

Josef Dufek, Ph.D.
Lillis Professor of Volcanology
Department of Earth Sciences
University of Oregon

I. Earned Degrees

Ph.D.	Earth and Space Sciences	2006	University of Washington (advisor: G. Bergantz)
M.S.	Geology	2004	University of Washington
B.S.	Geophysical Sciences	2000	University of Chicago

II Employment History

2006-2008	Miller Postdoctoral Fellow, University of California, Berkeley
2008-2013	Assistant Professor, School of Earth and Atmospheric Science, Georgia Institute of Technology
2012-2014	Blanchard-Milliken Young Faculty Chair, Georgia Institute of Technology
2013-2016	Associate Professor, School of Earth and Atmospheric Science, Georgia Institute of Technology
2016 -	Professor, School of Earth and Atmospheric Science, Georgia Institute of Technology (promotion effective date July 1, 2016).
2014-2018	Associate Chair, School of Earth and Atmospheric Science, Georgia Institute of Technology
2018 – present	Lillis Professor of Volcanology, Department of Earth Sciences, University of Oregon

III Honors and Awards

2014	Kavli Frontiers of Science Fellow (National Academy)
2012	AGU Fellow
2012	Macelwane Medal (AGU Union Award)
2012	Blanchard-Milliken College of Science Faculty Fellowship
2012	NSF CAREER Award
2011	George Walker Award (IAVCEI)
2010	H. Kuno Early Career Award (AGU,VGP Section)
2006	Miller Postdoctoral Fellowship
2004	AGU student paper award
2004	David Johnston Award for graduate research
2004	NASA Earth Systems Science Fellowship
2001	National Defense Science and Engineering Fellowship
2001	NSF Graduate Fellowship, declined to receive National Defense Fellowship
2001	Achievement Rewards for College Scientists (ARCS) Fellowship
1996-2000	University of Chicago Honors Scholarship
1996	United States Senate Youth Scholarship (program sponsored by the William Randolph Hearst Foundation and U.S. Senate)
1996	Robert C. Byrd Honors Scholarship

IV. Research, Scholarship, and Creative Activities

(* indicates work done at Georgia Tech)

(# indicates Dufek group student/postdoc)

A1. Books

No data

A2. Refereed Book Chapters

***Dufek, J.**, Huber, C#, and Karlstrom, L. 2010. *Magma Chamber Dynamics and Thermodynamics*, Book Chapter, In **Modeling Volcanic Processes, The Physics and Mathematics of Volcanism**, Cambridge University Press.

A3. Other Parts of Books

No data

A4. Edited Volumes

No data

B. Refereed Publications and Submitted Articles

B1. Published and Accepted Journal Articles

57. *Karakas, O.#, Degruyter, W., Bachmann, O. and **Dufek, J.** (2017) *Crustal-scale magmatism and its impact on growth and longevity of reservoirs*, **Nature Geoscience**, 10, 446-450
56. *Karakas, O.#, **Dufek, J.**, Mangan, M.T., Wright, H. and Bachmann, O. (2017) *Thermal and petrologic constraints on lower crustal melt accumulation under the Salton Sea Geothermal Field*, **Earth and Planetary Science Letters**, 467, 10-17.
55. * Qiao, L.#, Head, J. W., Wilson, L., Xiao, L., and **Dufek, J.** (2017) *Ina Pit Crater on the Moon: Origin as a Drained Summit Lava Lake Modified by Seismic Sieving*, **Geology**, 45, 455-458 .
54. *Mendez-Harper, J#, McDonald, G., **Dufek, J.**, Malaska, M.J., Burr, D.M., Hayes, A.G., McAdams, J. , Wray, J. (2017) *Electrification of sand on Titan and its influence on sediment transport*. **Nature Geoscience**, 10 (4), 260-265.
53. *Breard, E.#, Lube, G., Jones, J., **Dufek, J.**, Cronin, S., Valentine, G., Moebis, A. (2016), *Revealing the internal structure of pyroclastic flows*, **Nature Geosciences**, 9, 767-771.
52. *Mendez-Harper, J.# and **Dufek, J.** (2016) *The effects of granular dynamics on ash tribocharging*. **Journal of Geophysical Research**. DOI:10.1002/2015JD024275.
- 51.* Benage, M.#, **Dufek, J.**, Mothes, P.A. (2016) *Quantifying entrainment in pyroclastic density currents from the Tungurahua eruption, Ecuador: Integrating field proxies with numerical simulations*, **Geophysical Research Letters**, DOI:10.1002/2016GL069527.
50. ***Dufek, J.** (2016) *The Fluid Dynamics of Pyroclastic Density Currents*. **Annual Reviews of Fluid Mechanics**, Invited Contribution, 48, 459-489.
- 49.* Sliwinski, J., Bachmann, O., Ellis, B., Pablo, D.H., Nelson, B. and **Dufek, J.** (2015) *Eruption of shallow crystal cumulates during caldera-forming events on Tenerife, Canary Islands*. **Journal of Petrology**, doi: 10.1093/ptrology/egv068.
- 48.* Lillis, R., **Dufek, J.**, Kiefer, W., Black, B., Manga, M., Richardson, J. and Bleacher, J. (2015). *The Syrtis Major volcano, Mars: a multidisciplinary approach to interpreting its magmatic evolution and structural development*. **Journal of Geophysical Research**, 120, 1476-1496.
- 47*. Karakas, O.# and **Dufek, J.** (2015) *Melt generation and residence in extensional environments: Modeling the thermal evolution of crustal magmas*. **Earth and Planetary Science Letters**, 425, 131-144.

