. Fishbein, F. W. Irion, And T. S. Pagano (2010) Radiance Comparisons of MODIS and AIRS Using Spatial Response Information, *J. Atmos. Oceanic Tech.*, DOI: 10.1175/2010JTECHA1424.1
56. L. Zhang, D. J. Jacob, X. Liu, J. A. Logan, K. Chance, **A. Eldering**, and B. R. Bojkov, (2010) Intercomparison methods for satellite measurements of atmospheric composition: application to tropospheric ozone from TES and OMI, *Atmos. Chem. Phys.*, 10, 4725-4739.
55. M. Kopacz, D. J. Jacob, J. A. Fisher, J. A. Logan, L. Zhang, I. A. Megretskaya, R. M. Yantosca, K. Singh, D. K. Henze, J. P. Burrows, M. Buchwitz, I. Khlystova, W. W. McMillan, J. C. Gille, D. P. Edwards, **A. Eldering**, V. Thouret, and P. Nedelec, (2010) Global estimates of CO sources with high resolution by adjoint inversion of multiple satellite datasets (MOPITT, AIRS, SCIAMACHY, TES),

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- Atmos. Chem. Phys.*, 10, 855-876
54. Kahn, B. H., A. Gettelman, E. J. Fetzer, **A. Eldering**, and C. K. Liang (2009), Cloudy and clear-sky relative humidity in the upper troposphere observed by the A-train, *J. Geophys. Res.*, 114, D00H02, doi:10.1029/2009JD011738.
 53. Choi, Y., J. Kim, **A. Eldering**, G. Osterman, Y.L. Yung, Y. Gu, K.N. Liou (2009) Lightning and anthropogenic NO_x sources over the United States and the western North Atlantic Ocean: Impact on OLR and radiative effects, *Geophys. Res. Lett.* 36,L17806, doi:10.1029/2009GL039381
 52. Shim, C., Li, Q.B., Luo, M., Kulawik, S., Worden, H., Worden, J., **Eldering, A.**, Diskin, G., Sachse, G., Weinheimer, A., Knapp, D., Montzca, D., Campos, T (2009) Satellite observations of Mexico City pollution outflow from the Tropospheric Emissions Spectrometer (TES), *Atmos. Env.*, 43 1540-1547.
 51. Verma, S., Worden, J., Pierce, B., Jones, D.B.A., Al-Saadi, J., Boersma, F., Bowman, K., **Eldering, A.**, Fisher, B., Jourdain, L., Kulawik, S., Worden, H. (2009) Ozone production in boreal fire smoke plumes using observations from the Tropospheric Emission Spectrometer and the Ozone Monitoring Instrument, *J. Geophys. Res.*, 114, 0.1029/2008JD010108
 50. Worden, H.M., Bowman, K.W., Worden, J.R., **Eldering, A.**, Beer, R (2008) Satellite measurements of the clear-sky greenhouse effect from tropospheric ozone, *Nature Geosciences*, 1, 305-308.
 49. Fetzer, E. J., et al. (2008), Comparison of upper tropospheric water vapor observations from the Microwave Limb Sounder and Atmospheric Infrared Sounder, *J. Geophys. Res.*, 113, D22110, doi:10.1029/2008JD010000.
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 47. Shephard, M.W et al (2008) Comparison of Tropospheric Emission Spectrometer nadir water vapor retrievals with in situ measurements, *J. Geophys. Res.*, 113, D15S24
 46. Osterman, G. et al (2008) Validation of Tropospheric Emission Spectrometer (TES) measurements of the total, stratospheric, and tropospheric column abundance of ozone, *J. Geophys. Res.*, 113, D15S16
 45. Beer, R. et al (2008) First satellite observations of lower tropospheric ammonia and methanol, *Geophys. Res. Lett.* 35,L09801, doi:10.1029/2008GL033642.
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 43. B. H. Kahn, M. T. Chahine, G. L. Stephens, G. G. Mace, R. T. Marchand, Z. Wang, C. D. Barnett, **A. Eldering**, R. E. Holz, R. E. Kuehn, and D. G. Vane (2008) Cloud type comparisons of AIRS, CloudSat, and CALIPSO cloud height and amount, *Atmos. Chem. Phys.*, 8, 1231-1248
 42. Choi, Y., Wang, Y.H., Yang, Q., Cunnold, D., T., Shim, C., Luo, M., **Eldering, A.**, Bucsela, E., Gleason, J. (2008) Spring to summer northward migration of high O₃ over the western North Atlantic, *Geophys. Res. Lett.*,
 41. Luo, M., et al. (2007), TES carbon monoxide validation with DACOM aircraft measurements during INTEX-B 2006, *J. Geophys. Res.*, 112, D24S48, doi:10.1029/2007JD008803.
