

Dr. Simon A. Carn

Curriculum Vitae

Geological and Mining Engineering and Sciences
Michigan Technological University
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Education

St. Catharine's College, University of Cambridge, UK: Ph.D. (1999), Volcanology
Université Blaise Pascal, Clermont-Ferrand, France: D.E.A.[†] (1994), Volcanology and Magmatic Processes
Exeter College, University of Oxford, UK: B.A. Hons (1993), Natural Science - Geology

Employment

Department of Geological and Mining Engineering and Sciences, Michigan Technological University

2012 - Associate Professor
2008 - 2012 Assistant Professor

Joint Center for Earth Systems Technology, University of Maryland Baltimore County

2005 – 2008 Assistant Research Scientist
2001 – 2005 Research Associate

Montserrat Volcano Observatory, Montserrat, West Indies

2000 – 2001 Volcanologist (volcanic gas monitoring specialist)

Honors and Distinctions

William T. Pecora Award (NASA/US DOI) – TOMS Science Team (2006)

NASA Group Achievement Award – Aura Project (2005)

NASA Goddard Space Flight Center Group Achievement Award – Aura Science Team (2005)

Remote Sensing and Photogrammetry Society Len Curtis European Award (2000-2001) – for best paper published in the open remote sensing literature during the year 2000

Professional and Technical Societies

American Meteorological Society (2012 – present)

NASA NPP Science Team for Climate Data Records (2011 – present)

Geological Society of America (2009 – present)

NASA Aura Science Team (2006 – present)

Technical Advisory Committee, UN Project 'Volcano Risk Reduction in Goma, DRC' (2004 – 2008)

Ozone Monitoring Instrument (OMI) Science Team (2001 – present)

Total Ozone Mapping Spectrometer (TOMS) Science Team (2001 – 2005)

American Geophysical Union (1994 – present)

2011-12 Scientific Committee, AGU Chapman Conference on Hawaiian Volcanism, Jul 2012

2009-10 Guest Editor, JGR Special Issue: The 2008 Eruptions of Okmok and Kasatochi, Alaska

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) (1994 – present)

2011-12 International Committee member, Cities on Volcanoes 7 conference, Colima, Mexico, Nov 2012

2010-11 Scientific Committee member, IAVCEI Field Workshop on Chemistry of Volcanic Gases, Kamchatka, Russia

[†] *Diplôme d'études approfondies (DEA)* – the French equivalent of the MSc.

2008 - Secretary and website administrator, IAVCEI Remote Sensing Commission
2008 Scientific Committee member, IAVCEI Field Workshop on Chemistry of Volcanic Gases, Mexico

Academic Service

Editorships: *Journal of Geophysical Research-Atmospheres* (Associate Editor 2008-present); *Frontiers in Earth Science: Volcanology* (Review Editor 2014-present)

Journal reviews: *Geology*, *Geophysical Research Letters*, *J. Geophysical Research*, *Bulletin of Volcanology*, *J. Volcanology & Geothermal Research*, *Atmospheric Chemistry and Physics*, *J. Applied Meteorology*, *Geological Society of London Special Publications*, *AGU Geophysical Monographs*, *Acta Vulcanologica*, *J. Photogrammetry and Remote Sensing*, *Atmospheric Science Letters*, *International Journal of Remote Sensing*, *Remote Sensing of Environment*, *Natural Hazards*, *Revista Geologica de Chile*, *J. African Earth Sciences*

Proposal reviews: NASA Solid Earth and Natural Hazards program, NASA Atmospheric Composition, Modeling and Analysis (ACMAP) program, National Science Foundation Petrology and Geochemistry program, UK Natural Environment Research Council (NERC), Canadian Natural Sciences and Engineering Research Council (NSERC), AGU Chapman Conference proposals, AGU book proposals, Wiley book proposals

Panel reviews: NASA Earth Surface and Interior program (Geohazards Imaging, 2007), AAAS review of USGS Volcano Hazard Program (2007)

Research Grants

NASA

2012 Multi-Decadal Sulfur Dioxide Climatology from Satellite Instruments; NASA ROSES 2012, MEaSUREs, \$2,136k, 5 yrs (co-PI)
2011 A-Train Volcano Observatory; NASA ROSES 2010, Aura Science Team, \$667k, 3 yrs (PI)
2011 Continuation of Long-Term Sulfur Dioxide EDR with the NPP Ozone Mapping and Profiler Suite Nadir Mapper, NASA ROSES 2010, NPP Science Team, \$830k, 3 yrs (co-PI)
2010 A Combined EOS Data and GEOS-Chem Modeling Study of the Direct Radiative Forcing of Volcanic Sulfate Aerosols; NASA ROSES 2009, ACPMAP, \$400k, 3 yrs (co-PI)
2006 Validation of OMI L2 Sulfur Dioxide Retrievals Over Volcanic and Anthropogenic Sources; NASA Aura Validation NRA, \$550k, 3 yrs (PI)
2005 Near Real-time NASA Volcanic Cloud Data for NOAA, FAA and USGS Decision Support Systems; NASA DECISIONS CAN, \$1,272k, 3 yrs (co-PI)
2004 TOMS Science Team extension, NASA code YS, \$63k, 1 yr (co-PI)

National Science Foundation

2010 RAPID: Particle Trajectories in Volcanic Plumes: Tracking the 2010 Eyjafjallajökull Plume, NSF EAR, \$56k, 1 yr (co-PI)
2010 PASI: Volcanic Hazards and Remote Sensing in Pacific Latin America; San Jose, Costa Rica; January/February, 2011; NSF OISE, \$100k, 1 yr (co-PI)
2009 An Integrated Analysis of Seismicity, Infrasonic, and High-Resolution SO₂ Measurements to Determine the Source of Low-Frequency Seismicity at Villarrica Volcano, Chile; NSF EAR, \$222k, 3 yrs (co-PI)
2009 VHub: Cyberinfrastructure for Volcano Eruption and Hazards Modeling and Simulation; NSF CDI, 333k, 4 yrs (PI)
2005 Virunga Volcanic SO₂ Emissions Research (VISOR) project; NSF EAR, \$300k, 4 yrs (PI)
2002 Travel grant to attend Chapman Conference on Volcanism and the Earth's Atmosphere, \$600