- 46*. **Dufek, J.**, O. Roche, and T. Ongaro, (2015) *Pyroclastic density currents: processes and models* in **Encyclopedia of Volcanoes**. (Academic Press).
- 45*. Rader, E., Geist, D., Geissman, J., **Dufek, J.**, and Harpp, K., (2015) *Hot clasts and cold blasts: thermal heterogeneity in boiling-over pyroclastic density currents*. **Geological Society of London**, Special Publications, Volume 396.
- 44*. Young, C.#, Sokolik, I., Flanner, M. and **Dufek, J.** (2014) *Surface radiative impacts of ash deposits from the 2009 eruption of Mt. Redoubt*. **Journal of Geophysical Research – Atmospheres**, 119, 11,387-11,397.
- 43*. Myers, M., Geist, D. Rowe, M. Harpp, K., Wallace, P. and **Dufek, J.** (2014) *Replenishment of volatile-rich mafic magma into a degassed chamber drives mixing and eruption of Tungurahua volcano*, in press, **Bulletin of Volcanology**, Volume 76, 1-17.
- 42*. Benage, M.#, **Dufek, J.**, Degruyter, W.*, Geist, D., Harpp, K., Rader, E. (2014) *Tying Textures of Breadcrust Bombs to their Transport Regime and Cooling History*. **Journal of Volcanology and Geothermal Research**, 274, 92-107.
- 41*. Young, C.#, **Dufek, J.** and Sokolik, I. (2014) *Assessment of depositional ash loadings from the 2009 eruption of Mt. Redoubt*. **Journal of Volcanology and Geothermal Research**. 274, 122-138.
- 40*. Wray, J., Hansen, S., **Dufek, J.** et al. (2013) *Prolonged magmatic activity on Mars inferred from the detection of felsic rocks*. 2013. **Nature Geoscience**, 6m 1013-1017 doi:10.1038/ngeo1994.
- 39*. Telling, J.#, **Dufek, J.** and Shaikh, A.* (2013) *Ash aggregation in explosive volcanic eruptions*. **Geophysical Research Letters**, Vol. 40, 2355–2360
38. Huber, C., Parmigiani, A., Latt, J. and **Dufek, J.** (2013) *Channelization of buoyant nonwetting fluids in saturated porous media*, **Water Resources Research**, 49 (10), 6371-6380.
- 37*. Estep, J#., and **Dufek, J.** (2013) *Discrete Element Simulations of Bed Force Anomalies due to Force Chains in Dense Granular flows*. 2013. **Journal of Volcanology and Geothermal Research**, Vol. 254, 108-117.
- 36*. Huber, C., Su, Y., Nguyen, C., Parmigiani, A., Gonnermann, H., and **Dufek, J.**, (2014) *A new bubble dynamics model to study bubble growth, deformation and coalescence*, **Journal of Geophysical Research**, 119, doi:10.1002/2013JB010419.
- 35*. Nguyen, C., Gonnermann, H., Chen, Y., Huber, C., **Dufek, J.**, Maiorano, A., and Gouldstone, A. (2013) *Film drainage and the lifetime of bubbles*, **Geochemistry, Geophysics, Geosystems**, DOI: 10.1002/ggge.20198
- 34*. **Dufek, J.**, Patel, A., and Manga, M. (2012) *Granular Disruption During Explosive Volcanic Eruptions*, **Nature Geoscience**, August 2012, DOI: 10.1038/NGEO1524.
- 33*. Young, C.L#., Sokolik, I.N., and **Dufek, J.** (2012) *Assessment of regional radiative effects from the 2009 eruption of Redoubt volcano aided by NASA A-train data*, *Atmospheric Chemistry and Physics*. Volume 12, Issue 8, pp.3699-3715.

