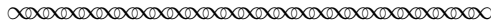


# DAVEN K. HENZE

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## Education

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University of Washington, Chemistry	B.S. (2001)
University of Washington, Chemical Engineering	B.S. (2001)
California Institute of Technology, Chemical Engineering	M.S. (2004)
California Institute of Technology, Chemical Engineering	Ph.D. (2007)

## Appointments

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- 2015- Associate Professor of Mechanical Engineering, University of Colorado, Boulder.
- 2009-2015 Assistant Professor of Mechanical Engineering, University of Colorado, Boulder.
- 2007-2009 Earth Institute Postdoctoral Fellow, Columbia University, NASA GISS.
- 2007 Postdoctoral Scholar, California Institute of Technology.

## Fellowships and Awards

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- 2017- **S.P. Chip and Lori Johnson Faculty Fellowship** *Department of Mechanical Engineering, CU Boulder*
- 2015 **Outstanding Research Award** *Department of Mechanical Engineering, CU Boulder*
- 2014 **Provost's Faculty Achievement Award**, *CU Boulder*
- 2013 **Dean's Junior Faculty Performance Award** *College of Engineering, CU Boulder*
- 2013 **Woodward Outstanding Faculty Award** *Department of Mechanical Engineering, CU Boulder*
- 2012-2015 **Charles C. Gates Faculty Fellow** *Department of Mechanical Engineering, CU Boulder*
- 2012 **Outstanding Research Award** *Department of Mechanical Engineering, CU Boulder*
- 2012 **Sullivan-Carlson Innovation in Education Award** *College of Engineering, CU Boulder*
- 2011 **Outstanding Undergraduate Education Award** *Department of Mechanical Engineering, CU Boulder*
- 2010 **NASA New Investigator Program Grant**
- 2009 **EPA Early Career Grant**
- 2007 **Columbia University Earth Institute Postdoctoral Fellowship**
- 2007 **William and Sonya Davidow Graduate Fellow** *Awarded to top graduate student in Environmental Science at Caltech.*
- 2002-2003 **William H. Corcoran Memorial Fellowship for Chemical Engineering** *Provided funding for first year of graduate studies.*

## Peer-reviewed Publications (Henze group members underlined>

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- 2020 Pfister, G. et al., A Multi-Scale Infrastructure for Chemistry and Aerosols - MUSIC *submitted*
- 2020 Z. Chen, S. M. Miller, J. Liu, **D. K. Henze**, D. N. Huntzinger, K. C. Wells, Exploring the environmental drivers of global terrestrial CO<sub>2</sub> fluxes inferred from OCO-2 and a geostatistical inverse model, *submitted*
- 2020 Bousserez, N., J. J. Guerrette, **D. K. Henze**, Enhanced parallelization of the incremental 4D-Var data assimilation algorithm using the Randomized Incremental Optimal Technique (RIOT), *in press*.
- 2020 Nakarmi, A., B. Sharma, U. S. Rajbhandari, A. Prajapati, C. S. Malley, J. C. I. Kuylenstierna, H. W. Vallack, **D. K. Henze**, A. Panday, Mitigating the impacts of air pollutants in Nepal and climate co-benefits: A scenario-based approach, *Air Qual. Atmos. & Health*, *in press*.
- 2019 Brown, K. E., **D. K. Henze**, K. R. Baker, J. B. Milford, Comparing health benefit calculations for alternative energy futures, *submitted*
- 2019 Jiang, J., K. Miyazaki, H. Worden, J. R. Worden, **D. K. Henze**, Z. Klimont, D. B. A. Jones, K. F. Boersma, H. A. C. D. van der Gon, H. Eskes, Decadal climate variability modulates tropospheric nitrogen oxides via stratosphere-troposphere exchange, *submitted*.
- 2019 Stanevich, I., D. B. A. Jones, K. Strong, M. Keller, **D. K. Henze**, R. J. Parker, H. Boesch, D. Wunch, J. Notholt, C. Petri, T. Warneke, R. Sussmann, M. Schneider, F. Hase, R. Kivi, N. M. Deutscher, V. A. Velasco, K. A. Walker, F. Deng, Characterizing model errors in chemical transport modelling of methane: Using GOSAT XCH<sub>4</sub> data with weak constraint four-dimensional variational data assimilation, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-786>, *in review*.
- 2019 Wang, Y., J. Wang, X. Xu, **D. K. Henze**, Z. Qu, Inverse modeling of SO<sub>2</sub> and NO<sub>x</sub> emissions over China using multi-sensor satellite data: 1. formulation and sensitivity analysis, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-879>, *in review*.
- 2019 Wang, Y., J. Wang, M. Zhou, **D. K. Henze**, C. Ge, W. Wang, Inverse modeling of SO<sub>2</sub> and NO<sub>x</sub> emissions over China using multi-sensor satellite data: 2. Downscaling techniques for air quality analysis and forecasts, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-880>, *in review*.
- 2019 Zhao, S., M. G. Russell, A. Hakami, S. L. Capps, M. D. Turner, **D. K. Henze**, P. B. Percell, J. Resler, H. Shen, A. G. Russell, A. Nenes, A. J. Pappin, S. L. Napelenok, J. O. Bash, K. M. Fahey, G. R. Carmichael, C. O. Stanier, C. O., T. Chai, A Multiphase CMAQ Version 5.0 Adjoint, *Geosci. Model Dev. Discuss.*, <https://doi.org/10.5194/gmd-2019-287>, *in review*.
- 2019 Lyu, C., S. L. Capps, A. Hakami, S. Zhao, J. Resler, G. R. Carmichael, A. Sandu, A. G. Russell, T. Chai, **D. K. Henze**, Elucidating emissions control strategies for ozone to protect human health and public welfare within the continental United States, *Environ. Res. Lett.*, 14, 124093, <https://doi.org/10.1088/1748-9326/ab5e05>.
- 2019 Nault, B. A., D. S. Jo, B. C. McDonald, P. Campuzano-Jost, D. A. Day, W. Hu, J. C. Schroder, J. Allan, D. R. Blake, M. R. Canagaratna, H. Coe, M. M. Coggon, P. F. DeCarlo, G. S. Diskin, R. Dunmore, F. Flocke, A. Fried, J. B. Gilman, G. Gkatzelis, J. F. Hamilton, T. F. Hanisco, P. L. Hayes, **D. K. Henze**, A. Hodzic, J. Hopkins, M. Hu, L. G. Huey, B. T. Jobson, W. C. Kuster, A. Lewis, M. Li, J. Liao, M. Omar Nawaz, I. B. Pollack, J. Peischl, B. Rappenglück, C. E. Reeves, D. Richter, J. M. Roberts, T. B. Ryerson, M. Shao, J. M. Sommers, J. Walega, C. Warneke, P. Weibring, G. M. Wolfe, D. E. Young, B. Yuan, Q. Zhang, J. A. de Gouw, and J. L. Jimenez, Anthropogenic secondary organic aerosols contribute substantially to air pollution mortality, *submitted*.
- 2019 Chen, C., O. Dubovik, **D. K. Henze**, M. Chin, T. Lapyonak, G. L. Schuster, F. Ducos, D. Fuertes, P. Litvinov, L. Li, A. Lopatin, Q. Hu, B. Torres, Constraining global aerosol emissions using POLDER/PARASOL satellite remote sensing observations, *Atmos. Chem. Phys.*, 19, 14585–14606, <https://doi.org/10.5194/acp-19-14585-2019>.

- 2019 Zhao, H., Q. Zhang, S. J. Davis, X. Li, Y. Liu, G. Geng, M. Li, B. Zheng, H. Huo, L. Zhang, **D. K. Henze**, K. He, Inequality of household consumption and air pollution deaths in China, *Nature Com.*, 10, 10, 4337, <https://doi.org/10.1038/s41467-019-12254-x>.
- 2019 Philip, S., M. S. Johnson, C. Potter, V. Genovesse, D. F. Baker, K. D. Haynes, **D. K. Henze**, J. Liu, B. Poulter, Prior biosphere model impact on global terrestrial CO<sub>2</sub> fluxes estimated, *Atmos. Chem. Phys.*, 19, 13267–13287, <https://doi.org/10.5194/acp-19-13267-2019>.
- 2019 Diao, M., T. Holloway, S. Choi, S. M. O'Neill, M. Z. Al-Hamdan, A. van Donkelaar, R. V. Martin, X. Jin, A. M. Fiore, **D. K. Henze**, F. Lacey, P. L. Kinney, F. Freedman, N. K. Larkin, Y. Zou, A. Vaidyanathan, Methods, availability, and applications of PM<sub>2.5</sub> exposure estimates derived from ground measurements, satellite, and atmospheric models, *J. A. & W. M. A.*, <https://doi.org/10.1080/10962247.2019.1668498>.
- 2019 Anenberg, S. C., P. Achakulwisut, M. Brauer, D. Moran, J. S. Apte, **D. K. Henze**, Mortality from particulate matter in cities worldwide: a challenge and an opportunity for co-benefits from low carbon development, *Sci. Reports*, 9 (11552), <https://doi.org/10.1038/s41598-019-48057-9>.
- 2019 Yi, K., J. Meng, H. Yang, C. He, **D. K. Henze**, J. Liu, D. Guan, Z. Liu, L. Zhang, X. Zhu, Y. Cheng, S. Tao, The cascade of global trade to large climate forcing over the Tibetan Plateau glaciers, *Nature Com.*, 10, 3281, <https://doi.org/10.1038/s41467-019-10876-9>.
- 2019 Zhang, X., D. B. A. Jones, M. Keller, T. W. Walker, Z. Jiang, **D. K. Henze**, H. M. Worden, A. E. Bourassa, D.A. Degenstein, Y. J. Rochon, S. Wofsy, Quantifying emissions of CO and NO<sub>x</sub> using observations from MOPITT, OMI, TES, and OSIRIS, *J. Geophys. Res.*, 124, 1170–1193, <https://doi.org/10.1029/2018JD028670>.
- 2019 Qu, Z., **D. K. Henze**, N. Theys, J. Wang, W. Wang, Hybrid mass balance / 4D-Var joint inversion of NO<sub>x</sub> and SO<sub>2</sub> emissions in East Asia, *J. Geophys. Res.*, 124, 8203–8224, <https://doi.org/10.1029/2018JD030240>.
- 2019 Qu, Z., **D. K. Henze**, C. Li, N. Theys, Y. Wang, J. Wang, W. Wang, J. Han, C. Shim, R. R. Dickerson, X. Ren, SO<sub>2</sub> emissions estimated using OMI SO<sub>2</sub> retrievals (2005-2017), *J. Geophys. Res.*, 124, 8336–8359, <https://doi.org/10.1029/2019JD030243>.
- 2019 Li, C., R. V. Martin, M. W. Shephard, M. J. Cooper, J. Kaiser, C. J. Lee, L. Zhang, **D. K. Henze**, Assessing the iterative finite difference mass balance and 4D-Var methods to retrieve ammonia emissions over North America using synthetic Cross-track Infrared Sounder Observations, *J. Geophys. Res.*, 124, 4222–4236. <https://doi.org/10.1029/2018JD030183>.
- 2019 Cui, Y., **D. K. Henze**, J. Brioude, W. M. Angevine, Z. Liu, N. Bousserez, J. Guerrette, S. A. McKeen, J. Peischl, B. Yuan, T. Ryerson, G. Frost, M. Trainer, Comprehensive inversion estimates of lognormally distributed methane emission fluxes from the Haynesville–Bossier oil and gas production region using airborne measurements, *J. Geophys. Res.*, 124, 3520–3531, <https://doi.org/10.1029/2018JD029489>.
- 2019 Anenberg, S., J. Miller, **D. K. Henze**, R. Minjares, P. Achakulwisut, The global burden of transportation tailpipe emissions on air pollution-related mortality in 2010 and 2015, *Environ. Res. Lett.*, 14, 9, <https://doi.org/10.1088/1748-9326/ab35fc>.
- 2019 Choi, J., R. J. Park, H.-M. Lee, S. Lee, D. S. Jo, J. I. Jeong, **D. K. Henze**, J.-H. Woo, S.-J. Ban, M.-D. Lee, C.-S. Lim, M.-K. Park, H. J. Shin, S. Cho, D. Peterson, C.-K. Song, Impacts of local vs. trans-boundary emissions from different sectors on PM<sub>2.5</sub> exposure in South Korea during the KORUS-AQ campaign, *Atmos. Environ.*, 203, 196–205, <https://doi.org/10.1016/j.atmosenv.2019.02.008>.
- 2019 Hakim, Z. Q., S. Archer-Nicholls, G. Beig, G. A. Folberth, K. Sudo, N. L. Abraham, S. Ghude, **D. K. Henze**, A.T. Archibald, Evaluation of tropospheric ozone and ozone precursors in simulations from the HTAP II and CCMII model intercomparisons – a focus on the Indian Subcontinent, *Atmos. Chem. Phys.*, 19, 6437–6458, <https://doi.org/10.5194/acp-19-6437-2019>.