U.S. Department of Education

2009 International Geological Masters in Volcanology and Geotechniques (INVOGE); U.S. Dept. of Education, \$460k, 5 yrs (PI; transfer from Dr. W.I. Rose; secured program extension until 2015)

Deep Carbon Observatory DECADE program

2013 Improving constraints on CO₂ emissions from the Vanuatu arc, Carnegie Institution of Washington/DECADE, \$17k, 1 yr (PI)

Natural Environment Research Council (UK)

2011 NERC Urgency Grant: Mechanisms and implications of the 2011 eruption of Nabro volcano, Eritrea, GBP65k, 18 months (project partner)

National Geographic Society Committee for Research and Exploration

2004 Virunga Volcanic SO₂ Emissions Research (VISOR) project, \$15k, 1 yr travel grant (PI)

Royal Society (UK)

2000 Travel grant to attend IAVCEI General Assembly, Bali, Indonesia, \$1k

European Union

2005 Network for Observation of Volcanic and Atmospheric Change (NOVAC), EU Sixth Framework Program (PI: B. Galle, Chalmers University, Sweden), 3 yrs (co-I)

Michigan Tech

2009 Infrared Spectroscopy of Volcanic Plumes; Michigan Space Grant Consortium, \$5k (PI)
2008 Century II Campaign Endowed Equipment Fund (C2E2); \$12.5k for equipment (PI)

Teaching

Michigan Tech

2012 Volcanology: the Volatile Earth (Fall 2012, 2013)
2010 Special Topics in Volcanology – Open-Vent Volcanism (Spring 2010)
2009- Atmospheric Observations and Meteorology (Fall 2009, 2010, 2011, 2012, 2013)
2009- Fundamentals of Remote Sensing (Spring 2009, 2010, 2011, 2012, 2013, 2014)

Previous teaching experience

2007 Invited guest scientist, International Volcanological Field School, Kamchatka, Russia
2000 Tutor in Volcanology, Dept. of Geography, Cambridge University, UK
1999 Lecturer in volcano remote sensing techniques, UNESCO Geological Applications of Remote Sensing program, Philippines Institute of Volcanology and Seismology, Manila, Philippines
1994 – 1999 Teaching Assistant, Dept. of Earth Sciences, Cambridge University, UK
1994 Tour guide (in French), Volcan de Lemptégy, Clermont-Ferrand, France

Academic advising and committees

Postdoctoral associates (Michigan Tech)

Dr. Jennifer Telling (2014-), Xinhua Shen (2010-11), Mathieu Gouhier (2009)

PhD (Michigan Tech unless otherwise noted)

Verity Flower (Geology) – committee chair
Riccardo Tortini (Geological Engineering) – committee chair
Zhixin Wang (Geology) - committee member
David Faber (Atmospheric Science Program) - committee member
Federica Lanza (Geology) - committee member
Kyle Brill (Geology) - committee member
Brendan McCormick (Geology, Dept. of Earth Sciences, Cambridge University, UK) – co-supervisor

Patricia Nadeau (Geology) – committee co-chair (Michigan Space Grant Consortium Graduate Fellowship 2009)
 Rüdiger Escobar-Wolf (Geology) – committee member
 Lorna Henney (Geology, 2011) – committee member
 Elisabet Head (Geology, 2011) – committee chair (Michigan Space Grant Consortium Graduate Fellowship 2010)
 John Lyons (Geophysics, 2011) – committee member
 Helen Thomas (Geology, 2011) – committee co-chair (Michigan Tech Finishing Fellowship award 2011)
 Marika Dalton (Geology, 2009) – committee member
 Kateryna Lapina (Civil and Environmental Eng., 2009) – committee member

MS (all Michigan Tech)

Aurelia Liegler (Geology, 2014) - committee member
 Josep Cabré Brullas (Geology, 2014) - committee member
 John Wellik II (Geology, 2014) - committee co-chair
 Valeria Cigala (Geology, 2013) - committee member
 Lucie Krewcun (Geology, 2013) – committee chair
 Kelly Wooten (Geology, 2013) – committee chair
 Christine Sealing (Geology, 2013) – committee chair
 Estelle Bonny (Geology, 2013) – committee chair
 Tim Gebuhr (Forestry, 2013) – committee member
 Céline Mandon (Geology, 2012) – committee co-chair
 Hilary Morgan (Geology, 2012) – committee co-chair (NSF Graduate Fellowship Honorable Mention 2012)
 Anieri Morales-Rivera (Geology, 2011) – committee chair (NSF Graduate Fellowship Honorable Mention 2011)
 Dulcinea Avouris (Geology, 2011) – committee co-chair (Michigan Space Grant Consortium Graduate Fellowship 2011)
 Steven O'Dacre (Electrical Engineering, 2011) – committee member
 Petri Latva-Käyrä (Forestry, 2011) – committee member
 Nicole McMahon (Geophysics, 2011) – committee member

Professional development

2011	'Repurposing the classroom' workshop, Michigan Tech, Oct 20, 2011
2010	Attended NSF ADVANCE training session 'Making STRIDE: Faculty Recruitment for Diversity and Excellence' led by Dr. J. Wayne Jones (U Michigan), Michigan Tech, April 1, 2010
2010	Attended 2-day workshop on 'Teaching for Understanding in Science: Designing learner-centered instruction' led by Diane Ebert-Mey (Michigan State), Michigan Tech, June 3-4, 2010