- 32*. Huber, C., Bachmann O., Vignerresse, J.L., **Dufek J.**, Parmigiani A. (2012), *A physical model for metal extraction and transport in shallow magmatic systems*, **Geochemistry, Geophysics and Geosystems**, 13 (8).
- 31*. Estep, J.# and **Dufek, J.** (2012) *Substrate effects from force chain dynamics in dense granular flows*. 2012. **Journal of Geophysical Research, Earth Surface**. Volume 117, Issue F1, F01028.
- 30*. Manga, M., Patel, A., **Dufek, J.** and Kite, E. (2012) *Wet surface and dense atmosphere on early Mars suggested by the bomb sag at Home Plate, Mars*. **Geophysical Research Letters**, V.39, Article Number L01202.
- 29*. Estep, J.# and **Dufek, J.** (2012) *Discrete Element Simulations of Bed Force Anomalies due to Force Chains in Dense Granular flows*. **Journal of Volcanology and Geothermal Research**. 254, 108-117.
- 28*. Huber, C., Bachmann, O. and **Dufek, J.** (2012) *Crystal-poor versus crystal-rich ignimbrites: A competition between stirring and reactivation*. **Geology**, 40, 115-118.
- 27*. Telling, J.# and **Dufek, J.** (2012) *An experimental evaluation of the role of water vapor and collisional energy on ash aggregation in explosive volcanic eruptions*. **Journal of Volcanology and Geothermal Research**. V. 209-210, 1-8.
- 26*. Huber, C., **Dufek, J.** and Chopard, B. (2011) *A simple algorithm to enforce Dirichlet boundary conditions in complex geometries*, **International Journal of Modern Physics C**, DOI No: 10.1142/S0129183111016774.
- 25*. Deering, C.D., Bachmann, O., **Dufek, J.** and Gravley, D.M. (2011) *Rift-related transition from andesite to rhyolite in the Taupo Volcanic Zone (New Zealand) controlled by crystal-melt dynamics in mush zones with variable mineral assemblages*. **Journal of Petrology**, 52 (11), 2243-2263.
- 24*. Manga, M., Patel, A., and **Dufek, J.** (2010) *Rounding of pumice clasts during transport: field measurements and laboratory studies*. **Bulletin of Volcanology**, 73 (3), 321-333.
- 23*. **Dufek, J.** and Bachmann, O. (2010) *Quantum magmatism: Magmatic compositional gaps generated by melt-crystal dynamics*. **Geology**, V38, Is. 8, 687-690.
- 22*. Huber, C.#, Bachmann, O., **Dufek, J.** (2010) *The limitations of melting in the rejuvenation of silicic crystal mushes*. 2010. **Journal of Volcanology and Geothermal Research**. V195, Is. 2-4, 97-105.
- 21*. Stroberg, T.W., Manga, M., and **Dufek, J.** (2010) *Heat Transfer Coefficient of Natural Volcanic Clasts*. **Journal of Volcanology and Geothermal Research**. V. 194, Is. 4, 214-219.
- 20*. Huber, C., Bachmann, O , **Dufek, J.** (2011) *Thermo-mechanical reactivation of locked crystal mushes: melting-induced internal fracturation and assimilation processes in magmas*. **Earth and Planetary Science Letters**, V. 304, Issue 3-4, 443-454.
- 19*. Lathem, T.L., Kumar, P, Nenes, A., **Dufek, J.**, Sokolik, I., Trail, M., Russell, A. (2011) *The hygroscopic properties of volcanic ash*, **Geophysical Research Letters**, 38 (11).

- 18*. **Dufek, J.**, Huber, C#, and Karlstrom, L. (2010). *Magma Chamber Dynamics and Thermodynamics*, Book Chapter, In **Modeling Volcanic Processes, The Physics and Mathematics of Volcanism**, Cambridge University Press
- 17*. Karlstrom, L., **Dufek, J.** and Manga, M (2010) *Magma Chamber Stability in arc and continental crust*. **Journal of Volcanology and Geothermal Research**, 190, 249-270.
- 16*. **Dufek, J.**, Wexler, J. , and Manga, M. (2009) *The Transport Capacity of Pyroclastic Flows: Experiments and Models of Substrate-Flow Interaction*. **Journal of Geophysical Research**, 114, B11203. DOI: 10.1029/2008JB006216.
- 15*. Karlstrom, L. , **Dufek, J.** and Manga, M. (2009) *Organization of volcanic plumbing through magmatic lensing by magma chambers and volcanic loads*. **Journal of Geophysical Research**, 114, B10204, DOI: 10.1029/2009JB006339.
- 14*. Lillis, R.J., **Dufek, J.**, Bleacher, J.E., and Manga, M., (2009). *Thermal demagnetization of crust by magmatic intrusion in southwestern Tharsis, Mars*. **Journal of Volcanology and Geothermal Research**. 185. 123-138.
- 13*. **Dufek, J.** and Manga, M., (2008). *The In-Situ Production of Ash in Pyroclastic Flows*. **Journal of Geophysical Research**, 113, B09207, doi:10.1029/2007JB005555.
- 12*. Leeman, W.P., Annen, C., and **Dufek, J.**, (2008) *Snake River Plain-Yellowstone silicic volcanism: implications for magma genesis and crustal evolution*. **Geological Society of London**. 304 (1), 235-259.
- 11*. Ruprecht, P., Bergantz, G., and **Dufek, J.**, (2008) *Modeling of Gas-Driven Magmatic Overturn: Tracking of Phenocryst Dispersal and Gathering During Magma Mixing*. **Geochemistry, Geophysics, Geosystems**, 9, Q07017, doi:10.1029/2008GC002022.
10. **Dufek, J.** and Bergantz, G.W., (2007). *The dynamics and deposits generated by the Kos Plateau Tuff eruption: I. The control of basal particle loss on pyroclastic flow transport*. **Geochemistry, Geophysics, Geosystems**, 8, doi:10.1029/2007GC001741.
9. **Dufek, J.**, Manga, M. and Staedter, M., (2007). *Littoral Blasts: Pumice-water heat transfer and the conditions for steam explosions when pyroclastic flows enter the ocean*. **Journal of Geophysical Research**, 112, B11201, doi:10.1029/2006JB004910.
8. **Dufek, J.** and Bergantz, G.W., (2007). *The suspended-load and bed-load transport of particle laden gravity currents: Insight from pyroclastic flows that traverse water*, **Theoretical and Computational Fluid Dynamics**, 21, 119-145.
7. **Dufek, J.** and Cooper, K.M. (2006) Radium excess generated in the lower crust: Comment and Reply. **Geology**. 34 (1), e104.
6. **Dufek, J.** and Bergantz, G.W., (2005). *Lower Crustal Magma Genesis and Preservation: A Stochastic Framework for the Evaluation of Basalt-Crust Interaction*, **Journal of Petrology**. 46, 2167-2195.
5. **Dufek, J.** and Bergantz, G.W., (2005). *Transient two-dimensional dynamics in the upper conduit of a rhyolitic eruption: A comparison of closure models for the granular stress*, *Journal of Volcanology and Geothermal Research*, 143, 113-132.