- 2018 Jiang, Z., McDonald, B. C., H. Worden, J. R. Worden, K. Miyazaki, Z. Qu, **D. K. Henze**, D. B. A. Jones, A. F. Arellano, E. V. Fischer, L. Zhu, K. F. Boersma, Unexpected slowdown of US pollutant emission reduction in the past decade, *Proc. Nat. Acad. Soc.*, 115(20), 5099–5104, doi:10.1073/pnas.1801191115.
- 2018 Shim, C., J. Han, **D. K. Henze** and T. Yoon, Identifying local anthropogenic CO<sub>2</sub> emissions with satellite retrievals: a case study in South Korea, *Int. J. Remote Sensing*, 1-19, doi:10.1080/01431161.2018.1523585.
- 2018 Anenberg, S., **D. K. Henze**, V. Tinney, P. Kinney, W. Raich, N. Fann, J. Kuylenstierna, C. Malley, H. Roman, L. Lamsal, B. Duncan, R. V. Martin, A. van Donkelaar, M. Brauer, Estimates of the global burden of ambient PM<sub>2.5</sub>, ozone, and NO<sub>2</sub> on asthma incidence and emergency room visits, *Environ. Health Perspect.*, 126(10), <https://doi.org/10.1289/EHP3766>.
- 2018 Chen, C., O. Dubovik, **D. K. Henze**, T. Lapyonak, M. Chin, F. Ducos, P. Litvinov, X. Huang, L. Li, Retrieval of desert dust and carbonaceous aerosol emissions over Africa from PARASOL/GRASP observations, *Atmos. Chem. Phys.*, 18, 12551-12580, <https://doi.org/10.5194/acp-18-12551-2018>.
- 2018 Cao, H., T.-M. Fu, L. Zhang, **D. K. Henze**, C. Chan Miller, C. Lerot, G. González Abad, I. De Smedt, Q. Zhang, M. van Roozendaal, K. Chance, J. Li, J. Y. Zheng, Y. H. Zhao, Adjoint inversion of Chinese non-methane volatile organic compound emissions using space-based observations of formaldehyde and glyoxal, *Atmos. Chem. Phys.*, 18, 15017-15046, <https://doi.org/10.5194/acp-18-15017-2018>.
- 2018 Dong, X, J. Fu, Q. Zhu, J. Sun, J. Tan, T. Keating, T. Sekiya, K. Sudo, L. Emmons, S. Tilmes, J. E. Jonson, M. Schulz, H. Bian, M. Chin, Y. Davila, **D. Henze**, T. Takemura, A. M. Benedictow, Long-range transport impacts on surface aerosol concentrations and the contributions to haze events in China: an HTAP2 multi-model study, *Atmos. Chem. Phys.*, 18, 15581-15600, <https://doi.org/10.5194/acp-18-15581-2018>.
- 2018 Jonson, J. E., M. Schulz, L. Emmons, J. Flemming, **D. K. Henze**, K. Sudo, M. Tronstad Lund, M. Lin, A. Benedictow, B. Koffi, F. Dentener, T. Keating, R. Kivi, Y. Davila, The effects of intercontinental emission sources on European air pollution levels, *Atmos. Chem. Phys.*, 18, 13655-13672, <https://doi.org/10.5194/acp-18-13655-2018>.
- 2018 Jaffe, D., O. R. Cooper, A. M. Fiore, B. H. Henderson, G. S. Tonnesen, A. G. Russell, **D. K. Henze**, A. O. Langford, M. Lin, T. Moore, Scientific assessment of background ozone over the U.S.: implications for air quality management, *Elem. Sci. Anth.*, 6, 56, <https://doi.org/10.1525/elementa.309>.
- 2018 Liang, C., J. J. West, R. A. Silva, H. Bian, M. Chin, F. J. Dentener, Y. Davila, L. Emmons, G. Folberth, J. Flemming, **D. K. Henze**, U. Im, J. E. Jonson, T. Kucsera, T. J. Keating, M. T. Lund, A. Lenzen, M. Lin, R. B. Pierce, R. J. Park, X. Pan, T. Sekiya, K. Sudo, T. Takemura, HTAP2 multi-model estimates of premature human mortality due to intercontinental transport of air pollution, *Atmos. Chem. Phys.*, 18, 10497-10520, <https://doi.org/10.5194/acp-18-10497-2018>.
- 2018 Turnock, S, O. Wild, F. Dentener, Y. Davila, L. Emmons, J. Flemming, G. Folberth, **D. K. Henze**, J. Jonson, T. Keating, S. Kengo, M. Lin, M. Lund, S. Tilmes, F. O'Connor, The impact of future emission policies on tropospheric ozone using a parameterised approach, *Atmos. Chem. Phys.*, 18, 8953-8978, <https://doi.org/10.5194/acp-18-8953-2018>.
- 2018 Galmarini, S., I. Kioutsioukis, E. Solazzo, A. Balzarini, R. Baro, R. Bellasio, A. Benedictow, R. Bianconi, J. Bieser, J. Brandt, J. Christensen, A. Colette, G. Curci, Y. Davila, X. Dong, J. Flemming, X. Francis, A. Fraser, J. Fu, **D. K. Henze**, C. Hogrefe, U. Im, M. G. Vivanco, P. Jiménez-Guerrero, J. E. Jonson, N. Kitwiroon, A. Manders, R. Mathur, G. Pirovano, L. Pozzoli, M. Prank, M. Schultz, R. Sokhi, K. Sudo, P. Tuccella, T. Takemura, T. Sekiya, A. Unal, Two-scale multi-model ensemble: Is a hybrid ensemble of opportunity telling us more? *Atmos. Chem. Phys.*, 18, 8727-8744, <https://doi.org/10.5194/acp-18-8727-2018>.
- 2018 Tan, J., J. S. Fu, F. Dentener, J. Sun, S. Tilmes, K. Sudo, J. Flemming, J. E. Jonson, S. Gravel, H. Bian, Y. Davila, **D. K. Henze**, M. T. Lund, T. Kucsera, T. Takemura, T. Keating, Multi-model study of HTAP

II on sulphur and nitrogen deposition, *Atmos. Chem. Phys.*, 18, 6847–6866, <https://doi.org/10.5194/acp-18-6847-2018>.

- 2018 Wells, K. C., D. B. Millet, N. Bousseréz, **D. K. Henze**, T. J. Griffis, S. Chaliyakunnel, E. J. Dlugokencky, E. Saikawa, G. Xiang, R. G. Prinn, S. O'Doherty, D. Young, R. F. Weiss, G. S. Dutton, J. W. Elkins, P. B. Krummel, R. Langenfelds, L. P. Steele, Top-down constraints on global N<sub>2</sub>O emissions at optimal resolution: application of a new dimension reduction technique, *Atmos. Chem. Phys.*, 18, 735–756, <https://doi.org/10.5194/acp-18-735-2018>.
- 2018 Zhang, L., Y. Chen, Y. Zhao, Y. **D. K. Henze**, L. Zhu, Y. Song, F. Paulot, X. Liu, Y. Pan, B. Huang, Agricultural ammonia emissions in China: reconciling bottom-up and top-down estimates, *Atmos. Chem. Phys.*, 18, 339–355, <https://doi.org/10.5194/acp-18-339-2018>.
- 2018 Sadighi, K., E. Coffey, A. Polidori, B. Feenstra, Q. Lv, **D. K. Henze**, M. Hannigan, Intra-urban spatial variability of surface ozone and carbon dioxide in Riverside, CA: viability and validation of low-cost sensors, *Atmos. Meas. Tech.*, 11, 1777–1792, <https://doi.org/10.5194/amt-11-1777-2018>.
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- 2017 Lacey F. G., E. A. Marais, **D. K. Henze**, C. J. Lee, A. van Donkelaar, R. V. Martin, M. P. Hannigan, C. Wiedinmyer, Improving present day and future estimates of anthropogenic sectoral emissions and the resulting air quality impacts in Africa, *Faraday Discuss.*, 200, 397–412.
- 2017 Cui, Y., J. Brioude, W. M. Angevine, J. Peischl, S. A. McKeen, S-W. Kim, J. Neuman, **D. K. Henze**, N. Bousseréz, M. Fischer, S. Jeong, H. Michelsen, R. P. Bambha, Z. Liu, G. W. Santoni, B. Duabe, E. Kort, G. Frost, T. B. Ryerson, S. C. Wofsy, M. Trainer., Top-down estimate of methane emissions in California using a mesoscale inverse modeling technique: The San Joaquin Valley, *J. Geophys. Res. Atmos.*, 122, 3686–3699, doi:10.1002/2016JD026398.
- 2017 Malley, C. S., J. C. I. Kuylenstierna, H. W. Vallack, **D. K. Henze**, H. Blencowe, and M. R. Ashmore, Preterm birth associated with maternal fine particulate matter exposure: A global, regional and national assessment, *Environ. Int.*, 101, 173–182, doi:10.1016/j.envint.2017.01.023.
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- 2017 Anenberg, S., J. Miller, R. Minjares, L. Du, **D. K. Henze**, F. Lacey, C. Malley, L. Emberson, V. Franco, Z. Klimont, C. Heyes, Impacts and mitigation of excess diesel NO<sub>x</sub> emissions in 11 major vehicle markets, *Nature*, 545, 467–471, doi:10.1038/nature22086.
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- 2017 Xu, J., R. V. Martin, A. Morrow, S. Sharma, L. Huang, W. R. Leitch, J. Burkart, H. Schulz, M. Zanutta, M. D. Willis, **D. K. Henze**, C. J. Lee, A. B. Herber, J. P. D. Abbatt, Source attribution of Arctic black carbon constrained by aircraft and surface measurements, *Atmos. Chem. Phys.*, 17, 11971–11989, <https://doi.org/10.5194/acp-17-11971-2017>.