Outreach activities and media

2011	Presentation on volcanology to 7-11 year old children at St. John's Primary School, Clifton, Bristol, UK, Oct 3, 2011
2010	Conducted several interviews for national and international newspapers and radio during the eruption of Eyjafjallajökull volcano (Iceland)
2007	Assisted production of outreach poster ('Sulfur in the Air') for NASA Aura Project
2005	Research featured in NOVA popular science TV program on Public Broadcasting Service (PBS) in the USA (http://www.pbs.org/wgbh/nova/volcanocity/)
2002 –	Contributor to NASA's Earth Observatory educational website (http://earthobservatory.nasa.gov)
2002 –	Moderator of Volcanic Clouds email list – a discussion forum for the volcanic cloud remote sensing community
2001 –	Contributor of volcanic activity reports to the Smithsonian Global Volcanism Program website (http://www.volcano.si.edu/)
2001 –	Developer of OMI/TOMS volcanic emissions website (http://so2.gsfc.nasa.gov)

University service

Chair, Graduate Committee, GMES, Michigan Tech (2013-)
Chair, Instructional Policy Committee, Michigan Tech (2013-)
Chair, Global Learning Goal Committee, Michigan Tech (2013-)
Member, Forestry Faculty Search Committee, Michigan Tech (2013-2014)
Geological Society of America campus representative (2011-)
Chair, Atmospheric Sciences Faculty Search Committee, GMES, Michigan Tech (2009-2010)
Member, Geology Lecturer Search Committee, GMES, Michigan Tech (2009)
Member, Forestry Faculty Search Committee, Michigan Tech (2008-2009)
Member, Graduate Committee, GMES, Michigan Tech (2008-)

Publications

Citation data (based on top 57 cited articles listed in Web of Science, as of December 2013)
Total citations: **1010**; Average citations per item: **17.7**; h-index: **20**

Refereed Journals and Monographs

* *Denotes student author*

Submitted or in prep.

Nadeau, P.A., C.A. Werner, G.P. Waite, **S.A. Carn**, I.D. Brewer, T. Elias, A.J. Sutton, C. Kern, M.R. Patrick (2014), Using SO₂ camera imagery to examine degassing and gas accumulation at Kilauea volcano, May 2010, *J. Volcanol. Geotherm. Res.*

Barnie, T., D. Keir, I. Hamling, B. Hofmann, M. Belachew, **S. Carn**, D. Eastwell, J.O.S. Hammond, A. Ayele, C. Oppenheimer, T. Wright (2014), Implications for patterns of volcanism during rifting from the concluding dike in the Manda Hararo dike sequence, *Geological Society, London, Special Publications*

Published/in press

72. *McCormick, B.T., M. Herzog, J. Yiang, M. Edmonds, T.A. Mather, **S.A. Carn**, S. Hidalgo, and B. Langmann (2014), A comparison of satellite- and ground-based measurements of SO₂ emissions from Tungurahua volcano, Ecuador, *J. Geophys. Res.*, doi: 10.1002/2013JD019771 (in press).

71. *Tortini, R., F.L. Bonali, C. Corazzato, **S.A. Carn**, and A. Tibaldi (2014), An innovative application of the Kinect in Earth Sciences: quantifying deformation in analogue modeling of volcanoes, *Terra Nova* (in press), <http://onlinelibrary.wiley.com/doi/10.1111/ter.12096/abstract>.

70. Smets, B., d'Oreye, N., Kervyn, F. Kervyn, M., Albino, F., Arellano, S., Bagalwa, C.B.M., **Carn, S.A.**, Darrah, T.H., Fernández, J., Galle, B., Gonzalez, P.J., Head, E.M., Karume, K., Kavotha, D., Lukaya, F., Mashagi, N., Mavonga, G.T., Norman, P., Osodundu, E., Pallero, J.L.G., Prieto, J.F., Samsonov, S., Sauswa, M., Tedesco, D., Tiampo, K., Wauthier, C., and Yalire, M.M. (2014), Detailed multidisciplinary monitoring reveals pre- and co-eruptive signals at Nyamulagira volcano (North Kivu, D.R.C.), *Bull. Volcanol.*, 76(1), doi: 10.1007/s00445-013-0787-1.

69. Sigmarsson, O., B. Haddadi, **S.A. Carn**, S. Moune, J. Gudnason, K. Yang, and L. Clarisse (2013), The sulfur budget of the 2011 Grímsvötn eruption, Iceland, *Geophys. Res. Lett.*, 40(23), 6095-6100, doi:10.1002/2013GL057760.

68. Yang, K., R.R. Dickerson, **S.A. Carn**, C. We, and J. Wang (2013), First observations of SO₂ from the satellite Suomi NPP OMPS: widespread air pollution events over China, *Geophys. Res. Lett.*, 40(18), 4957-4962, doi:10.1002/grl.50952.