4. Herrick, R.R., **Dufek, J.** and McGovern, P.J., 2005. *The Evolution of Large Shield Volcanoes on Venus*. **Journal of Geophysical Research**, Vol. 110. (EO1002), 1-19.
3. **Dufek, J.** and Cooper, K.M., (2005). *$(^{226}\text{Ra})/(^{230}\text{Th})$ excess generated in the upper mantle and lower crust: Implications for magma transport and storage time scales*. **Geology**. 33 (10), 833-836.
2. Petcovic, H.L. and **Dufek, J.**, (2005). *Modeling of Magma Flow and Cooling Dikes: Implications for Emplacement of Columbia River Flood Basalts*. **Journal of Geophysical Research**, Vol. 110 (B10201), 1-15.
1. Wallace, P.J., **Dufek, J.**, Anderson, A.T., and Zhang, X.Y., (2003). *Cooling rates of Plinian-fall and pyroclastic-flow deposits in the Bishop Tuff: inferences from water speciation in quartz hosted glass inclusion*, **Bulletin Of Volcanology**, 65 (3), 105-123.

B2. Submitted Journal Articles

59. *Mendez-Harper, J#, Dufek, J., Cimarelli, C., and Thomas, R., (2017) *Volcanic overpressure and the near-vent electrical panorama*, submitted to Nature.
58. *Mendez-Harper, J#, Cimarelli, C. and Dufek, J. (2017) *Near-vent lightning: fragmentation or triboelectric charging?*, submitted to Geophysical Research Letters.

C. Other Publications

Dufek, J. (2006). *The ascent and eruption of arc magmas: A physical examination of the genesis, rates and dynamics of silicic volcanism*. Ph.D. Dissertation. University of Washington.

D. Presentations

Keynote addresses and Invited Seminars and Talks:

- 1) *The Fluid Dynamics of Pyroclastic Density Currents*, **Keynote talk at International Meeting of Multiphase Flow**, Florence Italy, May 2016.
- 2) *The Fluid Dynamics of Explosive Volcanic Eruptions*, **University of Oregon Fluid Dynamics Seminar**. April 2016.
- 3) *Multiphase Flow in Crustal Magmatic Processes*, **Cambridge University, Newton Institute**, Feb., 2016.
- 4) *The generation and eruption of large silicic magma bodies*, **University of Illinois Department Seminar**, Oct. 2015
- 5) *The production and residence time of magmas in the crust*, **Keynote Gordon Conference**, June 2015.
- 6) *The fluid mechanics of pyroclastic density currents*, **Canterbury University, New Zealand**, April 2015.

- 7) *Supereruptions and crustal growth*, **University of Utah Geological Sciences Department Seminar**, April 2015.
- 8) *Multiscale Approaches to Geophysical Flows: Deciphering Emergent Order in High Energy Volcanic Eruptions*. **Brown University Department Seminar**, Fall 2015.
- 9) *The Distribution and Separation of Crystals from Melt During Magmatic Evolution*, **American Geophysical Union, Invited Talk**. Dec. 2014
- 10) *The Assembly and Dynamics of Explosive Volcanic Eruptions*, **American Museum of Natural History, NY**, March 2014.
- 11) *Tying Textures of Breadcrust Bombs to their Transport Regime and Cooling History*, **American Geophysical Union, Invited Talk**, December 2013.
- 12) *Multiscale Approaches to Geophysical Flows: Deciphering Emergent Order in High Energy Volcanic Eruptions*. **Department Seminar in Geology and Geophysics, Yale University**, October 2013.
- 13) *The Physics of Volcanic Eruptions*, **Department Seminar in Physics, Emory University**, September 2013.
- 14) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **University of Florida Seminar Series**, April 2013.
- 15) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **University of Chicago Geophysical Sciences Seminar Series**, April 2013.
- 16) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **University of South Florida Seminar Series**, Feb. 2013.
- 17) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **Harvard Solid Earth Seminar Series**, Feb. 2013).
- 18) *Multidisciplinary Approaches to Magma Dynamics*, **University of Wisconsin Department Seminar Series**, Scheduled Feb. 2013
- 19) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **Cornell Earth and Atmospheric Science Seminar Series**, Jan. 2013).
- 20) *Granular Dynamics in Geologic Processes*, **University of Texas Institute of Geophysics Seminar Series**, November, 2012.
- 21) *Controls on the evolving grain size distribution of ash in explosive eruptions and feedback in vent proximal dynamics*, **AGU Invited Talk**, December, 2012.
- 22) *A Multiphase Assessment of Melt Segregation, Residence Time and Compositional Evolution in Crustal Magmatic Systems*, **AGU Invited Talk**, Scheduled December, 2012.
- 23) *Multiphase Magmatism: Integrating Geophysical and Geochemical Perspectives*, **University of Washington Seminar**, March, 2012.