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- 2009 **Henze, D. K.**, J. H. Seinfeld, and D. T. Shindell, Inverse modeling and mapping U.S. air quality influences of inorganic PM<sub>2.5</sub> precursor emissions with the adjoint of GEOS-Chem, *Atmos. Chem. Phys.*, *9*, 5877–5903.
- 2009 Zhang, L., D. J. Jacob, M. Kopacz, **D. K. Henze**, and D. A. Jaffe, Intercontinental source attribution of ozone pollution at western U.S. sites using an adjoint method, *Geophys. Res. Lett.*, *36*, L11810, doi:10.1029/2009GL037950.
- 2009 Kopacz, M., D. Jacob, **D. K. Henze**, C. L. Heald, D. G. Streets, and Q. Zhang, A comparison of analytical and adjoint Bayesian inversion methods for constraining Asian sources of CO using satellite (MOPITT) measurements of CO columns, *J. Geophys. Res.*, *114*, D04305, doi:10.1029/2007JD009264.
- 2009 Pye, H. O. T., J. H. Seinfeld, H. Liao, S. Wu, L. J. Mickely, D. J. Jacob, and **D. K. Henze**, Effect of changes in climate and emissions on future sulfate-nitrate-ammonium aerosol levels in the United States, *J. Geophys. Res.*, *114*, D01205, doi:10.1029/2008JD010701.
- 2009 Eller, P., K. Singh, A. Sandu, K. Bowman, **D. K. Henze**, and M. Lee, Implementation and evaluation of an array of chemical solvers in a global chemical transport model, *Geosci. Mod. Devel.*, *2*, 185–207.
- 2008 Fu, T.-M., D. J. Jacob, F. Wittrock, J. P. Burrows, M. Vrekoussis, and **D. K. Henze**, Global budgets of atmospheric glyoxal and methylglyoxal, and implications for formation of secondary organic aerosols, *J. Geophys. Res.*, *113*, D15303, doi:10.1029/2007JD009505.
- 2008 **Henze, D. K.**, J. H. Seinfeld, N. G. Ng, J. H. Kroll, T.-M. Fu, D. J. Jacob, and C. L. Heald, Global modeling of secondary organic aerosol formation from aromatic hydrocarbons: High- vs low-yield pathways, *Atmos. Chem. Phys.*, *8*, 2405–2420.
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- 2007 **Henze, D. K.**, A. Hakami and J. H. Seinfeld, Development of the adjoint of GEOS-Chem, *Atmos. Chem. Phys.*, *7*, 2413–2433.
- 2007 Hakami, A., **D. K. Henze**, J. H. Seinfeld, K. Singh, A. Sandu, S. Kim, D. Byun, and Q. Li, The adjoint of CMAQ, *Environ. Sci. Technol.*, *41*(22), 7807–7818, doi:10.1021/es070944p.
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- 2006 **Henze, D. K.**, and J. H. Seinfeld, Global secondary organic aerosol formation from isoprene oxidation, *Geophys. Res. Lett.*, *33*, L09812, doi:10.1029/2006GL025976.
- 2005 Sandu, A., W. Liao, G. R. Carmichael, **D. K. Henze**, and J. H. Seinfeld, Inverse modeling of aerosol dynamics using adjoints: Theoretical and numerical considerations, *Aerosol Sci. Tech.*, *39*, 677–694, doi:10.1080/02786820500182289.

- 2005 Hakami, A., **D. K. Henze**, J. H. Seinfeld, T. Chai, Y. Tang, G. R. Carmichael, and A. Sandu, Adjoint inverse modeling of black carbon during the Asian Pacific Regional Aerosol Characterization Experiment, *J. Geophys. Res.*, 110, D14301, doi:10.1029/2004JD005671.
- 2004 **Henze, D. K.**, J. H. Seinfeld, W. Liao, A. Sandu, and G. R. Carmichael, Inverse modeling of aerosol dynamics: Condensational growth, *J. Geophys. Res.*, 109, D14201, doi:10.1029/2004JD004593.
- 2004 Tantillo, D. J., R. Hoffmann, K. N. Houk, P. M. Warner, E. C. Brown, and **D. K. Henze**, Extended barbaralanes: Sigmatropic shiftamers or alpha-polyacenes? *J. Am. Chem. Soc.*, 126, 13, 4256-4263.
- 2002 Brown, E. C., **D. K. Henze**, and W. T. Borden, Are 1,5-disubstituted semibullvalenes that have C-2v equilibrium geometries necessarily bishomoaromatic?, *J. Am. Chem. Soc.*, 124, 50, 14977-14982.

## Books and additional publications

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- 2016 **Henze, D. K.**, *Source-apportionment methods*, in Using Satellite Data for Air Quality Management, Ed. M. Estes, <https://aqast.wisc.edu/source-apportionment-methods.htm>
- 2015 Bash, J. O., J. T. Walker, M. W. Shephard, K. E. Cady-Pereira, **D. K. Henze**, D. Schwede, L. Zhu, E. J. Cooter, Modeling reactive nitrogen in North America: recent developments, observational needs and future directions, *EM Magazine*, Sep.
- 2014 Mickley, L. J., A. M. Fiore, and **D. K. Henze**, Interactions between Climate Change and U.S. Air Quality, *Environ. Manag.*, 30, February.
- 2010 Napelenok, S. L., J. Arnold, K. M. Foley, and **D. K. Henze**, Regional Background Fine Particulate Matter, *Air pollution modeling and its application XX*, NATO Science for Peace and Security Series B-Physics and Biophysics, Springer, 277-280.
- 2002 Epiotis, N. D. and **D. K. Henze**, The Periodic Table, *Encyclopedia of Physical Science and Technology*, Academic Press, R. A. Meyers.

## Professional Societies and Service

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- 2019 Co-Chair session *Data Assimilation and Inverse Modeling of the Atmospheric Composition Applications*, AGU Fall Meeting, San Francisco, CA.
- 2019 Co-Chair session *Systems Approach to a Clean Environment*, EU-US, National Academy of Science Frontiers of Engineering Symposium, Stockholm, Sweden, Nov 18-20.
- 2019 Co-Chair sessions *Data Assimilation and Inverse Modeling* and *New and Innovative Modeling Techniques: Machine Learning, New Computational Methods/GPUs, Exposure Estimate Improvement, Data Simulation*, Meteorology and Climate - Modeling for Air Quality (MAC-MAQ), Davis, CA, Sep 11 - 13.
- 2019- Analysis of Emissions Using Observations (AMIGO) Steering Committee
- 2019- Multi-scale Chemistry Modeling (MUSICA) Advisory Panel Member and Evaluation and Data Assimilation Working Group Co-Chair.
- 2018 Co-Chair session *Data Assimilation and Inverse Modeling of the Atmospheric Composition Applications*, AGU Fall Meeting, Washington D. C.
- 2017 Co-Chair session *Data Assimilation and Inverse Modeling of the Atmospheric Composition Applications*, AGU Fall Meeting, New Orleans, LA.
- 2017- NASA Earth Science Advisory Committee
- 2016 Co-Chair session *Data Assimilation and Inverse Modeling of the Atmospheric Composition Applications*, AGU Fall Meeting, San Francisco, CA.

- 2015- US EPA Clean Air Scientific Advisory Committee (CASAC) for secondary SO<sub>x</sub>/NO<sub>x</sub> standards.
- 2015 Co-Chair session *Data Assimilation and Inverse Modeling for Atmospheric Composition Applications*, AGU Fall Meeting, San Francisco, CA.
- 2014 Co-Chair session *Energy and Climate*, CMAS Conference, Chapel Hill, NC, Oct 27 - 29.
- 2014 Participant in WHO Expert Workshop on Integrated Health Assessment Tools, Bonn, May 11 - 14.
- 2012- Work Package Lead 2.6: *Comparison of source-receptor and source-attribution methods*, United Nations Task Force on Hemispheric Transport of Atmospheric Pollutants (HTAP).
- 2011 Organizing Committee and session Co-Chair (Aerosol Thermodynamics and Dynamics), International Aerosol Modeling Algorithms Conference, Davis, CA, Nov 30 - Dec 2.
- 2011-2018 Co-chair Emissions Working Group for GEO-CAPE Science Team.
- 2010 Co-Chair session *Measuring Earth-Atmosphere Fluxes and Tropospheric Composition from Space*, AGU Fall Meeting, San Francisco, CA.
- 2009- GEOS-Chem Adjoint Model Scientist and member of GEOS-Chem Steering Committee.
- 2009, 2011, 2013, 2015 Co-Chair adjoint modeling sessions at the GEOS-Chem Users' Meetings, Cambridge, MA.
- 2005- Member of American Geophysical Union (AGU).

## Department Service

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- 2018- Mechanical Engineering Undergraduate Committee
- 2018 Fluid Dynamics Preliminary Exam Committee
- 2017-2018 College of Engineering Search Committee (Robotics and Controls)
- 2017-2019 Mechanical Engineering Personnel Committee
- 2017 Fluid Dynamics Preliminary Exam Committee
- 2015-2016 Mechanical Engineering Associate Chair and Undergraduate Program Chair
- 2015 Staff Search Committee Chair (Instructor)
- 2015 Staff Search Committee Chair (Undergraduate Advisor)
- 2015 Fluid Dynamics Preliminary Exam Committee
- 2014-2016 Mechanical Engineering Executive Committee
- 2014 Faculty Search Committee (Fluids)
- 2014 Staff Search Committee (Undergraduate Advisor)
- 2013 Staff Search Committee (Financial Manager)
- 2012-2015 Chair of Undergraduate Student Affairs and Professionalism Subcommittee
- 2012 Fluid Dynamics and Air Quality Preliminary Exam Committees
- 2012 Faculty Search Committee (Fluids)
- 2011 Fluid Dynamics and Air Quality Preliminary Exam Committees
- 2010-2012 Student Affairs and Professionalism Subcommittee
- 2010 Undergraduate Curriculum and Assessment Subcommittee
- 2010 Fluid Dynamics Preliminary Exam Committee
- 2009 Graduate Committee

## Research Advisors

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- 2007-2009 Earth Institute Postdoctoral Fellow, Columbia University, NASA GISS. Advisor: Dr. Drew Shindell.
- 2007 Postdoctoral Scholar, California Institute of Technology. Advisor: Prof. John H. Seinfeld.
- 2007 Ph.D., California Institute of Technology. Advisor: Prof. John H. Seinfeld.  
Additional Thesis Committee members: Prof. Richard Flagan (Caltech), Prof. Tapio Schneider (Caltech), Prof. Qinbin Li (UCLA).

## Research Mentees

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- Postdocs Dr. Hansen Cao
- PhD Omar Nawaz  
Jinkyul Choi  
Colin Harkins  
Chia-Hua Hsu
- BS Mohammed Alwakeel
- Staff Yanko Davila, Scientific Programmer, part-time  
Colin Lee, Research Scholar, part-time  
Corey Trujillo, System Admin, part-time
- Alumni Dr. Zhen Qu (Ph.D. 2019, now a Postdoc at Harvard)  
Dr. Nicolas Bousserez (Postdoc 2011-2018, now a research scientist at ECMWF)  
Dr. Azadeh Keshavarzmohammadian (PhD 2018)  
Dr. Jonathan Guerrette (Ph.D. 2016, next a Postdoc at NOAA)  
Dr. Sojin Lee (Postdoc 2017 - 2018)  
Dr. Shannon Capps (Postdoc 2014 - 2016, co-advised with J. Milford, next an Assistant Professor at Drexel University)  
Dr. Forrest Lacey (Ph.D. 2016, next a Postdoc at NCAR)  
Dr. Hyungmin Lee (Ph.D. 2016)  
Dr. Kristen Brown (Ph.D. 2016, next a Postdoc at US EPA)  
Dr. Li Zhang (Postdoc 2012 - 2016, next a Research Scientist at NOAA)  
Dr. Kateryna Lapina (Postdoc 2011 - 2015, co-advised with J. Milford)  
Dr. Brian Meland (Postdoc 2011-2013, next at CU Denver)  
Dr. Gill-Ran Jeong (Postdoc 2010-2012, next a Research Scientist at KIAPS)  
Dr. Matthew Turner (Ph.D. 2015, next a Postdoc at NRL)  
Dr. Juliet (Lye) Zhu (Ph.D. 2014, next a Postdoc at CSU)  
Ping Kang (visiting Ph.D. fellow from Wuhan University, 2014-2015)  
Brigitte Rooney (Undergraduate researcher, Discovery Learning Apprentices, 2012-2013, next a graduate student at Caltech)  
Carl Hussman (Scientific programmer 2013-2014)  
Joseph Parks (Undergraduate researcher, 2012-2014)  
Andre Perkins (BS, SOARS Protege, 2012-2013, now a graduate student at University of Washington)  
Alexander J. Turner (Undergraduate researcher and Discovery Learning Apprentice 2010-2012, next a graduate student at Harvard University)  
Steven Vogel (Undergraduate researcher 2012, next a graduate student at Stanford University)
- Other Shanon Reckinger, PhD Comprehensive Exam 2010, PhD Committee 2011  
Dave Makhija, PhD Comprehensive Exam 2010, PhD Committee 2013  
Christopher Lang, PhD Preliminary Exam 2010  
Sebastian Kreissl, PhD Committee 2011  
Ingrid Ulbrich, PhD Committee 2011