67. **Carn, S.A.**, N.A. Krotkov, K. Yang, and A.J. Krueger (2013), Measuring global volcanic degassing with the Ozone Monitoring Instrument (OMI), In: Pyle, D.M., Mather, T.A. and Biggs, J. (eds) Remote Sensing of Volcanoes and Volcanic Processes: Integrating Observation and Modeling, *Geol. Soc. Lon, Special Publications*, 380, doi:10.1144/SP380.12.
66. *McCormick, B.T., M. Edmonds, T. Mather, R. Campion, C. Hayer, H.E. Thomas, and **S.A. Carn** (2013), Volcano monitoring applications of the Ozone Monitoring Instrument (OMI), In: Pyle, D.M., Mather, T.A. and Biggs, J. (eds) Remote Sensing of Volcanoes and Volcanic Processes: Integrating Observation and Modeling, *Geol. Soc. Lon, Special Publications*, 380, doi:10.1144/SP380.11.
65. Wang, J., S. Park, J. Zeng, C. Ge, K. Yang, **S.A. Carn**, N. Krotkov, and A. H. Omar (2013). Modeling of 2008 Kasatochi volcanic sulfate direct radiative forcing: assimilation of OMI SO₂ plume height data and comparison with MODIS and CALIOP observations. *Atmos. Chem. Phys.* 13, 1895-1912, <http://www.atmos-chem-phys.net/13/1895/2013/acp-13-1895-2013.html>.
64. Bursik, M., M. Jones, **S.A. Carn**, K. Dean, A. Patra, M. Pavolonis, E.B. Pitman, T. Singh, P. Singla, P. Webley, H. Bjornsson, and M. Ripepe (2012), Estimation and propagation of volcanic source parameter uncertainty in an ash transport and dispersal model: application to the Eyjafjallajökull plume of 14-16 April, 2010, *Bull. Volcanol.*, 74(10), 2321-2338.
63. *Hughes, E.J., L.C. Sparling, **S.A. Carn**, and A.J. Krueger (2012). Using horizontal transport characteristics to infer an emission height time-series of volcanic SO₂. *J. Geophys. Res.*, 117, D18307, doi:10.1029/2012JD017957.
62. Shen, X., T. Lee., J. Guo, X. Wang, P. Li, P. Xu, Y. Wang, Y. Ren, W. Wang, T. Wang, Y. Li, **S.A. Carn**, and J.L. Collett, Jr. (2012). Aqueous phase sulfate production in clouds in eastern China, *Atmos. Environ.* 62, 502-511.
61. Campion, R., M. Martinez-Cruz, T. Lecoq, C. Caudron, J. Pacheco, G. Pinardi, C. Hermans, **S.A. Carn**, and A. Bernard (2012). Space- and ground-based measurements of sulfur dioxide emissions from Turrialba volcano (Costa Rica). *Bull. Volcanol.* 74(7), 1757-1770, doi:10.1007/s00445-012-0631-z.
60. Kushendratno, J.S. Pallister, Kristianto, F.R. Bina, W. McCausland, **S.A. Carn**, N. Haerani, J. Griswold, and R. Keeler (2012). Recent explosive eruptions and volcano hazards at Sopotan volcano – a basalt stratovolcano in north Sulawesi, Indonesia, *Bull. Volcanol.*, 74(7), 1581-1609.
59. Surono, P. Jousset, J. Pallister, M. Boichu, M.F. Buongiorno, A. Budisantoso, F. Costa, S. Andreastuti, F. Prata, D. Schneider, L. Clarisse, H. Humaida, S. Sumarti, C. Bignami, J. Griswold, **S.A. Carn**, C. Oppenheimer and F. Lavigne (2012). The 2010 explosive eruption of Java's Merapi volcano – a '100-year' event, *J. Volcanol. Geotherm. Res.*, 241-242, 121-135, doi:10.1016/j.jvolgeores.2012.06.018.
58. *Head, E.M., A. Maclean, and **S.A. Carn** (2012). Mapping lava flows from Nyamuragira volcano (1967-2011) with satellite data and automated classification methods, *Geomatics, Natural Hazards and Risk*, 4(2), 119-144, doi:10.1080/19475705.2012.680503.
57. *Lopez. T.M., **S.A. Carn**, C. Werner, P. Kelly, M. Doukas, M. Pfeffer, D. Fee, P. Webley, C. Cahill, and D.J. Schneider (2012). Evaluation of Redoubt volcano's sulfur dioxide emissions by the Ozone Monitoring Instrument, *J. Volcanol. Geotherm. Res.*, <http://dx.doi.org/10.1016/j.jvolgeores.2012.03.002>, (in press).
56. Eck, T., B. Holben, J.S. Reid, D. Giles, M. Rivas, R. Singh, S. Tripathi, C. Bruegge, S. Platnick, G.T. Arnold, N. Krotkov, **S.A. Carn**, A. Sinyuk, O. Dubovik, A. Arola, J. Schafer, P. Artaxo, A. Smirnov, H. Chen, and P. Goloub (2012). Fog- and cloud-induced aerosol modification observed by the Aerosol Robotic Network (AERONET), *J. Geophys. Res.*, 117, D07206, doi:10.1029/2011JD016839.
55. *McCormick, B.T., M. Edmonds, T.A. Mather, and **S.A. Carn** (2012). First synoptic analysis of volcanic degassing in Papua New Guinea, *Geochem. Geophys. Geosyst.*, 13(3), Q03008, doi:10.1029/2011GC003945.