- 24) *Multiscale Approaches to Geophysical Flows: Deciphering Emergent Order in High Energy Volcanic Eruptions*, **Princeton University Seminar**, February, 2012.
- 25) *Understanding the generation and emplacement of batholiths in space and time*, **4D Adamello Conference, Keynote Speaker, Bagolino, Italy, 2012.**
- 26) *Multiphase Magmatism: From Crustal Construction to Eruptive Dynamics*, **USC Department Seminar Series**, April, 2012.
- 27) *Emergent Dynamics in Multiphase Geophysical Flows: From Magma Chambers to Atmospheric Dynamics*, **Caltech Department Seminar**, October 2011.
- 28) *Melt Segregation in Crustal Magmatic Systems: A Coupled Dynamics and Thermodynamics Approach*. **Invited Presentation. Fall AGU**, Dec. 2011.
- 29) *Granular Disruption During Explosive Volcanic Eruptions*. **Invited Presentation. Fall AGU**. Dec. 2011.
- 30) *Instabilities in Eruptive Columns, Insight from Mt. St. Helens and Eyjafjallajokull Eruptions*. **DTM, Carnegie Institution of Washington Seminar Series**, May, 2011.
- 31) *Microphysical processes in magma chambers and explosive eruptions*, **Stanford Department of Geology Seminar Series**, January, 2011.
- 32) *Multiphase Explosions on Mars: Numerical Studies of Phreatomagmatic Blast Dynamics*. Invited Presentation. Fall AGU, Dec. 2010.
- 33) *The Production and Detection of Magmatic Compositional Gaps: A Consideration of Nested Probabilities in Crustal Evolution*. Invited Presentation. Fall AGU, Dec. 2010.
- 34) *Geophysical Fluid Dynamics – Volcanoes*, **Keynote Talk**, Mathematical Geophysics, Pisa, Italy, Scheduled June 2010.
- 35) *Quantum magmatism: The Probability of Magma Chamber Melt Extraction From a Dynamics Perspective*, **Invited Presentation**. Fall American Geophysical Union Meeting, December 2009.
- 36) *Emergent Flow Dynamics in Volcanic Flows: Insight From Multiphase Modeling*, **Invited Presentation**. Fall American Geophysical Union Meeting, December 2009.
- 37) *Multiscale Eruption Dynamics*, **Virginia Tech Department Seminar**, November 2009.
- 38) *Multiscale Dynamics in Explosive Volcanic Eruptions*, **Scripps Institution of Oceanography Department Seminar**, January 2010.
- 39) *Integrating Experiments and Numerical Models of Geophysical Multiphase Flow*. ASME Forum on Multiphase Processes in Geophysical and Environmental Flows. **Invited Meeting Presentation**. August 2009.
- 40) *Melt Extraction and Accumulation in the Deep Mantle*, Cooperative Institute for Deep Earth Research, **Keynote Presentation**. May 2009.