Carlos Hernan Villanueva, PhD Preliminary Exam 2012  
 Eric Brown-Dymkoski, MS Committee 2012, PhD Preliminary Exam 2013, PhD Comprehensive Exam 2014, PhD Committee 2016  
 Xiaoguang Xu, U. of Nebraska Lincoln, PhD Comprehensive Exam 2012, PhD Committee 2015  
 Berkeley Almand, PhD Preliminary Exam 2012, PhD Comprehensive Exam 2014  
 Mingjie Xie, PhD Comprehensive Exam 2012, PhD Committee 2013  
 Nick Clements, PhD Comprehensive Exam 2012, PhD Committee 2013  
 Ryan King, PhD Preliminary Exam 2013, PhD Comprehensive Exam 2015  
 Nurlybek Kasimov, PhD Comprehensive Exam 2014, PhD Committee 2016  
 Spencer Alexander, MS Committee 2014  
 Ji Peng, PhD Comprehensive Exam 2014, PhD Committee 2015  
 Birendra Adhikari, PhD Comprehensive Exam 2014, PhD Committee 2015  
 Scott Wieland, PhD Preliminary Exam 2014, PhD Comprehensive Exam 2017, PhD Committee 2017  
 Katherine Smith, PhD Preliminary Exam 2014  
 Collin J. Bezrouk, PhD Comprehensive Exam 2015, PhD Committee 2016  
 Irene Dedoussi, MIT, PhD Exam Proposal 2016, PhD Committee 2018  
 Luke Engvall, PhD Comprehensive Exam 2017, PhD Committee 2018  
 Rene Nsanzeza, PhD Comprehensive Exam 2017, PhD Committee 2018  
 Jason Christopher, PhD Comprehensive Exam 2017  
 Michaela Farr, Masters Thesis Committee 2017  
 Yi Wang, U. Iowa, PhD Comprehensive Exam 2018, PhD Committee 2019  
 Cheng Chen, U. Lille, PhD Committee 2018  
 Lie Li, U. Lille, PhD Committee 2018  
 Jake Thorson, MS Committee 2019  
 Parker Case, PhD Comprehensive Exam 2019  
 Olga Doronina, PhD Comprehensive Exam 2019  
 Nathan Malarich, PhD Comprehensive Exam 2020  
 Skyler Kern, PhD Preliminary Exam 2020

## Mentoring and Outreach

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2019 Interview for National Academy of Science “Sciences Sessions” podcast series for PNAS, Feb 17.  
 2014 Supported Dr. Lapina’s creation of two ozone gardens (one at NCAR, one on campus)  
 2014 Alicia Camacho, SOARS Protege, Research Mentee  
 2013-2014 Michael Seltzer, summer student, Research Mentee  
 2013 Judge, SOARS Protege Research Colloquium, NCAR, Aug 29  
 2012-2013 Andre Perkins, SOARS Protege, Research Mentee  
 2010 Raymond Detweiler, SOARS Protege, Writing Mentee  
 2009 Victoria Dorr, McNair Scholar, Research Mentee

## Previous Research Grants

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**Observations, trends and health impacts for air quality in African urbanization hotspots** \$21,367, Patrick L. Kinney (PI), Henze (Co-PI).

- Columbia Univ. Earth Institute CCI; Robin DeJong (robin@ei.columbia.edu)
- 09/01/2008 – 09/01/2010
- Academic / summer / total months per year: 1/0/1



**Inverse modeling and attainment analysis for improved decision support of PM<sub>2.5</sub> air quality regulations** \$1,201,007,

Henze (PI), Patrick Kinney (Co-PI).

- NASA ROSES NNH08ZDA001N-Decisions; Lawrence Friedl (LFriedl@nasa.gov)
- 09/01/2009 – 08/30/2015
- Academic / summer / total months per year: 0/1/1

**Regional effects of climate change on energy management and climate impact of potential changes in transportation sector emissions** \$279,000, Drew T. Shindell (PI), (Henze is Collaborator, nonfunded).

- NASA ROSES NNH08ZDA001N-Decisions; Lawrence Friedl (LFriedl@nasa.gov)
- 01/01/2009 – 12/31/2012
- Academic / summer / total months per year: 0.5/0/0.5

**Further development, application, and evaluation of multi-phase adjoint sensitivity analysis for multidimensional air quality modeling** \$179,840, Amir Hakami (PI), (Henze is Consultant, \$25,000).

- American Petroleum Institute; Dan Baker (dan.baker@shell.com)
- 10/01/2009 – 09/31/2011
- Academic / summer / total months per year: 0/0.5/0.5

**Constraining ammonia emissions and PM<sub>2.5</sub> control efficiencies with a new combination of satellite data, surface observations and adjoint modeling techniques** \$249,942, Henze (PI).

- EPA STAR EPA-G2009-STAR-D2; Sherri Hunt (hunt.sherri@epa.gov)
- 01/05/2010 – 04/30/2014
- Academic / summer / total months per year: 0/1/1

**Constraining local to global sources and distributions of tropospheric ammonia through model assimilation of satellite and in situ observations** \$485,162, Henze (PI).

- NASA ROSES NNH09ZDA001N-ACMA; D. Considine (David.B.Considine@nasa.gov)
- 03/17/2010 – 03/16/2015
- Academic / summer / total months per year: 0/1/1

**Collaborative research: Quantifying the sensitivity of antarctic snowpack nitrate to primary NO<sub>x</sub> sources and photodenitrification: Implications for the ice core record** \$443,640, Becky Alexander (PI), (Henze is Co-PI, \$116,440).

- NSF ANT - OPP; Peter Milne (pmilne@nsf.gov)
- 05/01/2010 – 04/30/2012
- Academic / summer / total months per year: 0/1/1

**Development of the CO/CO<sub>2</sub> adjoint for GEOS-Chem** \$59,665 Daven Henze (PI).

- NASA JPL; Gabriel Obregon (gabriel.obregon@jpl.nasa.gov)
- 03/08/2010 - 12/17/2010
- Academic / summer / total months per year: 0/2/2

**Internalizing Environmental Damage Costs to Shape US Power System Development** \$35,000 Jana Milford (PI), Henze (Collaborator).

- RASEI Seed Grant; Carl A. Koval (koval@colorado.edu)
- 07/01/2010 – 06/30/2011
- Academic / summer / total months per year: 0/0/0

**Constraining global estimates of aerosol direct radiative forcing and surface concentrations with APS data and the GEOS-Chem adjoint model** \$385,752 Henze (PI).

- NASA ROSES NNH09ZDA001N-GLORY; Hal Maring (hal.maring@nasa.gov)
- 11/01/2010 – 10/31/2014
- Academic / summer / total months per year: 0/1/1

**Linking radiative forcing of fine-mode aerosols and tropospheric ozone to precursor emissions** \$328,650 Henze (PI).

- NASA ROSES NNH09ZDA001N-NIP; Ming-Ying Wei (Ming-Ying.We-1@nasa.gov)
- 08/06/2010 – 08/05/2014
- Academic / summer / total months per year: 1/1/2

**Estimation and attribution of global CO<sub>2</sub> surface fluxes using satellite observations of CO<sub>2</sub> and CO from TES, GOSAT, and MOPITT** \$1,399,210 Dylan Jones (PI), (Henze is a Co-I, \$57,942).

- NASA NNH09ZDA001N-ACOS; Kenneth Jucks (kenneth.w.jucks@nasa.gov)
- 09/02/2010 – 09/01/2015
- Academic / summer / total months per year: 0/1/1

**Constraining urban-to-global scale estimates of black carbon distributions, sources, regional climate impacts, and co-benefit metrics with advanced coupled dynamic - chemical transport - adjoint models.** \$904,211 Greg Carmichael (PI) (Henze is a Co-PI, \$512,892).

- EPA-G2010-STAR-L1; Bryan Bloomer (bloomer.bryan@epa.gov)
- 09/01/2011 – 08/31/2015
- Academic / summer / total months per year: 1/0/1

**Source contributions to seasonal vegetative exposure to ozone** \$70,000 Daven Henze (PI), Jana Milford (Co-PI)

- NASA AQUEST TT; John Haynes (jhaynes@nasa.gov)
- 09/01/2011 – 08/31/2012
- Academic / summer / total months per year: 0/0/0

**The power of GEO-CAPE observations to constrain our understanding of ammonia fluxes** \$20,000 Daven Henze (PI).

- NASA GEO-CAPE Science Team; Jassim A. Al-Saadi (j.a.al-saadi@nasa.gov)
- 01/01/2012 – 12/31/2013
- Academic / summer / total months per year: 0/0/0

**Source attribution of radiative forcing from short lived climate forcing agents** \$244,446 Daven Henze (PI).

- EPA-G2011-ORD-A1; James Davies (davies.james@epa.gov)
- 06/01/2012 – 05/31/2016
- Academic / summer / total months per year: 0.5/0/0.5

**Continuation of the CMS Flux Pilot Project** \$1,542,900 Kevin Bowman (PI) (Henze is Co-I, \$104,485).

- NASA CMS; Diane Wickland (Diane.E.Wickland@nasa.gov)
- 08/31/2012 – 02/28/2014
- Academic / summer / total months per year: 0/1/1

**Collaborative Research: SNOWpack Photodenitrification from the Antarctic and Arctic Cryosphere (SNOW-PAAC)** \$197,689 Becky Alexander (PI) (Henze is a Co-PI, \$57,151).

- NSF 11-532; Peter Milne (pmlne@nsf.gov)
- 06/01/2013 – 05/31/2015
- Academic / summer / total months per year: 0/1/1

**Source contributions to reactive nitrogen in the US** \$69,915 Daven Henze (PI), Jana Milford (Co-PI)

- NASA AQUEST TT; John Haynes (jhaynes@nasa.gov)
- 10/01/2011 – 09/30/2012
- Academic / summer / total months per year: 0/0/0

**NASA ACAST Year 3 Tiger Teams** \$92,105 Daven Henze (PI)

- NASA ACAST TT; John Haynes (jhaynes@nasa.gov)
- 03/01/2014 – 02/28/2015
- Academic / summer / total months per year: 0/0/0

**Optimal aggregation schemes for inversion of geostationary remote sensing observations** \$75,000 Daven Henze (PI).

- NASA GEO-CAPE Science Team; Jassim A. Al-Saadi (j.a.al-saadi@nasa.gov)
- 03/01/2016 – 12/31/2016
- Academic / summer / total months per year: 0.1/0/0.1

**Using remote sensing and adjoint modeling for integration of climate impacts into design of ozone and aerosol control strategies** \$738,461 Henze (PI).

- NASA NNH09ZDA001N-ACAST; Lawrence Friedl (LFriedl@nasa.gov)
- 05/12/2011 – 05/11/2017
- Academic / summer / total months per year: 1/1/2

**Optimal dimension reduction techniques for near-real time regional inversions of methane fluxes using WRF-DA and MCMC simulations** \$60,000 Daven Henze (PI).