54. O'Neill, N.T., C. Perro, A. Saha, G. Lesins, T.J. Duck, E.W. Eloranta, G.J. Nott, A. Hoffman, M.L. Karumudi, C. Ritter, A. Bourassa, I. Abboud, **S.A. Carn**, and V. Savastiouk (2012). Properties of Sarychev sulphate aerosols over the Arctic, *J. Geophys. Res.*, 117, D04203, doi:10.1029/2011JD016838.
53. Bani, P., C. Oppenheimer, P. Allard, H. Shinohara, V. Tsanev, **S. Carn**, M. Lardy, and E. Garaebeti (2012). First arc-scale volcanic SO₂ budget for the Vanuatu archipelago, *J. Volcanol. Geotherm. Res.*, 211-212, 36-46, doi:10.1016/j.jvolgeores.2011.10.005.
52. *Head, E.M., A. Shaw, P. Wallace, K.W.W. Sims, and **S.A. Carn** (2011). Insight into volatile behavior at Nyamuragira volcano (D.R. Congo, Africa) through olivine-hosted melt inclusions, *Geochem., Geophys., Geosyst.*, 12, Q0AB11, doi:10.1029/2011GC003699.
51. **Carn, S.A.** and *T.M. Lopez (2011). Opportunistic validation of sulfur dioxide in the Sarychev Peak volcanic eruption cloud, *Atmos. Meas. Tech.*, 4, 1705-1712, doi:10.5194/amt-4-1705-2011.
50. *Thomas, H.E., I.M. Watson, **S.A. Carn**, A.J. Prata, and V.J. Realmuto (2011). A comparison of AIRS, MODIS and OMI sulphur dioxide retrievals in volcanic clouds, *Geomatics, Natural Hazards and Risk, Special Issue: Passive satellite techniques and ground-based investigations for volcanic activity monitoring*, 2(3), 217-232, doi:10.1080/19475705.2011.564212.
49. **Carn, S.A.**, K. Froyd, B.E. Anderson, P. Wennberg, J. Crouse, K. Spencer, J. Dibb, N.A. Krotkov, E.V. Browell, J.W. Hair, G. Diskin, G. Sachse, and S. Vay (2011). *In-situ* measurements of tropospheric volcanic plumes in Ecuador and Colombia during TC⁴, *J. Geophys. Res.*, 116, D00J24, doi:10.1029/2010JD014718.
48. Krotkov, N.A., M.R. Schoeberl, G.A. Morris, **S.A. Carn**, and K. Yang (2010). Dispersion and lifetime of the SO₂ cloud from the August 2008 Kasatochi eruption, *J. Geophys. Res., Okmok-Kasatochi Special Issue*, 115, D00L20, doi:10.1029/2010JD013984.
47. **Carn, S.A.**, and A.J. Prata (2010). Satellite-based constraints on explosive SO₂ release from Soufrière Hills volcano, Montserrat, *Geophys. Res. Lett.*, 37, L00E22, doi:10.1029/2010GL044971.
46. Yang, K., X. Liu, P.K. Bhartia, N.A. Krotkov, **S.A. Carn**, E. Hughes, A.J. Krueger, R. Spurr and S. Trahan (2010). Direct Retrieval of Sulfur Dioxide Amount and Altitude from Spaceborne Hyper-spectral UV Measurements: Theory and Application, *J. Geophys. Res., Okmok-Kasatochi Special Issue*, 115, D00L09, doi:10.1029/2010JD013982.
45. *Spinei, E., **S.A. Carn**, N.A. Krotkov, G.H. Mount, K. Yang, and A.J. Krueger (2010). Validation of OMI SO₂ measurements in the Okmok volcanic plume over Pullman, WA in July 2008. *J. Geophys. Res., Okmok-Kasatochi Special Issue*, 115, D00L08, doi:10.1029/2009JD013492.
44. *Ferguson, D.J., T.D. Barnie, D.M. Pyle, C. Oppenheimer, G. Yirgu, E. Lewi, T. Kidane, **S.A. Carn**, and I. Hamling (2010). Recent rift-related volcanism in Afar, Ethiopia, *Earth Planet. Sci. Lett.*, 292(3-4), 409-418, doi:10.1016/j.epsl.2010.02.010.
43. Prata, A.J., G.J.S. Bluth, C. Werner, V.J. Realmuto, **S.A. Carn**, and I.M. Watson (2010). Gas Emissions from Volcanoes, in *Monitoring Volcanoes in the North Pacific: Observations from Space*, eds. K.G. Dean and J. Dehn, ISBN: 978-3-540-24125-6, Springer-Praxis Books (in press).
42. Krueger, A.J., N. Krotkov, K. Yang, **S. Carn**, G. Vicente, and W. Schroeder (2009). Applications of satellite-based sulfur dioxide monitoring. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2(4), 293-298.
41. Bani, P., C. Oppenheimer, J.C. Varekamp, T. Quinou, M. Lardy, **S.A. Carn** (2009). Remarkable geochemical changes and degassing at Vouï crater lake, Ambae volcano, Vanuatu, *J. Volcanol. Geotherm. Res.*, 188(4), 347-357, doi: 10.1016/j.jvolgeores.2009.09.018.

40. Bani, P., C. Oppenheimer, V.I. Tsanev, **S.A. Carn**, S.J. Cronin, R. Crimp, J.A. Calkins, D. Charley, M. Lardy, and T.R. Roberts (2009). Surge in sulfur and halogen degassing from Ambrym volcano, Vanuatu, *Bull. Volcanol.*, 71(10), 1159-1168, [doi:10.1007/s00445-009-0293-7](https://doi.org/10.1007/s00445-009-0293-7).
39. **Carn, S.A.**, A.J. Krueger, N.A. Krotkov, K. Yang, and K. Evans (2009). Tracking volcanic sulfur dioxide clouds for aviation hazard mitigation. *Natural Hazards*, 51(2), 325-343, [doi:10.1007/s11069-008-9228-4](https://doi.org/10.1007/s11069-008-9228-4).
38. Martinsson, B.G., C.A.M. Brenninkmeijer, **S.A. Carn**, M. Hermann, K.-P. Heue, P.F.J. van Velthoven, and A. Zahn (2009). Influence of the 2008 Kasatochi volcanic eruption on sulfurous and carbonaceous aerosol constituents in the lower stratosphere. *Geophys. Res. Lett.*, 36, L12813, doi:10.1029/2009GL038735.
37. **Carn, S.A.**, J.S. Pallister, L. Lara, J.W. Ewert, S. Watt, A.J. Prata, R.J. Thomas, and G. Villarosa (2009). The unexpected awakening of Chaitén volcano, Chile, *EOS Trans. AGU*, 90(24), 205-206. [NASA Earth Science Research highlight]
36. *Kearney, C., I.M. Watson, G.J.S. Bluth, **S.A. Carn**, and V. Realmuto (2009). A Comparison of Thermal Infrared and Ultraviolet Retrievals of SO₂ in the Cloud Produced by the 2003 Al-Mishraq State Sulfur Plant Fire. *Geophys. Res. Lett.*, 36, L10807, doi:10.1029/2009GL038215.
35. Yang, K., X. Liu, N.A. Krotkov, A.J. Krueger and **S.A. Carn** (2009). Estimating the altitude of volcanic sulfur dioxide plumes from space-borne hyper-spectral UV measurements, *Geophys. Res. Lett.*, 36, L10803, doi:10.1029/2009GL038025.
34. *Thomas, H.E., I.M. Watson, C. Kearney, **S.A. Carn**, and S.J. Murray (2009). A multi-sensor comparison of sulphur dioxide emissions from the 2005 eruption of Sierra Negra volcano, Galápagos Islands. *Remote Sens. Environ.*, 113(6), 1331-1342, doi:10.1016/j.rse.2009.02.019.
33. Yang, K., N.A. Krotkov, A.J. Krueger, **S.A. Carn**, P.K. Bhartia, and P.F. Levelt (2009). Improving retrieval of volcanic sulfur dioxide from backscattered UV satellite observations. *Geophys. Res. Lett.*, 36, L03102, doi:10.1029/2008GL036036.
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13. Tupper, A., **S.A. Carn**, J. Davey, Y. Kamada, R. Potts, F. Prata, and M. Tokuno (2004). An evaluation of volcanic cloud detection techniques during recent significant eruptions in the western 'Ring of Fire'. *Rem. Sens. Environ.*, 91, 27-46, doi: 10.1016/j.rse.2004.02.004.
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2. Sigmarsson, O., ***S.A. Carn**, and J.C. Carracedo (1998). Systematics of U-series nuclides in primitive lavas from the 1730-36 eruption of Lanzarote, Canary Islands, and implications for the role of garnet pyroxenites during oceanic basalt formations. *Earth Planet. Sci. Lett.*, 162(1-4), 137-151.