- 41) *Timescales and Dynamics of Caldera Forming Eruptions*. **Portland State University Department of Geology Seminar**, April 2009.
- 42) *Multi-scale Dynamics during Volcanic Eruptions*. **University of Georgia Department of Geology Seminar**, January 2009.
- 443) *Multi-scale Dynamics during Volcanic Eruptions*. **Georgia Institute of Technology Department of Physics Seminar**, October 2008.
- 44) *Microphysical Processes in Volcanic Flows*. **Cascades Volcano Observatory (USGS), Hazards Seminar**, April 2008.
- 45) *Transitional dynamics in pyroclastic density currents: Integrating multi-scale observations with macroscopic models of explosive volcanic activity*, Natural Disasters in Small Communities Conference, **Keynote Presentation**, March 2008.
- 46) *Self-organization in geophysical transport processes: Integrating multi-scale observations with macroscopic models of explosive volcanic activity*. **USGS Volcanoes Hazards Seminar Series, Menlo Park, CA**, March 2008.
- 47) *Thermal and Dynamic Constraints on Crustal Growth and Preservation*. Vanderbilt University, **Department of Earth and Environmental Sciences Seminar**, February 2008.
- 48) *From Vent to Deposit: Self-organization in granular and turbulent multiphase flows*. **University of California, Davis, Department of Geology Seminar**. January 2008.
- 49) *Multi-scale dynamics near the Moho: The role of mass and energy exchange between the crust, sub-continental lithosphere and asthenosphere in crustal development*. **Invited Presentation**. Fall American Geophysical Union Meeting, December 2007.
- 50) *Self-Organization in Geophysical Multiphase Flows*, **MIT Department of Earth and Planetary Science Seminar**, March 2007.
- 51) *High-Energy Multiphase Flows: The Transport and Deposition of Volcanically Initiated Gravity Currents*. **Princeton University Department of Geological Sciences Seminar**. April 2007.
- 52) *The Dynamics of Explosive Volcanic Eruptions: Linking computational, experimental and field approaches*. **University of Oregon Department of Geology Seminar**. May 2007.
- 53) *Microphysical Processes in Pyroclastic Flows*. **University of California, Santa Cruz, Department of Geology Seminar**. October 2007.
- 54) *Linking Deposits to Dynamics in Explosive Volcanic Eruptions: Advances and Open Questions in Geophysical Multiphase Flow*. **University of British Columbia, Complex Fluids Seminar**. March 2007.
- 55) *Dynamical Constraints on the Life Cycle of Voluminous Silicic Systems: How to Build, Maintain, and Destroy Shallow Silicic Magma Bodies*. **Invited Presentation**. Fall American Geophysical Union Meeting, December 2007.

- 56) *Modeling the dynamics of turbulent multiphase gravity currents: the importance of geologically diverse boundary conditions.* **Invited Presentation.** International Union of Geodesy and Geophysics, Perugia Italy. July 2007.
- 57) *Progress in Linking the Dynamics of Volcanic Eruptions with Geophysical and Depositional Observations.* **University of California, Berkeley, Seismology Seminar.** October 2006.
- 58) *Accessing the dynamics and timescales of large, caldera-forming eruptions.* **Caltech Department of Geological and Planetary Sciences Seminar.** November, 2006.
- 59) *Self-organization in geophysical transport processes: Integrating multi-scale observations with macroscopic models of explosive volcanic eruption.* **University of Maryland, Department of Geology Seminar,** February 2006.
- 60) *Self-organization in geophysical transport processes: Integrating multi-scale observations with macroscopic models of explosive volcanic eruption.* **Georgia Institute of Technology, School of Earth and Atmospheric Sciences Seminar,** February 2006.
- 61) *The dynamics of explosive volcanic eruption: Insight from field and numerical studies.* **Rice University, Department of Earth Science Seminar,** April 2006.
- 62) *Using Natural Boundary Conditions to Probe the Internal Dynamics of Pyroclastic Flows: Mass, Enthalpy and Momentum Transfer at the Flow-Bed Interface.* **Invited Presentation.** Fall American Geophysical Union Meeting. December 2006.
- 63) *Multiphase Geophysical Flows.* **University of British Columbia, Seminar in the Department of Earth and Ocean Sciences,** February, 2005.
- 64) *The Multiphase Characterization of Volcanic Phenomena: A Comparison of Numerical and Experimental Approaches.* **Invited Presentation,** American Geophysical Union (AGU) Meeting, December 2005.
- 65) *The Over-water Mobility of Pyroclastic Flows: Linking the Physics at the Flow-Sea Interface with the Depositional Record.* **Arizona State University, Seminar in the Department of Geological Sciences,** November 2004.
- 66) *The Over-Water Transport of Pyroclastic Flows: A Coupled Grain Size Distribution and Multi-fluid Numerical Approach.* **Keynote Talk.** International Association of Volcanology and Chemistry of the Earth's Interior Meeting (IAVCEI), November 2004.
- 67) *Physical and Temporal Controls on Lower Crustal Melting and Mixing: Mass and Enthalpy Transport in Actively Growing Arcs.* **Invited Talk.** American Geophysical Union Meeting (AGU), December 2004.

Other Conference Presentations (Non-Exhaustive List)

Mendez, J.# and Dufek, J. The microphysics of ash tribocharging: New insights from laboratory experiments, presented at 2014 Fall Meeting AGU, San Francisco, CA. *Won AGU student paper award.*