- NASA GEO-CAPE Science Team; Jassim A. Al-Saadi (j.a.al-saadi@nasa.gov)
- 03/01/2017 – 12/31/2017
- Academic / summer / total months per year: 0.1/0/0.1

**Sustainable Energy Pathways: A lab-to-market paradigm for the optimal design of sustainable energy storage materials** \$1,900,000 Sehee Lee (PI) (Henze is funded Collaborator).

- NSF SEP; Zeev Rosenzweig (zrosenzw@nsf.gov)
- 10/01/2012 – 09/30/2017
- Academic / summer / total months per year: 0/1/1

**GEOS-Chem adjoint inversion of aerosol source emissions with multi-sensor (MODIS, MISR, and OMI) datasets over east Asia, and consequences for estimating aerosol direct radiative forcing and transboundary air pollution** \$466,002 Jun Wang (PI) (Henze is a Co-I, \$127,280).

- NNH12ZDA001N-ACMAP; Richard S. Eckman (Richard.S.Eckman@nasa.gov)
- 07/15/2013 – 07/14/2017
- Academic / summer / total months per year: 0.1/0/0.1

**Constraining US and global sources of nitrous oxide based on field observations and the GEOS-Chem adjoint model** \$412,359 Dylan Millet (PI) (Daven Henze is Co-PI, \$76,999).

- NOAA-OAR-CPO-2013-2003445; Monika Kopacz (monika.kopacz@noaa.gov)
- 08/01/2013 – 07/31/2017
- Academic / summer / total months per year: 1/0/1

**Sources, formation, and impacts of ammonium nitrate and ammonium sulfate aerosols: A modeling analysis constrained by surface, aircraft, and satellite data** \$453,637 Matthew J. Alvarado (PI) (Daven Henze is Co-PI, \$76,999).

- NOAA-OAR-CPO-2013-2003445; Monika Kopacz (monika.kopacz@noaa.gov)
- 08/01/2013 – 07/31/2017
- Academic / summer / total months per year: 1/0/1

**Inorganic aerosol precursor emissions during SENEX: A modeling analysis constrained by surface, aircraft and satellite data** \$392,884 Matthew J. Alvarado (PI) (Daven Henze is Co-PI, \$82,507).

- NOAA-OAR-CPO-2014-2003692; Monika Kopacz (monika.kopacz@noaa.gov)
- 08/01/2014 – 07/31/2017
- Academic / summer / total months per year: 0.25/0/0.25

**Source attribution of greenhouse gases in the Southeast at the interface of biogenic and anthropogenic emissions: multi-scale inverse modeling and uncertainty quantification** \$580,731 Daven Henze (PI).

- NOAA-OAR-CPO-2014-2003692; Monika Kopacz (monika.kopacz@noaa.gov)
- 08/01/2014 – 07/31/2017
- Academic / summer / total months per year: 0.25/0/0.25

**CyberSEES: Type 2: Collaborative Research: Connecting Next-generation Air Pollution Exposure Measurements to Environmentally Sustainable Communities** \$845,936, Qin Lv (PI) (Daven Henze is Co-PI).

- NSF 14-531; Bruce K. Hamilton (bhamilto@nsf.gov)
- 09/01/2014 – 08/31/2018
- Academic / summer / total months per year: 0/0.35/0.35

**Sensitivity analysis and recovery of dust emissions from spectral climate signals** \$539,721 Jun Wang (PI) (Daven Henze is Co-I, \$216,451).

- NNH14ZDA001N-ACSCS; Hal Maring, hal.maring@nasa.gov
- 11/01/2014 – 10/31/2018 (one year NCE)
- Academic / summer / total months per year: 0/0.5/0.5

**Supporting health impact assessment tools using remote sensing and earth system models - Tiger Team Supplement** \$100,000 Daven Henze (PI).

- NNH15ZDA001N-HAQST; John Haynes (jhaynes@nasa.gov)
- 07/01/2017 – 06/30/2018
- Academic / summer / total months per year: 0/0.25/0.25

**High resolution atmospheric carbon cycle data assimilation** \$52,500 Daven Henze (PI).

- NASA JPL SURP; Kevin Bowman (kevin.bowman@nasa.gov)
- 10/01/2018 – 09/30/2019
- Academic / summer / total months per year: 0/0/0

## Active Research Grants

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**Improving emissions, predictions and impact assessments of biomass burning smoke and dynamic air quality using FIREX observations, ground networks and satellite data** \$703,678 Daven Henze (PI).

- NOAA-OAR-CPO-2016-2004413; Monika Kopacz (monika.kopacz@noaa.gov)
- 07/01/2016 – 06/30/2020
- Academic / summer / total months per year: 1/0/1

**Supporting health impact assessment tools using remote sensing and earth system models** \$348,143 Daven Henze (PI).

- NNH15ZDA001N-HAQST; John Haynes (jhaynes@nasa.gov)
- 08/11/2016 – 08/10/2020
- Academic / summer / total months per year: 0/1/1

**Novel Use of NASA data with Emission Data Assimilation to Support U.S. National Air Quality Forecasting Capability and WMO Regional Chemical Reanalysis** \$367,145 Daniel Tong (PI) (Daven Henze Co-I, \$43,606).

- NNH15ZDA001N-HAQST: John Haynes (jhaynes@nasa.gov)
- 08/11/2016 – 08/10/2020
- Academic / summer / total months per year: 0/1/1

**Multi-phase inversion of aerosol sources using MODIS, MISR, OMI, and AERONET data and the GEOS-Chem adjoint.** \$809,486 Daven Henze (PI).

- NNH16ZDA001N-ACMAP: Kenneth Jucks (kenneth.w.jucks@nasa.gov)
- 02/17/2017 – 02/16/2020
- Academic / summer / total months per year: 0/1/1

**Supporting health impact assessment tools using remote sensing and earth system models - Tiger Team Supplement 2** \$350,782 Daven Henze (PI).

- NNH15ZDA001N-HAQST: John Haynes (jhaynes@nasa.gov)
- 09/01/2018 – 08/30/2020
- Academic / summer / total months per year: 0/0.29/0.29

**Inverse modeling constraints on sources of NH<sub>3</sub> using CrIS remote sensing measurements** \$450,000, Daven Henze (PI).

- NNH17ZDA001N-TASNPP; Paula Bontempi (paula.bontempi@nasa.gov)
- 03/23/2018 – 03/22/2021
- Academic / summer / total months per year: 0/1/1

**Constraining NMVOCs with inverse modeling** \$300,000, Daven Henze (PI).

- 2017 Korean National Strategic Project for Fine Particles Proposal; Subcontract from UNIST, Chang-Keun (cksong@unist.ac.kr)
- 09/01/2017 – 04/30/2020
- Academic / summer / total months per year: 0/1/1

**Using remote sensing and Earth system models to improve air quality and public health in megacities** \$1,048,738 Susan Anenberg (PI) (Daven Henze is institutional PI, \$349,841).

- NNH17ZDA001N-HAQ; John Haynes (jhaynes@nasa.gov)
- 11/16/2018 – 11/15/2021
- Academic / summer / total months per year: 0/1/1

**Closing Methane Budget for the US Corn Belt** \$1,527,183 Dylan Millet (PI). (Daven Henze Co-I, \$45,865)

- NASA NNH16ZDA001N-IDS, Hank Margolis (hank.a.margolis@nasa.gov)
- 5/15/2017 – 5/14/2020
- Academic / summer / total months per year: 0/0/0

**Methods and tools to integrate air quality and health into urban climate action planning** \$634,509 Susan Anenberg (Daven Henze is Co-I, \$49,564).

- Wellcome Trust 2018 Climate Change and Health, ourplanetourhealth@wellcome.ac.uk
- 11/1/2019 – 10/30/2022
- Academic / summer / total months per year: 0/0.66/0.66

**Multi-sensor (OMI, OMPS, VIIRS, and TROPOMI) constraints and downscaling of NO<sub>x</sub> emissions in the continental U.S. during 2005-2018 and beyond** \$565,697 Jun Wang (Daven Henze is Co-I/Institutional PI, \$236,485).

- 18-ACMAP18-0112; Richard Eckman (richard.s.eckman@nasa.gov)
- 03/01/2019 – 02/28/2022
- Academic / summer / total months per year: 0/1/1

**Surrogate modeling for atmospheric chemistry and data assimilation** \$689,851, Daven Henze (PI)

- NNH18ZDA001N-AIST; Michael Little (michael.m.little@nasa.gov)
- 01/16/2020 – 01/15/2023
- Academic / summer / total months per year: 0/1/1

**Pending Research Proposals**

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**Automated Model Reduction for Atmospheric Chemical Mechanisms** \$799,699, V. Faye McNeill (PI) (Henze is Co-I)

- EPA-G2019-STAR-C; Serena Chung (serena.chung@gov)
- 01/01/2020 – 12/31/2022
- Academic / summer / total months per year: 0/0.5/0.5

**Incorporating NO<sub>2</sub> remote sensing observations into an operational air quality forecasting system for Colorado** \$449,384, Daven Henze

- NNH19ZDA001N-AURAST; Kenneth Jucks (kenneth.w.jucks@nasa.gov)
- 04/01/2020 – 03/31/2023
- Academic / summer / total months per year: 0/1/1

**Interpretation of OMI observations the context of complementary satellite data (MODIS, MISR, TROPOMI) for tracking changes air quality** \$635,720, Randall Martin (PI), Henze is Co-I, \$180,000)

- NNH19ZDA001N-AURAST; Kenneth Jucks (kenneth.w.jucks@nasa.gov)
- 04/01/2020 – 03/31/2023
- Academic / summer / total months per year: 0/1/1

**Constraining urban-scale anthropogenic emissions of NO<sub>2</sub> and CO<sub>2</sub> in the US and Africa** \$598,921, Daven Henze (PI)

- NOAA-OAR-CPO-2020-2006076; Monika Kopacz (monika.kopacz@noaa.gov)
- 05/01/2020 – 04/30/2023
- Academic / summer / total months per year: 0/0.5/0.5

**Novel multivariate techniques for efficient computational factorization of large mass spectroscopic datasets** \$239,702, Daven Henze (PI) (\$180,000 to CU Boulder)

- NSF PD 16-1271; Yuliya Gorb (ygorb@nsf.gov)
- 07/01/2020 – 06/30/2022
- Academic / summer / total months per year: 0/0.5/0.5

**Research Expenditures (pending update through 2018)**

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**2012: \$901,396**

- Startup: \$21,426
- Sponsored Projects: \$879,969

**2013: \$1,224,106**

- Startup: \$32,055
- Sponsored Projects: \$1,192,051

**2014: \$1,206,361**

- Gifts: \$7,459
- ICR: \$55,705
- Sponsored Projects: \$1,143,197

**2015: \$837,590**

- Gifts and other: \$6,087
- ICR: \$84,177
- Sponsored Projects: \$747,326

**2016: \$435,231**

- Gifts and other: \$2,296
- ICR: \$52,186
- Sponsored Projects: \$380,748

**2017: \$420,288**

- Gifts and other: \$3,188
- ICR: \$15,784
- Sponsored Projects: \$401,316

**2018: \$557,705**

- Gifts and other: \$10,174
- ICR: \$18,878
- Sponsored Projects: \$528,653

**Recent (2016 - 2019) Invited Seminars**

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- 2019 **Henze, D. K., H. Cao, M. Omar Nawaz, C. Malley**, Evaluation and application of remote sensing and air quality modeling for international health and climate assessment studies, European Commission Joint Research Centre, Ispra, Italy, Oct 3.
- 2019 **Henze, D. K., Z. Qu, H. Cao, J. J. Guerrette, N. Bousserrez, L. Zhang**, Satellite-based constraints on aerosol, ozone, and GHG precursors emissions: applications and new inverse modeling techniques, University of Helsinki, Department of Physics, Helsinki, Finland, Aug 22.
- 2019 **Henze, D. K., C. Lee, A. von Donkelaar, R. Martin, F. Lacey, S. Anenberg, C. Malley, H. Zhao**, Using models and remote sensing to estimate global health impacts of air pollution, Frontiers of Atmospheric Science and Chemistry: Integration of Novel Applications and Technological Endeavors (FASCINATE), Boulder, CO, Sep 9 - 12.
- 2019 **Henze, D. K., Z. Qu, H. Cao, Z. Jiang**, Top-down constraints on emissions of NO<sub>2</sub>, SO<sub>2</sub> and NH<sub>3</sub>, NASA Health and Air Quality Applied Sciences Team Meeting 6, Pasadena, CA, Jul 10 - 12.
- 2019 **Henze, D. K., Z. Qu, J. Milford, K. Brown, S. Anenberg, P. Achakulwisut, M. Brauer, D. Moran, J. S. Apte**, Mortality from particulate matter in cities worldwide: a challenge and an opportunity for co-benefits from low carbon development, 15th Meeting of the Atmospheric Composition Virtual Constellation (NASA CEOS AC-VC), Tokyo, Japan, Jun 10-12.
- 2019 **Qu, Z., D. K. Henze**, 4D-Var NO<sub>x</sub> emission constraints and the potential of future high-resolution geo-stationary observations, TEMPO Science Team Meeting, Madison, WI, June 7.