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Book chapters (refereed)

1. **Carn, S.A.** (2001). Landform Monitoring. *Encyclopedia of Environmetrics*, John Wiley & Sons Ltd.

Non-refereed reports and software

2. **Carn, S.A.** (2011). OMIplot – OMI data analysis software in IDL. <https://vhub.org/resources/682>

1. G. Thompson, R. Watts, **S.A. Carn**, R. Nye, G. Norton, B. Voight, T. Syers, P. Williams, V. Bass, and D. Williams (2000). The 20 March, 2000, collapse of the November 1999 dome. *Montserrat Volcano Observatory Special Report 8, Montserrat Volcano Observatory, Montserrat, West Indies*.

Web-based publications and news items

- NASA Earth Observatory (2010) Image of the Day: Eruption at Mount Merapi, Indonesia. <http://earthobservatory.nasa.gov/IOTD/view.php?id=46881>
- Research highlighted in Michigan Tech Engineering Research Magazine 2010 (including cover image)
- Volcanic cloud research featured in [Sensing Our Planet: NASA Earth Science Research Features 2009](#)
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- NASA Earth Observatory Newsroom (2006) Eruption of Mount Nyamulagira (Nyamuragira). URL: http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=17483
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- NASA Earth Observatory Newsroom (2005) Sierra Negra erupts. URL: http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php3?img_id=13253
- NASA Earth Observatory Newsroom (2005) Sulfur dioxide leaks from Ambrym volcano. URL: http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php3?img_id=12795
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- NASA Earth Observatory Newsroom (2005) Eruption of Anatahan. URL: http://earthobservatory.nasa.gov/NaturalHazards/natural_hazards_v2.php3?img_id=12711
- UMBC website (2005) Studying Iraq Fire Pollution. URL: <http://www.umbc.edu/window/carn.html>
- Nature Online (2004) Iraqi fire pollution rivaled volcano. URL: <http://www.nature.com/news/2004/041025/full/041025-5.html>, doi:10.1038/news041025-5
- BBC Online (2004) Iraq sulphur fire breaks records. URL: <http://news.bbc.co.uk/1/hi/sci/tech/3955005.stm>
- NASA Earth Observatory Newsroom (2003) Sulfur dioxide plume lingers over Iraq. URL: http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=15349
- New Scientist (2002) Rainstorms could trigger killer eruptions. URL: <http://www.newscientist.com/news/news.jsp;jsessionid=ECAGKHHGHDB?id=ns99992755>

Invited talks and seminars

- 2013 IAVCEI General Assembly, Kagoshima, Japan, July 20-24, Session 3-5 (invited talk)
- 2013 Workshop on Satellite-Data-Driven Detection, Tracking and Modeling of Volcanic Hot Spots, Univ. Blaise Pascal, Clermont-Ferrand, France, May 27-30 (invited talk).
- 2013 6th WMO International Workshop on Volcanic Ash, Citeko, Java, Indonesia, Mar 10-15 (invited talk)
- 2013 Mini-Workshop on A-Train Science, Tokyo, Japan, Mar 8 (invited talk)
- 2012 Dept. of Geological Sciences, University of Minnesota – Duluth, Duluth, MN (invited seminar)
- 2012 Climate Change Institute, University of Maine, Orono, ME (invited seminar)
- 2012 EGU General Assembly, session GMPV4.4, Vienna, Austria, Apr 22-27 (invited talk)
- 2011 Conference on Remote Sensing, Natural Hazards and Environmental Change, CRISP/NUS, Singapore, Jul 28-29 (invited keynote)
- 2010 AGU Fall Meeting, Session V34, San Francisco, CA, Dec 13-17 (invited talk)
- 2010 International Symposium on the A-Train Satellite Constellation, New Orleans, LA, Oct 25-28 (invited plenary talk)
- 2010 NWS Alaska Aviation and Volcanic Ash Workshop, Anchorage, AK, Sep 20-23 (invited panel member).
- 2010 15th OMI Science Team Meeting, De Bilt, The Netherlands, June 15-17 (invited talk)
- 2010 USGS Workshop on Remote Sensing and GIS Modeling at Volcanoes, Earth Observatory of Singapore (EOS), Nanyang Technological University, Singapore, March 3-10 (invited lecturer)
- 2009 IAVCEI Commission on Explosive Volcanism workshop, Advances in Studies of Volcanic Plumes and Pyroclastic Density Currents, Clermont-Ferrand, France, Oct 26-29 (invited keynote).
- 2009 Advanced Workshop on Evaluating, Monitoring and Communicating Volcanic and Seismic Hazards in East Africa, co-sponsored by IAVCEI-IASPEI-NSF-UNAVCO-USAID, Trieste, Italy, Aug 17-28 (invited keynote).