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 39. Luo, M. et al. (2007), Comparison of carbon monoxide measurements by TES and MOPITT: Influence of a priori data and instrument characteristics on nadir atmospheric species retrievals, *J. Geophys. Res.*, 112, doi:10.1029/2006JD007663
 38. Kahn, B. H., E. Fishbein, S. L. Nasiri, **A. Eldering**, E. J. Fetzer, M. J. Garay, and S. Lee (2007), The radiative consistency of AIRS and MODIS cloud retrievals, *J. Geophys. Res.*, 112, doi:10.1029/2006JD007486.
 37. Kahn, B. H., **A. Eldering**, A. J. Braverman, E. J. Fetzer, J. H. Jiang, E. Fishbein, and D. L. Wu (2007), Toward the characterization of upper tropospheric clouds using Atmospheric Infrared Sounder and Microwave Limb Sounder observations, *J. Geophys. Res.*, 112, D05202, doi:10.1029/2006JD007336.
 36. L. Jourdain, H.M. Worden, J.R. Worden, K. Bowman, Q. Li, **A. Eldering**, S.S. Kulawik, G. Osterman, F. Boersma, B. Fisher, C.P. Rinsland, R. Beer, M. Gunson, (2007) Tropospheric vertical distribution of tropical Atlantic ozone observed by TES during the Northern African biomass burning season,

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- Geophys. Res. Lett.*, doi:10.1029/2006GL028284
35. J. Worden, X. Lui, K. Bowman, K. Chance, R. Beer, **A. Eldering**, M. Gunson, H. Worden (2007), Improved tropospheric ozone profile retrievals using OMI and TES radiances, *Geo. Res. Lett.*, 34, L01809, doi:10.1029/2006GL027806.
 34. L. Zhang, D.J. Jacob, K.W. Bowman, et al, (2007) Ozone-CO correlations determined by the TES satellite instrument in continental outflow regions, *Geo. Res. Lett.*, 33 doi:10.1029/2006GL026399.
 33. Worden, H. M., et al. (2007), Comparisons of Tropospheric Emission Spectrometer (TES) ozone profiles to ozonesondes: Methods and initial results, *J. Geophys. Res.*, 112, D03309, doi:10.1029/2006JD007258.
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 30. S.S. Kulawik, J. Worden, **A. Eldering**, K. Bowman, M.R. Gunson, et al., (2006), Implementation of Cloud Retrievals for Tropospheric Emission Spectrometer (TES) Atmospheric Retrievals - part I description and characterization of errors on trace gas retrievals, *J. Geophys. Res.*, 111, D24204, doi:1029/2005JD006733
 29. J. Worden et al, (2006) TES observations of the tropospheric HDO/H₂O ratio: estimation approach and characterization, *J. Geophys. Res.*, 111, D16309. doi:10.1029/2005JD006606
 28. M.C. Lampel et al, (2006) Diagnostics for initial Tropospheric Emissions Spectrometer (TES) Nadir Retrievals, *IEEE Transactions on Geoscience and Remote Sensing*, accepted
 27. K.W. Bowman et al, (2006) Tropospheric Emission Spectrometer: Retrieval Method and Error Analysis, *IEEE Transactions on Geoscience and Remote Sensing*, 44,1297-1307.
 26. S.S. Kulawik et al, (2006) TES atmospheric profile retrieval characterization: an orbit of simulated observations, *IEEE Transactions on Geoscience and Remote Sensing*, 1324-1333.
 25. S.A. Clough et al, (2006) Forward model and jacobians for Tropospheric Emission Spectrometer retrievals, *IEEE Transactions on Geoscience and Remote Sensing*, 44, 1308-1323
 24. E. J. Fetzer, B. Lambrigtsen, A. Eldering, H.H. Aumann, M.T. Chahine (2006) Biases in precipitable water vapor climatologies from AIRS and AMSR-E, *J. Geophys. Res.*, 111, D09S16, doi:10.1029/2005JD006598.