- 2019 **Henze, D. K.**, F. Lacey, H. Cao, K. Brown, J. Milford, M. Omar Nawaz, Application of remote sensing and air quality models for constraining sources and impacts of air quality and greenhouse gas emissions, Johns Hopkins University, Department of Environmental Health and Engineering, Baltimore, MD, Apr 30.
- 2019 **Henze, D. K.**, F. Lacey, H. Cao, K. Brown, J. Milford, M. Omar Nawaz, Evaluation and application of remote sensing and air quality modeling for international health and climate assessment studies, Department of Mechanical Engineering, University of California Riverside, Apr 19.
- 2019 **Henze, D. K.**, C. Malley, J. C. I. Kuylenstierna, R. W. Pinder, S. Terry, H. Vallack, C. Heaps, E. Lefevre, S. Anenberg, S. Penn, A. CurryBrown, N. Fann, J. Neumann, H. Roman, K. Hicks, Y. Davila, E. Marais, F. Lacey, O. Nawaz, J. Choi, H. Lee, Air quality and climate assessment tools and analyses to inform policy, American Association for the Advancement of Science (AAAS) 185th Annual Meeting, Panel Member for Transboundary Air Pollution: The Impact of Science on Policy, Washington D.C., Feb 16.
- 2019 **Henze, D. K.**, C. Malley, J. C. I. Kuylenstierna, R. W. Pinder, S. Terry, H. Vallack, C. Heaps, E. Lefevre, S. Anenberg, S. Penn, A. CurryBrown, N. Fann, J. Neumann, H. Roman, K. Hicks, Y. Davila, E. Marais, F. Lacey, P. Kinney, Use of satellite-informed PM<sub>2.5</sub> concentrations in an international integrated assessment tool (LEAP-IBC), NASA Health and Air Quality Applied Sciences Team Meeting 5, Phoenix, AZ, Jan 3 - 4.
- 2018 **Henze, D. K.**, C. Malley, J. C. I. Kuylenstierna, R. W. Pinder, S. Terry, H. Vallack, C. Heaps, E. Lefevre, S. Anenberg, S. Penn, A. CurryBrown, N. Fann, J. Neumann, H. Roman, K. Hicks, Y. Davila, E. Marais, F. Lacey, A33F-01: Linking global-scale and urban-scale integrated assessment tools, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Worden, H., Z. Jiang, B. McDonald, J. R. Worden, K. Miyazaki, Z. Qu, **D. K. Henze**, D. B. A. Jones, A. Arellano, E. Fischer, L. Zhu, F. Boersma, D. Jacob, R. S. Silvern, A31B-02: Unexpected slowdown of US pollutant emission reduction in the past decade, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Bowman, K., N. Bousserez, J. Liu, M. Lee, **D. K. Henze**, A21A-03: Resolving the information in large-scale inversions: application to CMS-Flux, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 **Henze, D. K.** and C. Shim, NMVOCs and NH<sub>3</sub> top-down emissions using 4-D VAR adjoint modeling The First Workshop for the Development of Korean Air Quality Forecasting System, Busan, Korea, Nov 8 – 10.
- 2018 **Henze, D. K.**, H. Cao, J. Choi, H. M. Lee, Z. Qu, R. Park, Satellite remote-sensing constraints on O<sub>3</sub> precursor emissions in East Asia, The First Workshop for the Development of Korean Air Quality Forecasting System, Busan, Korea, Nov 8 – 10.
- 2018 **Henze, D. K.**, H. M. Lee, J. Choi, R. Park, Sources of PM<sub>2.5</sub> during pollution events in Korea, Air Pollution Extremes Workshop, Columbia University, Nov 1 – 2.
- 2018 **Henze, D. K.**, Jiang, Z., McDonald, B. C., H. Worden, J. R. Worden, K. Miyazaki, Z. Qu, D. B. A. Jones, A. F. Arellano, E. V. Fischer, L. Zhu, K. F. Boersma, Slowing Declines in U.S. NO<sub>x</sub> Emissions Reductions Detected With OMI, EPRI webinar, Sep 11.
- 2018 **Henze, D. K.**, J. Wang, and Y. Davila, GEOS-Chem adjoint model and data assimilation working group, NCAR, Boulder, July 30.
- 2018 **Henze, D. K.**, Jiang, Z., McDonald, B. C., H. Worden, J. R. Worden, K. Miyazaki, Z. Qu, D. B. A. Jones, A. F. Arellano, E. V. Fischer, L. Zhu, K. F. Boersma, Slowing Declines in U.S. NO<sub>x</sub> Emissions Reductions Detected With OMI, NASA Health and Air Quality Applied Sciences Team Meeting 4, July 16 – 17.
- 2018 **Henze, D. K.**, N. Bousserez, and J. J. Guerrette, Randomized Incremental Optimal Technique (RIOT) for large-scale Bayesian atmospheric inversions and data assimilation, Asia Oceana Geosciences Society, Honolulu, HI, June 4 – 8.



- 2018 **Henze, D. K.**, International air quality, health, and climate impacts of cookstoves, diesel NO<sub>x</sub>, and recent updates to ozone health impacts, CU Boulder, Department of Chemistry, Mar 5.
- 2018 **Henze, D. K.**, N. Bousserez, and J. J. Guerrette, Error estimation, dimension reduction, and the Randomized Incremental Optimal Technique (RIOT) for large-scale Bayesian atmospheric inversions and data assimilation, NASA GMAO, Greenbelt, MD, Feb 27.
- 2017 **Henze, D. K.**, N. Bousserez, and J. J. Guerrette, Dimension reduction, error estimation, and the Randomized Incremental Optimal Technique (RIOT) for large-scale Bayesian atmospheric inversions and data assimilation, Korean Society for Atmospheric Environment, Daegu, Korea, Nov 8 – 9.
- 2017 **Henze, D. K.** International air quality, health, and climate impacts of cookstoves, diesel NO<sub>x</sub>, and other anthropogenic sectors via PM<sub>2.5</sub> and O<sub>3</sub>, NCAR ACOM, Boulder CO, Oct 2.
- 2017 **Henze, D. K.** and A. Fiore, Overview of current evaluations, applications and advances in global air quality models, Western Regional Air Quality Modeling, NCAR, Boulder, CO, Sep 6 – 8.
- 2017 **Henze, D. K.**, Top-down constraints on NH<sub>3</sub> emissions, EPA Emissions Webinar Series, June 19.
- 2017 **Henze, D. K.**, NASA Health and Air Quality Applied Sciences Team, ICESat-2, Boulder, CO, May 31 – June 2.
- 2017 **Henze, D. K.** International air quality, health, and climate impacts of cookstoves, diesel NO<sub>x</sub>, and other anthropogenic sectors via PM<sub>2.5</sub> and O<sub>3</sub>, EHS, Columbia University, New York City, NY, May 18.
- 2017 **Henze, D. K.** The GEOS-Chem adjoint model, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 **Henze, D. K.** Remote sensing constraints on aerosol and greenhouse gas emissions, BPE Lecture Series, Columbia University, New York City, NY, April 21.
- 2017 **Henze, D. K.** Dimension reduction, error estimation, and the Randomized Incremental Optimal Technique (RIOT) for large-scale Bayesian atmospheric inversions and data assimilation, SCiCS Lecture Series, Columbia University, New York City, NY, April 20.
- 2017 **Henze, D. K.** International air quality, health, and climate impacts of cookstoves, diesel NO<sub>x</sub>, and recent updates to ozone health impacts, Climate Center Lecture Series, Columbia University, New York City, NY, April 19.
- 2017 **Henze, D. K.** International air quality and climate impacts of emissions control strategies for cookstoves and diesel NO<sub>x</sub>, G&G AOCD, Yale University, New Haven, CT, March 30.
- 2017 **Henze, D. K.** and N. Bousserez, A. Doostan, and J. J. Guerrette, Algorithm needs for addressing chemical data assimilation and source inversion, NSF, Unified Data Assimilation, Alexandria, VA, April 5.
- 2017 **Henze, D. K.**, Adjoint and perturbation estimates of PM<sub>2.5</sub> and O<sub>3</sub> source-receptor relationships, HTAP, EPA, RTP, NC, April 3.
- 2017 **Henze, D. K.**, Climate and health impacts of cookstoves: Evaluation with satellite-data, modeling, and source attribution, HAQAST 2, Seattle, WA, Feb 28.
- 2016 **Henze, D. K.**, Evaluating international air quality, climate, and ecosystem impacts of control strategies using remote sensing and adjoint modeling – case studies on cookstoves and diesel NO<sub>x</sub> emissions, SIPA, Columbia University, New York City, NY, Oct 10.
- 2016 **Henze, D. K.**, Adjoint modelling, International Summer School on Atmospheric and Oceanic Sciences (ISSAOS), Advanced Programming Techniques for the Earth System Science, Gran Sasso Science Institute, August 28 – September 2, L'Aquila, Italy.

- 2016 **Henze, D. K.**, How scientific and technical air quality modeling tools interact with policy, Advances in Air Quality Analysis and Prediction: The Interaction of Science and Policy, NCAR ASP Summer Colloquium, Boulder, CO, July 25 – Aug 5.
- 2016 **Henze, D. K.**, Inverse problems and parameter (emissions) estimation, Advances in Air Quality Analysis and Prediction: The Interaction of Science and Policy, NCAR ASP Summer Colloquium, Boulder, CO, July 25 – Aug 5.
- 2016 **Henze, D. K.**, Current and future impacts of long-range transport on vegetative ozone exposure in the U.S., Telluride Gas Phase Atmospheric Chemistry Meeting, July 18 – 22.
- 2016 **Henze, D. K.**, Constraining sources of air pollution using air quality adjoint models and remote sensing observations, Department of Chemical Engineering, Columbia University, New York City, NY, March 22.
- 2016 **Henze, D. K.**, Constraining sources of air pollution using air quality adjoint models and remote sensing observations, NCAR Advance Studies Program, Boulder, CO, April 26.
- 2016 **Henze, D. K.**, and N. Bousserez, Preparing an air quality assimilation system for operational requirements and next generation measurement technologies, Blueprints for Next Generation Data Assimilation Systems Convened jointly by the NCAR DA Program and the JCSDA, Boulder, CO, March 8 – 10.