- 2008 Cascades Volcano Observatory, Vancouver, WA, 6 Feb (invited seminar).
- 2007 Cities on Volcanoes 5 meeting, Shimabara, Japan, Nov 19-23 (invited talk).
- 2007 Michigan Technological University, Dept. of Geological and Mining Engineering and Sciences, Remote Sensing Institute seminar, 5 Nov.
- 2007 Woods Hole Oceanographic Institution, Dept. of Geology and Geophysics seminar, 26 Oct.
- 2007 International Volcanological Field School, Mutnovsky-Gorely volcanoes, Kamchatka, Russia, Jul 22 – Aug 5 (invited guest lecturer)
- 2007 AGU Joint Assembly, Session V41, Acapulco, Mexico, May 22-25 (invited talk)
- 2007 International Conference on Evolution, Transfer and Release of Magmas and Volcanic Gases, Academia Sinica, Taipei, April 22-27 (keynote)
- 2007 4th International Workshop on Volcanic Ash, Rotorua, New Zealand, Mar 22-25 (invited talk)
- 2006 AGU Fall Meeting, Session V43, San Francisco, CA, Dec 11-15 (invited talk)
- 2006 NASA Graduate Student Summer Program (GSSP) seminar series, NASA Goddard Space Flight Center, invited seminar, 26 July
- 2006 Cities on Volcanoes 4 meeting, Quito, Ecuador (invited talk)
- 2005 Michigan Technological University, Dept. of Geological and Mining Engineering and Sciences, Remote Sensing Institute seminar, 14 Nov
- 2005 Michigan Technological University, Dept. of Geological and Mining Engineering and Sciences, Remote Sensing Institute seminar, 21 Feb.
- 2003 University of Pittsburgh, Dept. Geology and Planetary Sciences Colloquium Series, 7 Nov.
- 2003 8th IAVCEI Field Workshop on Volcanic Gases, Nicaragua/Costa Rica, Mar 26 – Apr 1, Keynote speaker.

Abstracts and conference presentations (through Dec 2012)

* Denotes student author

153. Park, S., J. Wang, J. Zeng, K. Yang, **S.A. Carn**, N. Krotkov, and A. H. Omar, 2012, Modeling of 2008 Kasatochi volcanic sulfate direct radiative forcing: integrated use of OMI SO₂ plume height data and comparison with MODIS and CALIOP observations, *AGU Fall Meeting, San Francisco, CA, Dec 3-7* (poster).

152. Seftor, C., G. Jaross, R.D. McPeters, L.E. Flynn, **S.A. Carn**, N.A. Krotkov and O. Torres, 2012, Improving OMPS products through the use of high spatial resolution data, *AGU Fall Meeting, San Francisco, CA, Dec 3-7* (poster).

151. *McCormick, B., J. Yiang, M. Edmonds, T. Mather, **S.A. Carn**, S. Hidalgo, B. Langmann and M. Herzog, 2012, An integrated study of SO₂ degassing from Tungurahua volcano, Ecuador, *AGU Fall Meeting, San Francisco, CA, Dec 3-7* (poster).

150. *Tortini, R. and **S.A. Carn**, 2012, Volcanological applications of the Kinect sensor, *AGU Fall Meeting, San Francisco, CA, Dec 3-7* (talk).

149. **Carn, S.A.**, and F. Schwandner, 2012, Satellite-based constraints on tropospheric volcanic emissions of SO₂ and CO₂, *AGU Fall Meeting, San Francisco, CA, Dec 3-7* (poster).

148. *McCormick, B., J. Yiang, M. Edmonds, T. Mather, **S.A. Carn**, S. Hidalgo, B. Langmann and M. Herzog, 2012, Integrating ground- and satellite-based monitoring of volcanic SO₂ degassing, *Cities on Volcanoes 7 meeting, Colima, Mexico, Nov 19-23* (poster).

147. Rodriguez, L., C. Reyes, A. Morales, J. Marrero, **S.A. Carn**, W. Morrow, C. Ramirez, G. Gonzalez, R. Mora-Amador, and M. Taras, 2012, SO₂ fluxes in volcanic clouds from active volcanoes in Costa Rica, determined using OMI satellite images and ground-based measurements, *Cities on Volcanoes 7 meeting, Colima, Mexico, Nov 19-23* (poster).

146. **Carn S.A.**, K. Yang, and V.J.B. Flower, 2012, Satellite-based assessment of global volcanic degassing, *Cities on Volcanoes 7 meeting, Colima, Mexico, Nov 19-23* (talk).