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 22. A. Gettelman, E.J. Fetzer, **A. Eldering**, F.W. Irion (2006) The global distribution of supersaturation in the upper troposphere from the atmospheric infrared sounder, *Journal of Climate*, 19, 6089-6103.
 21. H. M. Steele, **A. Eldering**, J. Lumpe (2006) Simulations of the accuracy in retrieving stratospheric aerosol effective radius, composition and loading from infrared spectral transmission measurements, *Applied Optics*, 45,2048-2061
 20. B.H. Kahn, K.N. Liou, S.-Y. Lee, E.F. Fishbein, S. DeSouza-Machado, **A. Eldering**, E.J. Fetzer, S.E. Hanson, L.L. Strow, (2005) Nighttime cirrus detection using Atmospheric Infrared Sounder window channels and total column water vapor, *Journal Of Geophysical Research*, 110, 10.1029/2004JD005430
 19. B.H. Kahn, **A. Eldering**, M. Ghil, S. Bordoni, and S.A. Clough (2004) Sensitivity analysis of cirrus cloud properties from high-resolution infrared spectra. Part I: Methodology and synthetic cirrus. *Journal Of Climate* 17, 4856-4870
 18. A. Gettelman, E.M. Weinstock, E.J., Fetzer, F.W. Irion, **A. Eldering**, E.C. Richard, K. H. Rosenlof, T. L. Thompson, J.V. Pittman, C. R. Webster, and R. L. Herman (2004) Validation of Aqua satellite data in the upper troposphere and lower stratosphere with in situ aircraft instruments, *Geophysical Research Letters* 31, Art. No. L22107
 17. **A. Eldering**, B.H. Kahn, F.P. Mills, F.W. Irion, H.M. Steele, and M.R. Gunson (2004) Vertical profiles of aerosol volume from high spectral resolution infrared transmission measurements: Results, *Journal Of Geophysical Research-Atmospheres* 109, Art. No. D20201
 16. A. Braverman, E. Fetzer, **A. Eldering**, S. Nittel, K. Leung, (2003) Semi-streaming Quantization for Remote Sensing Data, *Journal of Computational and Graphical Statistics*, vol. 2, 759-780.

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15. B.H. Kahn, **A. Eldering**, S.A. Clough, E.J. Fetzer, E. Fishbein, M. R. Gunson, S.Y. Lee, P.F. Lester, V.J. Realmuto (2003) Near micron-sized orographic cirrus cloud particles in high-resolution infrared spectra, *Geophysical Research Letters*, 10.1029/2003GL016909.
14. H.M. Steele, **A. Eldering**, B. Sen, G.C. Toon, (2003) The retrieval of stratospheric aerosol size and composition information from solar infrared transmission spectra, *Applied Optics* 42, 2140-2154..
13. F.W. Irion, M.R. Gunson, G.C. Toon, A.Y. Chang, **A. Eldering**, E. Mahieu, G.L. Manney, H.A. Michelsen, E.J. Moyer, M.J. Newchurch, G.B. Osterman, C.P. Rinsland, R.J. Salawitch, B. Sen, Y.L. Yung, and R. Zander, (2002) The Atmospheric Trace Molecule Spectroscopy Experiment (ATMOS) Version 3 data retrievals. *Applied Optics*, 42, 2140-2154.
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9. M. J. Kleeman, **A. Eldering**, and G. R. Cass (2001). Source contributions to visibility reduction in Los Angeles, *Environmental Science and Technology* 35, 4668-4674.
8. **A. Eldering** and R. Glasgow (1998). Short term particulate matter mass and aerosol size distribution measurements: Transient pollution episodes and bimodal aerosol mass distributions. *Atmospheric Environment*, **32**, 2017-2024.
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6. S. Hering, **A. Eldering**, and J. H. Seinfeld (1997). Bimodal character of accumulation mode aerosols in Southern California. *Atmospheric Environment*, **31**, 1-11.
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4. **A. Eldering**, J. R. Hall, K. J. Hussey, and G. R. Cass (1996). A visibility model based on satellite-generated landscape data. *Environmental Science and Technology*, **30**, 361-370.
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2. **A. Eldering**, S. M. Larson, J. R. Hall, K. J. Hussey, and G. R. Cass (1993). Development of an improved image processing based visibility model. *Environmental Science and Technology*, **27**, 626-635.
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