### Recent (2016 - 2018) Conference Presentations (Oral)

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- 2018 Zhang, Y., D. Gao, Q. Lv, R. Dick, M. Hannigan, **D. K. Henze**, IN14A-05: A novel data fusion model to integrate heterogeneous geo-sensory networks for air quality prediction, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Anenberg, S., P. Achakulwisut, M. Brauer, **D. K. Henze**, P. Kinney, C. Kalman, GH34B-05: Using satellite-derived surface concentrations to estimate the mortality associated with ambient air pollution in cities worldwide, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Qu, Z., **D. K. Henze**, N. Theys, Y. Wang, X. Xu, J. Wang, W. Wang, A33I-3265: Joint inversion of SO<sub>2</sub> and NO<sub>x</sub> emissions using OMI observations in China, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Goldberg, D., L. N. Lamsal, P. Saide, C. Loughner, B. de Foy, M. Gao, J.-H. Woo, Y. Kim, J. Kim, N. Krotkov, G. R. Carmichael, **D. K. Henze**, Z. Liu, D. G. Streets, A31B-04: Recent Advances in Deriving NO<sub>x</sub> Emission Estimates from Satellite Data, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Wang, Y., J. Wang, X. Xu, **D. K. Henze**, Z. Qu, A21A-08: GEOS-Chem Adjoint Inversion of SO<sub>2</sub> and NO<sub>x</sub> Emissions with Multi-sensor Data over China, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Capps, S., M. Momeni, M. Lombardo, A. Hakami, **D. K. Henze**, S. P. Thomas, P. J. Rayner, J. Silver, A21A-06: Towards Refining U.S. Ammonia Emissions with CrIS Observations through Four-dimensional Variational Assimilation, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Bousserez, Bowman, K., **Henze, D. K.**, M. Lee, J. Liu, S. Eastham, A New Fast Randomized Optimal Approach for Diagnostic and Optimization (FRODO) Carbon Dioxide Fluxes Inferred from the NASA CMS-Flux, Asia Oceana Geosciences Society, Honolulu, HI, June 4 – 8.
- 2018 **Henze, D. K.**, J. Wang, and Y. Davila GEOS-Chem adjoint model and data assimilation working group, 1st International GEOS-Chem Asia Meeting, Nanjing, China, May 21 – 23.
- 2017 Goldberg, D. L., L. N. Lamsal, C. Loughner, W. H. Swartz, P. E. Saide, G. R. Carmichael, **D. K. Henze**, Z. Lu, D. G. Streets, A51I-02 Estimating NO<sub>x</sub> emissions and surface concentrations at high spatial resolution using OMI, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.

- 2017 Qu, Z., **D. K. Henze**, J. Wang, X. Xu, and Y. Wang, A41N-03: Top-down NO<sub>x</sub> and SO<sub>2</sub> emissions simultaneously estimated from different OMI retrievals and inversion frameworks, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 **Henze, D. K.**, Y. Davila, S. Anenberg, C. Malley, J. C. I. Kuylenstierna, H. Vallack, M. R. Ashmore, M. Turner, K. Sudo, J. E. Jonson, M. Chin, R. M. Doherty, A32C-03: Is ozone, rather than PM<sub>2.5</sub>, actually the largest contributor to premature deaths associated with trans-continental transport of air pollution? AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Xu, J., R. Martin, A. Morrow, S. Sharma, L. Huang, W. R. Leaitch, J. Burkart, H. Schulz, M. Zanatta, M. D Willis, **D. K. Henze**, C. J. Lee, A. B. Herber, J. Abbatt, A22A-03: The importance of Asia as a source of black carbon to the Arctic constrained by aircraft and surface measurements, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Lacey, F., E. Ann Marais, C. Wiedinmyer, E. Coffey, D. Pfothenauer, **D. K. Henze**, M. J. Evans, M. Hannigan, E. Morris, Y. Davila, E. C. Mesenbring, A24C-03: Future shifts in African air quality and the resulting impacts on human health and climate: Design of efficient mitigation strategies, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Okamoto, S. H. Tanimoto, L. K. Emmons, S. Gravel, **D. K. Henze**, M. T. Lund, R. B. Pierce, K. Sudo, M. Schulz, Global comparisons of seasonal cycles of tropospheric ozone and its precursors observed at mountain sites, ACPM, Gotemba, Japan, Nov. 7 – 10.
- 2017 Guerrette, J., N. Bousseres, P. Saide, G. Carmichael, and **D. K. Henze**, 2.034: Efficient high-resolution constraints for primary aerosol emissions during biomass burning events, GEIA Conference, University of Hamburg, Germany, Sep 13 – 15.
- 2017 Qu, Z., **D. K. Henze**, J. Wang, X. Xu, Y. Wang, Regional and global long-term emissions constrained by NO<sub>2</sub> and SO<sub>2</sub> satellite observations, EPA International Emission Inventory Conference, Baltimore, MD, Aug 15 – 18.
- 2017 Guerrette, J. J., N. Bousseres, and **D. K. Henze**, Application of the Randomized Incremental Optimal Technique (RIOT) for parallelization of 4D-Var in WRFDA-Chem, WRF Workshop, NCAR, Boulder, CO, June 12 – 16.
- 2017 Bousseres, N., and **D. K. Henze**, Efficient tuning of transport and prior error statistics in high-dimensional source inversions using the adjoint of GEOS-Chem, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Zhang, L., et al., Adjoint analyses of PM pollution over North China, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Zhang, X., et al., Global CO and NO<sub>x</sub> emission estimates using multiple species data assimilation with GEOS-Chem adjoint model, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Qu, Z., Decadal-scale top-down NO<sub>x</sub> and SO<sub>2</sub> emissions from a hybrid 4D-Var / mass balance joint inversion, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Wells, K., et al., Top-down constraints on global N<sub>2</sub>O emissions at optimal resolution, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Cooper, M., et al., Comparing mass balance and adjoint methods for inverse modeling of nitrogen dioxide columns for global nitrogen oxide emissions, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Morris, E., et al., EGU2017-16091: Simulation of West African air pollution during the DACCIWA experiment with the GEOS-Chem West African regional model. EGU General Assembly, Vienna, Austria, April 28.

- 2017 Chen, C., O. Dubovik, T. Lapyonak, **D. K. Henze**, F. Ducos, M. Chin, Desert Dust and Carbonaceous Aerosol Emissions Inferred from PARASOL/GRASP Observations, International Conference on Aerosol Cycle, University of Lille, France, March 22.
- 2016 Wells, K., D. B. Millet, N. Bousserez, **D. K. Henze**, T. J. Griffis, B13I-02: Top-down Constraints on Global N<sub>2</sub>O Emissions at Optimal Spatial and Temporal Resolution, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16. (Invited)
- 2016 Chen, C., O. Dubovik, T. Lapyonok, **D. K. Henze**, F. Ducos, X. Huang, A42D-06: Retrieval Desert Dust and Carbonaceous Aerosol Emissions over Africa from PARASOL/GRASP Observations, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Cui, Y., J. F. Brioude, W. M. Angevine, S. A. McKeen, **D. K. Henze**, N. Bousserez, Z. Liu, B. McDonald, J. Pieischl, T. B. Ryerson, G. Frost, M. Trainer, A42D-02: Top-down estimates of methane and nitrogen oxide emissions from shale gas production regions using aircraft measurements and a mesoscale Bayesian inversion system together with a flux ratio inversion technique, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 **Henze, D. K.**, S. Anenberg, J. Miller, F. Vincente, L. Du, L. Emberson, F. Lacey, C. Malley, R. J. Minjares, A31J-03: Integrated assessment of health, crop, and climate impacts of mitigating excess diesel NO<sub>x</sub> emissions in 11 major vehicle markets, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Guerrette, J., N. Bousserez, and **D. K. Henze**, A42D-07: Evaluating the Utility of Adjoint-based Inverse Modeling with Aircraft and Surface Measurements during ARCTAS-CARB to Constrain Wildfire Emissions of Black Carbon, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Alvarado, M., C. Lonsdale, E. Winijkul, C. M. Brodowski, K. Cady-Pereira, **D. K. Henze**, S. Capps, A24F-05: Top-Down Constraints on Air Quality Model Emissions of NH<sub>3</sub>, NO<sub>x</sub>, and SO<sub>2</sub> using Surface, Aircraft, and Satellite Data, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16. (Invited)
- 2016 Fu, T.-M., H. Cao, L. Zhang, **D. K. Henze**, C. Lerot, C. E. Miller, Y. Zhao, A23P-05: Space-based constraints on global and Chinese non-methane volatile organic compound emissions: exploring the sources of uncertainties AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16. (Invited)
- 2016 Bousserez, N., **D. K. Henze**, Z. Liu, J. F. Brioude, Y. Cui, A22G-03: Estimating the Spatiotemporal Constraints and Uncertainties in a Mesoscale Inversion of Methane Emissions During SENEX, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Bousserez, N., and **D. K. Henze**, Fast Algorithms for High-dimensional Atmospheric Source Inversion Problems: Application to Top-down Estimates of Methane Emissions, Second Workshop on Atmospheric Composition Observation System Simulation Experiments (OSSEs), Reading, UK, Nov 9 – 11.
- 2016 **Henze, D. K.**, S. Anenberg, and P. Kinney, Supporting health impact assessment tools using remote sensing and earth system models, NASA HAQAST 1, Emory University, Decatur, GA, Nov 2 – 4.
- 2016 Xu, J., R. V. Martin, A. Morrow, S. Sharma, W. R. Leitch, H. Lin, J. Burkart, M. D. Willis, **D. K. Henze**, C. J. Lee, A. Herber, J. P. D. Abbatt, Source attribution of Arctic black carbon constrained by surface and aircraft measurements, Netcare Workshop, Toronto, Canada, Nov 14 – 15.
- 2016 Bash, J., K. Foley, J. Walker, M. Shephard, K. Cady-Pereira, S. Napelenok, **D. K. Henze**, E. Cooter, Modeling Atmospheric Reactive Nitrogen, ASAS-ADSA-CSAS-WSASAS, Salt Lake City, Utah, July 19 – 23.
- 2016 Guerrette, J., and **D. K. Henze**, Chemical 4D-Var in WRFDA-Chem: Improving Black Carbon Emission Inventories during ARCTAS-CARB, 17th WRF Users' Workshop, Boulder, CO, June 27 – July 1.

- 2016 Baublitz, C., B. Henderson, D. Loughlin, C. Nolte, **D. K. Henze**, H.-M. Lee, Climate Policy Impact on Nitrogen Deposition in the USA , A&WMA's 109th Annual Conference & Exhibition, New Orleans, Louisiana, June 20 – 23.
- 2016 **Henze, D. K.** et al., Damages of aerosol and ozone precursor emissions to health, ecosystems, and climate using energy and air quality models integrated with remote sensing observations, NASA AQUEST 10, EPA, Research Triangle Park, N.C., Jan 5 – 7.