145. **Carn, S.A.**, N.A. Krotkov, and A.J. Krueger, 2012, Three decades of satellite monitoring of Hawaiian volcanic sulfur dioxide emissions, *AGU Chapman Conference on Hawaiian volcanoes: from source to surface, Waikoloa, Hawaii, Aug 20-24* (poster).
144. *Flower, V.J.B., **S.A. Carn**, and R. Wright, 2012, Synergistic monitoring of Hawaiian volcanic activity from space, *AGU Chapman Conference on Hawaiian volcanoes: from source to surface, Waikoloa, Hawaii, Aug 20-24* (poster).
143. Schwandner, F.M., and **S.A. Carn**, 2012, Detecting volcanic CO₂ anomalies from space using GOSAT SWIR FTS target-mode data, *Asia Oceania Geosciences Society (AOGS) – AGU Joint Assembly, Singapore, Aug 13-17* (invited talk).
142. **Carn S.A.**, K. Yang, J. Wang, S. Park, and A.J. Prata, 2012, Satellite measurements and modeling of the 2011 Nabro (Eritrea) volcanic clouds, *AGU Chapman Conference on Volcanism and the Atmosphere, Selfoss, Iceland, Jun 10-15* (talk and poster).
141. *McCormick, B., J. Yiang, M. Edmonds, T. Mather, **S.A. Carn**, S. Hidalgo, B. Langmann and M. Herzog, 2012, Validating OMI measurements of tropospheric volcanic SO₂, *AGU Chapman Conference on Volcanism and the Atmosphere, Selfoss, Iceland, Jun 10-15* (poster).
140. **Carn S.A.**, K. Yang, and A.J. Prata, 2012, A-Train Satellite Observations of Recent Explosive Eruptions in Iceland and Chile, *EGU General Assembly, Vienna, Austria, Apr 22-27* (invited talk).
139. Schwandner, F.M., **S.A. Carn**, S. Corradini, L. Merucci, G. Salerno, and A. La Spina, 2012, Space-borne detection of volcanic carbon dioxide anomalies: the importance of ground-based validation networks, *EGU General Assembly, Vienna, Austria, Apr 22-27* (invited talk).
138. **Carn S.A.**, D. Fee, and A.J. Prata, 2012, Remote detection of monitoring of volcanic eruptions in the East African Rift, *Magmatic Rifting and Active Volcanism Conference, Addis Ababa, Ethiopia, Jan 11-13* (talk).
137. **Carn S.A.**, A.J. Prata, K. Yang, and W.I. Rose, 2011, A-Train Observations of Young Volcanic Eruption Clouds, *AGU Fall Meeting, San Francisco, CA, Dec 5-9* (poster).
136. **Carn, S.A.**, 2011, Monitoring global volcanic degassing from space: progress and prospects, *William Smith Meeting on Remote Sensing of Volcanoes and Volcanic Processes: integrating observations and modeling, Geological Society, London, UK, Oct 4-5* (talk).
135. **Carn, S.A.**, 2011, Remote sensing of volcanic emissions in the Asia-Pacific region, *Conference on Remote Sensing, Natural Hazards and Environmental Change, CRISP/NUS, Singapore, Jul 28-29* (invited keynote).
134. **Carn, S.A.**, J. Wang, K. Yang, A.J. Prata and L. Clarisse, 2011, Satellite measurements and modeling of the 2010 Merapi volcanic eruption clouds, *XXV IUGG General Assembly, Melbourne, Australia, Jun 27 – Jul 8* (talk).
133. Wang, J., S. Park, X. Xu, J. Zeng, K. Yang and **S.A. Carn**, 2011, Estimate of volcanic aerosol forcing by combined use of OMI SO₂ data and GEOS-Chem, *5th International GEOS-Chem Scientific and Users Meeting, Cambridge, MA, May 2-5* (talk).
132. **Carn, S.A.**, A.J. Prata, A.J. Durant and W.I. Rose, 2010, Satellite remote sensing of the 2008 Chaitén eruption, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (invited talk).
131. **Carn, S.A.**, J. Wang, K. Yang, and N.A. Krotkov, 2010, Sulfur budget of the 2010 Eyjafjallajökull eruption derived from satellite observations, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (talk).
130. *Head, E.M., **S.A. Carn**, and G.J.S. Bluth, 2010, Galapagos Islands volcanic SO₂ emissions (1979-2009), *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).

129. *Nadeau, P.A., C.A. Werner, G.P. Waite, I.D. Brewer, **S.A. Carn**, T. Elias, M.P. Poland, A.J. Sutton, and D. Wilson, 2010, Ultraviolet imaging of volcanic SO₂: implementation as part of a multidisciplinary approach to studying summit activity at Kilauea volcano, Hawaii, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (invited poster).
128. *Thomas, H.E., A.J. Prata, **S.A. Carn**, L. Clarisse, and I.W. Watson, 2010, Separation of volcanic ash and sulfur dioxide from the Eyjafjallajökull eruption, April-May 2010, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
127. Schwandner, F.M., **S.A. Carn**, E.M. Head, and C.G. Newhall, 2010, Volcanic carbon dioxide emissions: observation strategies using GOSAT FTS SWIR data, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
126. Bursik, M.I., **S.A. Carn**, K.G. Dean, A.K. Patra, M.J. Pavolonis, E. Pitman, P. Singla, T. Singh, and P. Webley, 2010, Ensemble modeling of the Eyjafjallajökull plume of 15-20 April 2010, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
125. Yang, K., X. Liu, N.A. Krotkov, P.K. Bhartia, **S.A. Carn**, and A.J. Krueger, 2010, Eyjafjallajökull eruptions: direct SO₂ plume height estimation and enhanced ash detection with OMI, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
124. Hendratno, K., J.S. Pallister, W.A. McCausland, M. Kristianto, F.R. Bina, **S.A. Carn**, N. Haerani, J. Griswold, and R. Keeler, 2010, 2006-2008 eruptions and volcano hazards of Sopotan volcano, North Sulawesi, Indonesia, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
123. Perro, C.W., T.J. Duck, L. Bitar, G.J. Nott, G.B. Lesins, N.T. O'Neill, E. Eloranta, K. Strong, **S.A. Carn**, R. Lindenmaier, R. Batchelor, A. Saha, C. Pike-Thackray, and J.R. Drummond, 2010, Sarychev volcanic aerosol and chemical measurements over Eureka, Canada, *AGU Fall Meeting, San Francisco, CA, Dec 13-17* (poster).
122. **Carn, S.A.**, A.J. Prata, K. Yang, and N.A. Krotkov, 2010, New perspectives on volcanic clouds from the A-Train, *International A-Train Symposium, New Orleans, LA, Oct 25-28* (invited plenary talk).
121. **Carn, S.A.**, N.A. Krotkov, K. Yang, and A.J. Prata, 2010, A-Train observations of the 2010 eruption of Eyjafjallajökull volcano (Iceland), *Aura Science Team Meeting, Boulder, CO, Sep 27-29* (talk).
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