### Recent (2016-2018) Conference Presentations (Poster)

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- 2018 Gao, D., Y. Zhang, Y. Zhao, Q. Lv, **D. K. Henze**, M. Hannigan, R. Dick, H31H-2005: Analyzing tempo-spatial data series with Graph Convolutional Neural Network, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Nawaz, O., **D. K. Henze**, C. Malley, GH41C-1446: Source Attribution of Climate and Health Impacts from Aerosols, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Ye, X., P. Saide, H. Shi, A. da Silva, S. Kondragunta, A. Lyapustin, Y. Wang, J. McQueen, R. J. Engelen, V.-H. Peuch, M. Parrington, R. B. Pierce, R. Ahmadov, G. A. Grell, E. J. Hyer, D. Davignon, J. Chen, P. Makar, L. K. Emmons, **D. K. Henze**, A51L-2340: Development of a biomass burning smoke prediction system including near-real time constraints on emissions over the Western U.S., AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Morris, E., M. J. Evans, J. D. Lee, J. R. Hopkins, A. R. Vaughan, S. Garraway, S. Young, H. Coe, S. Haslett, J. Taylor, K. Bower, M. Ramonet, L. Hazan, M. Cluzeau, J. F. de Brito, A. Schwarzenboeck, A. Colomb, P. Dominutti, C. Denjean, T. Bourrienne, V. Catoire, V. Brocchi, G. Krysztofiak, H. Schlager, G. Stratmann, Y. Ren, **D. K. Henze**, Y. Davila, A51J-2303: Evaluation and impact of emissions over West Africa during the DACCWA experiment using the GEOS-Chem West African regional model, AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 Philip, S., M. S. Johnson, C. S. Potter, V. B. Genovese, D. Baker, K. Haynes, **D. K. Henze**, J. Liu, B. Poulter, The Impact of Prior Biospheric Models on Global CO<sub>2</sub> Flux Estimates when Assimilating OCO-2 Retrievals AGU Fall Meeting, Washington D.C., Dec. 10 – 14.
- 2018 **Henze, D. K.**, C. Malley, J. C.I. Kuylentierna, H W. Vallack, Y. Davila, S. C. Anenberg, S. Terry, A. CurryBrown, N. Fann, E. Lefevre, C. Heaps, S. Penn, H. Roman, J. Neumann, The global network of import and export of air-pollution related premature mortalities, 15 International Global Atmospheric Chemistry Science Conference, Takematsu, Japan, Sep 25 – 29.
- 2018 Qu, Z., **Henze, D. K.**, Incorporating chemical interactions and co-emissions in top-down constraints on sources of NO<sub>x</sub>, SO<sub>2</sub> and CO, 15 International Global Atmospheric Chemistry Science Conference, Takematsu, Japan, Sep 25 – 29.
- 2017 Gao, D. Y. Zhang, Z. Qu, K. Sadighi, E. Coffey, Qi Liu, M. Hannigan, **D. K. Henze**, R. Dick, L. Shang, Q. Lv, A41H-2387 High resolution tempo-spatial ozone prediction with SVM and LSTM, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Bousserez, N., **D. K. Henze**, Y. Cui., and Z. Liu, A33A-2340: A Fast Method for Optimal Tuning of Observation and Prior Error Statistics in High-dimensional Bayesian Inversions: Application to Methane Source Estimation Over the US, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Shim, C., **D. K. Henze**, and F. Deng, A23B-2339: Constraining East Asian CO<sub>2</sub> emissions with GOSAT retrievals: methods and policy implications, AGU Fall Meeting, New Orleans, LA, Dec. 11 – 15.
- 2017 Lacey, F., et al., Adjoint analysis of the climate and human health impacts of transient shifts in anthropogenic activity in China, IGC8, Harvard University, Cambridge, MA, May 1 – 4.

- 2017 Cao, H., et al, Adjoint inversion of Chinese non-methane volatile organic compounds sources using space-based observations of formaldehyde and glyoxal, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Lee, C., et al., 4DVAR Assimilation of CALIOP Level 2 aerosol profiles with the adjoint of GEOS-Chem, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2017 Dedoussi, I., et al., On the development of the UCX GEOS-Chem adjoint, IGC8, Harvard University, Cambridge, MA, May 1 – 4.
- 2016 Shim, C., and **D. K. Henze**, A41F-0095: Applying satellite retrievals to identify urban emissions of GHG's over East Asia, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Soltanzadeh, M., A. J. Pappin, A. Hakami, S. Zhao, M. D. Turner, S. Capps, **D. K. Henze**, P. Percell, J. O. Bash, S. L. Napelenok, R. W. Pinder, A. G. Russell, A. Nenes, J. Baek, G. R. Carmichael, C. O. Stanier, T. Chai, D. Byun, K. Faye, J. Resler, R. Mashayekhi, A33C-0236: Quantifying co-benefits of source-specific CO<sub>2</sub> emission reductions in Canada and the US: An adjoint sensitivity analysis, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Zhang, X., D. B. A. Jones, M. Keller, T. Walker, Z. Jiang, **D. K. Henze**, A. E. Bourassa, D. A. Degenstein, Y. Rochon, A31I-0181: Quantifying emissions of CO and NO<sub>x</sub> using observations from MOPITT, OMI, TES, and OSIRIS, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Qu, Z., **D. K. Henze**, S. Capps, Y. Wang, X. Xu, J. Wang, M. Keller, A31E-0084 Decadal-scale joint inversion of NO<sub>x</sub> and SO<sub>2</sub> using a hybrid 4D-Var / mass balance approach, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Cooper, M., R. V. Martin, and **D. K. Henze**, A31E-0082 Comparing Mass Balance and Adjoint-Based 4D-VAR Methods for Inverse Modeling of Nitrogen Dioxide Columns for Nitrogen Oxide Emissions, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Xu, J., R. V. Martin, A. Morrow, S. Sharma, R. Leitch, L. Huang, J. Burkart, M. D. Willis, **D. K. Henze**, C. J. Lee, A. B. Herber, J. Abbatt, A23K-0377: Source Attribution of Arctic Black Carbon Constrained by Surface and Aircraft measurements, AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Coffey, E., K. Sadighi, Q. Lv, D. Gao, A. Polidori, B. J. Feenstra, **D. K. Henze**, L. Shang, R. Dick, Z. Qu, A21G-0165: Evaluating Small Spatial Scale Ozone Levels in Riverside, CA using a Low-Cost Sensor Network AGU Fall Meeting, San Francisco, CA, Dec. 12 – 16.
- 2016 Ikeda, K., H. Tanimoto, T. Nagashima, H. Nara, H. Mukai, Y. Nojiri, Y. Tohjima, Y. Davila, X. Dong, L. K. Emmons, J. Flemming, J. S. Fu, S. Ghude, **D. K. Henze**, J. E. Jonson, M. T. Lund, R. J. Park, R. B. Pierce, K. Sudo, Multi-model comparison of marine boundary layer O<sub>3</sub> in HTAP2 simulations with cargo ship observations in Asia-Pacific, IGAC, Breckenridge, CO, Sep 20 – 26.
- 2016 Alvarado, M. J., C. R. Lonsdale, E. Winijkul, C. Brodowski, R. Pernak, K. E. Cady-Pereira, J. D. Hegarty, **D. K. Henze**, S. L. Capps, Investigating Ammonia Sources with the Cross-Track Infrared Spectrometer IGAC, Breckenridge, CO, Sep 20 – 26.
- 2016 Qu, Z., **D. K. Henze**, S. L. Capps, Y. Wang, X. Xu, J. Wang, M. Keller, Top-down NO<sub>x</sub> Emissions for China (2005-2012): a Hybrid Inversion Method and Trend Analysis, IGAC, Breckenridge, CO, Sep 20 – 26.
- 2016 J. Guerrette and **D. K. Henze**, Chemical 4D-Var in WRFDA-Chem: Improving black carbon emission inventories during ARCTAS-CARB, IGAC, Breckenridge, CO, Sep 20 – 26.
- 2016 S. Anenberg, J Miller, F. Lacey, **D. K. Henze**, V. Franco, L. Du, R. Minjares, Health and climate impacts in and from G-20 countries using realistic diesel emissions under present and future standards, IGAC, Breckenridge, CO, Sep 20 – 26.

- 2016 **Henze, D. K.**, C. S. Malley, J. C. I. Kuylenstierna, H. W. Vallack, Y. Davila, S. C. Anenberg, M C. Turner, M. R. Ashmore, K. Sudo, J. E. Jonson, Have the global health impacts of O<sub>3</sub> been severely underestimated? IGAC, Breckenridge, CO, Sep 20 – 26.
- 2016 Lacey, F., **D. K. Henze**, C. Lee, R. V. Martin, A. van Donkelaar, Modeled current and future PM<sub>2.5</sub> health impacts of location and sector-specific emissions using GBD exposure estimates, satellite-based downscaling, and global source-receptor modeling, Health Effects Institute, Denver, CO, May 1 – 3.
- 2016 Brown, K., **D. K. Henze**, and J. B. Milford, Air quality co-benefits of greenhouse gas emissions fees in the U.S. energy system, Health Effects Institute, Denver, CO, May 1 – 3.
- 2016 Zhao, Y., et al., Atmospheric nitrogen deposition to the northwestern Pacific: seasonal variation and source attribution, EGU General Assembly 2016, Session AS3.16, Vienna, Austria, April 23 – 28.
- 2016 Zhang, L., et al., Atmospheric ammonia over China: emission estimates and impacts on air quality, EGU General Assembly 2016, Session AS3.19, Vienna, Austria, April 23 – 28.

## Peer Review of Journals and Proposals

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*Advances in Meteorology*: 2016 (1)

*Aerosol Science and Technology*: 2017 (1), 2011 (2), 2009 (1), 2006 (1)

*Aerosol and Air Quality Research*: 2016 (1)

*Asia-Pacific Journal of Atmospheric Sciences*: 2012 (2)

*Atmosphere*: 2011 (2)

*Atmospheric Chemistry and Physics*: 2019 (8), 2018 (7), 2017 (8), 2016 (3), 2015 (5), 2014 (6), 2013 (10), 2012 (5), 2011 (8), 2010 (4), 2009 (2), 2008 (4), 2006 (1)

*Atmospheric Environment*: 2016 (1), 2015 (4), 2012 (4), 2011 (3), 2010 (2), 2009 (3), 2008 (1), 2006 (1)

*Atmospheric Research*: 2017 (1), 2016 (1)

*Climate Change*: 2011 (1)

*Computers & Geosciences*: 2011 (2)

*Earth System Dynamics*: 2017

*Environment International*: 2016 (3)

*Environmental Pollution*: 2017 (1), 2016 (1)

*Environmental Research Letters*: 2019 (2), 2017 (2), 2016 (5), 2015 (2)

*Environmental Science and Technology*: 2019 (5), 2018 (1), 2017 (3), 2016 (3), 2015 (3), 2014 (1), 2013 (1), 2012 (2), 2011 (2), 2010 (3), 2009 (1), 2006 (1)

*Environmental Science and Technology Letters*: 2018 (1)

*Geoscientific Model Development*: 2019 (1) 2018 (1), 2017 (1), 2016 (1), 2015 (1), 2014 (2), 2013 (1), 2010 (1), 2009 (2)

*Geophysical Research Letters*: 2018 (2), 2017 (1), 2016 (2), 2013 (1), 2010 (1)

*Global Biogeochemical Cycles*: 2011 (1)

*International Journal of Climatology*: 2010 (1), 2009 (1)

*Inverse Problems*: 2018 (1)

*Journal of Advances in Modeling Earth Systems*: 2013 (2)

*Journal of Aerosol Science*: 2008 (1), 2007 (1)

*Journal of Exposure Science And Environmental Epidemiology*: 2019 (1)

*Journal of Geophysical Research*: 2019 (1), 2018 (4), 2016 (4), 2015 (4), 2014 (4), 2013 (3), 2012 (2), 2011 (3), 2010 (6), 2009 (2), 2008 (2), 2006 (2), 2005 (2), 2004 (2)

*Nature*: 2018 (1)

*PLOS Medicine*: 2018 (2)

*PNAS*: 2018 (1), 2013 (1)

*QJRMS*: 2013 (1)

*Remote Sensing*: 2013 (2)

*Remote Sensing of Environment*: 2015 (2)

*Science*: 2015 (1), 2009 (1), 2006 (1)

*Science of the Total Environment*: 2019 (1), 2009 (1)

*Scientific Reports*: 2019 (1), 2017 (1)

CARA: 2016 (1)

CORE: 2013 (2)

CU Seed Grant Panel: 2011 (1)

Dutch Research Council Proposal Review: 2019 (1)

NASA Review Panel: 2013 (1), 2012 (2), 2011 (1), 2010 (1)

NERC Proposal Review: 2013 (1)

Netherlands Space Office (NSO): 2011 (1)

NSF Proposal Review: 2017 (1), 2014 (1), 2011 (1), 2010 (1)

NOAA Proposal Review: 2019 (2), 2016 (1), 2011 (1), 2010 (1)