- Estep, J.# and **Dufek, J.** *Analog and numerical experiments investigating force chain influences on bed conditions in granular flows*, presented at 2013 Fall Meeting AGU, San Francisco, CA. *Won AGU student paper award.*
- Karakas, O.# and **Dufek, J.** *Thermal Evolution of Crustal Magmatic Systems in Extensional Settings*, presented at 2013 Fall Meeting, AGU, San Francisco, CA.
- Mendez, J.# and **Dufek, J.** *The Generation of Lightning in Volcanic Plumes: The Microphysics of Ash in Triboelectric Charging*, presented at 2013 Fall Meeting, AGU, San Francisco, CA.
- Benage, M.#, **Dufek, J.** and Degruyter, W.* *Modeling Breadcrust Bombs to Better Understand Their Transport Mechanisms and Thermal History*, presented at 2012 Fall Meeting AGU.
- Fullerton, K.#, Paty, C., **Dufek, J.**, Waite, J., Teolis, B. and Magee, B. *Multiphase Modeling of Dusty Eruptions on Enceladus*, 2012 Fall AGU.
- Rajendar, A.#, **Dufek, J.** Roberts, J. and Paty, C. *Melt Segregation and Tidal Heating at Io*. Abstract P11D-1611, presented at 2011 Fall Meeting, AGU, San Francisco, Calif.
- Estep, J.# and **Dufek, J.** *Discrete Element Modeling of Bed Force Anomalies due to Force Chains in Dense Granular Flows*. Abstract EP21D-04. presented at 2011 Fall Meeting, AGU, San Francisco, Calif.
- Benage, M.#, **Dufek, J.**, Geist, D. and Harpp, K. *Surge Across the Chambo: Entrainment, topographical influences, and flow transformation of pyroclastic density currents using a combined field and multiphase modeling approach*. Abstract EP31C-0827. presented at 2011 Fall Meeting, AGU, San Francisco, Calif.
- Dufek, J.** and Miers, J.# 2010. *Multiphase Dynamics in the Eyjafjallajokull Eruption*. Abstract V54C-05 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Telling, J.# and **Dufek, J.** 2010. *Ash aggregation in explosive volcanic eruptions*. Abstract NG23A-1370 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
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- Wexler, J S; **Dufek, J**; Manga, M. 2007. *Experimental and numerical investigation of the boundary conditions of over-water pyroclastic flows*. Eos, Transactions, American Geophysical Union, vol. 88, no. 52, Suppl., Abstract V31E-0704.
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- Dufek, Josef D;** Bergantz, George W. 2002. *A stochastic evaluation of the dynamical and thermal response of the lower crust to progressive basaltic input; applications to MASH zone dynamics.* Eos, Transactions, American Geophysical Union, vol.83, no.47, Suppl., pp.1417.
- Davis, A M; **Dufek, J D;** Wadhwa, M. 2001. *Euhedral phosphate grains in vugs and vesicles in ordinary chondrites, lunar samples and the Ibitira eucrite; implications for trace element transport processes.* Meteoritics & Planetary Science, vol.36, no.9, Suppl., pp.47.
- Dufek, Josef D;** Herrick, Robert R. 2000. *Comparison of extinct and active large shield volcanoes on Venus.* Abstracts of Papers Submitted to the Lunar and Planetary Science Conference, vol. 31, abstr. no. 1447.

E. Grants and Contracts

E1. As Principal Investigator

Currently Funded:

Title: *The interaction of Pyroclastic Density Currents with the Atmosphere and Landscapes*
Agency: NSF, Geochemistry & Petrology
Amount requested: \$292,404
Period: Jan 1: 2017 – Dec. 31 2020

Title: *Collaborative Research: Constraining the flux of magma and magmatic CO₂ during early-stage rifting in East Africa*
Agency: NSF, GeoPRISMS
Amount requested: \$67,120
Period: July 1, 2017 – July 1, 2020

Title of Project:
“CAREER: The Role of Proximal Dynamics and Particle Aggregation in Ash Dispersal: An Educational, Numerical, Field and Laboratory Approach”
Agency: NSF
Total Dollar Amount: \$470,000
Role: PI
No Collaborators
Period of Contract: 1/1/12 – 1/1/17,

Title of Project:
“Dynamics of caldera-scale rhyolitic magma systems”
Agency: NSF
Total Dollar Amount: \$2,593,026 (\$335K at Dufek’s Institution)
Role: PI (1 of 3)
Collaborators: Singer (Wisconsin, Project Director, PI), Keranen (Cornell, PI)
Period of Contract: 6/1/14 – 5/31/19,

Previous funding:
Title of Project:
“Accomplishment Based Renewal: Multiscale Dynamics in Explosive Volcanic Eruptions”
Agency: NSF
Total Dollar Amount: \$382,385
Period of Contract: 7/1/12 - 7/1/15

Title of Project:
“Collaborative Research: Windows of Opportunity: Exploring the Controls on the Depths of Eruption-forming Silicic Magma Bodies Using Improved Thermodynamics and Dynamics Models”
Agency: NSF
Total Dollar Amount: \$218,228
Period of contract: 8/1/13 - 8/1/15

Title of Project:
“Plume Morphology on Europa: Assessment of the Driving Forces, Multiphase Plume Dynamics, and Plasma Environment”
Agency: Jet Propulsion Laboratory
Total Dollar Amount: \$78,829

Period of Contract: 7/21/2014-7/21/2015

Title of Project:

“Multi-scale dynamics in explosive volcanic eruptions”

Agency: NSF

Total Dollar Amount: \$344,964

Period of Contract: 9/1/08 – 9/1/11

Title of Project:

“Boiling-over Pyroclastic Flows “

Agency: NSF

Total Dollar Amount: \$311,596

Period of Contract: 1/1/09 – 1/1/12

Title of Project:

“The Dynamics of Explosive Phreatomagmatic Events on Mars: The Role of Atmospheric Pressure in Determining Eruptive Style and Deposit Architecture”

Agency: NASA

Total Dollar Amount: \$242,419

Period of Contract: 6/1/09 – 5/31/12

Title of Project:

“A Closer Look at the May 18th, 1980 Pumice Plain Deposits: Implications for Assessing Eruptive Conditions and Pyroclastic Density Current Dynamics”

Agency: NSF

Total Dollar Amount: \$369,400

Period of Contract: 1/1/10 – 12/31/12

Title of Project:

“Eruptive Potential of Silicic Magmas: Thermodynamic and Fluid Dynamics Modeling, and Implications to the Evolution of Selected Natural Systems”

Agency: NSF

Total Dollar Amount: \$413,224

Period of Contract: 6/1/10-5/31/13

Title of Project:

“Development of Hands-on Fluid Dynamics Modules for EAS”

Internal Georgia Tech Technology Fund

Total Dollar Amount: \$24,400

Period of contract: 2011

E2. As Co-Principal Investigator

Currently Funded:

Title: Collaborative Research: ENH: Physical modeling of submarine volcanic eruption generated tsunamis

Agency: NSF

Amount Requested: \$659,000

Period: July 1, 2016 – Feb. 1, 2019

Location: Georgia Institute of Technology

Title: Magma waves, magma wagging and volcanic oscillations
Agency: NSF, Geophysics
Amount requested: \$638,826 (Oregon subcontract: \$111,392)
Period: Jan 1: 2017 – Dec. 31 2020
Location: Yale University

Previous Funding:

Title of Project:

“The magmatic history of Tharsis: Insight from thermal, mechanical and magnetic field modeling”

Agency: NASA

Total Dollar Amount: \$314,494

Role: Co-PI

Period of Contract: 6/1/09 – 5/31/12

Title of Project:

“Enceladus’ Plume: Coupling Eruptive Dynamics to Plasma Dynamics”

Agency: NASA

Total Dollar Amount: \$280,000

Period of Contract: 5/1/2011 – 4/30/2014

Title of Project:

“Heterogeneous Bubble Dynamics in Volcanic Conduits”

Agency: NSF

Total Dollar Amount: \$292,061

Role: Co-PI

Period of Contract: 1/1/13-1/1/15

F. Other Scholarly Accomplishments

No Data.

G. Societal and Policy Impacts

- Annual course for media on volcanism (at CNN International Headquarters)
- Explained current eruptive episodes on CNN, Weather Channel, Discovery Channel, and local Fox and NBC affiliates.
- Roundtable panel of future of volcanology for National Research Council 2012

H. Other Professional Activities

No Data.

V. Teaching

A. Courses Taught

<u>Semester, Year</u>	<u>Course Number</u>	<u>Course Title</u>	<u>Number of Students</u>
Spring, 2009	4803/8803	Physical Volcanology	6

Fall, 2009	8803	Physical Volcanology	7
Spring, 2010	4803/8803	Geofluids	18
Fall, 2010	8801	Multiphase Flow	7
Spring, 2011	4803/8803	Geofluids	6
Spring, 2011	8803JD2	Natural Hazards	16
Fall, 2012	4331/6331	Physical Volcanology	10
Spring, 2013	4803/8803JD	Volcanic Field Methods	12
Spring, 2013	4803/8803JD2	Geofluids	10
Spring, 2014	4420	Environ. Field Methods	8
Spring, 2014	4331/6331	Physical Volcanology	16
Spring, 2014	8803	Volcanic Terrains	9
Spring, 2015	8803	Geofluids	11

B. Individual Student Guidance

B1. PhD Students

1. Jennifer Telling (PhD, 2013), Microphysics of ash aggregation and base surge dynamics
Undergraduate Institution: Colgate University
Currently a postdoctoral researcher at Michigan Tech/NASA Goddard.
2. Cindy Young (PhD 2014), Remote sensing of eruptions using A-Train Satellites
Undergraduate Institution: Georgia Tech
Currently a postdoctoral researcher at Emory.
3. Joe Estep, (PhD, 2014) Granular flows and force chain dynamics
Undergraduate Institution: Georgia Tech
AGU Student Paper Award Winner.
Currently a geophysicist at Chevron.
4. Mary Benage (PhD, 2015), Boiling-over eruption dynamics at Tungurahua, Ecuador
Undergraduate Institution: Colorado Mesa University
DOE Computational Sciences Graduate Fellowship
NSF Graduate Fellowship
5. Ozge Karakas (PhD, 2015), Tectonic forcing and melt production
Undergraduate Institution: Middle East Technical University
6. Josh Mendez (PhD, 2017), Microphysical processes, charging, and instrument design
Undergraduate Institution: Boston University
Georgia Tech Presidential Fellowship
NSF Graduate Fellowship
AGU Student Paper Award
Blue Waters Computational Fellowship
7. Taryn Black, Eruption dynamics, granular instabilities
Undergraduate Institution: University of Washington
Georgia Tech Presidential Fellowship
NSF Graduate Fellowship
8. Ryan Cahalan, Submarine eruptions, entrainment

Undergraduate Institution: University of Texas
AGU Student Paper Award
NSF Graduate Fellowship

9. Gabe Eggers (Co-advised), Mars magma/crustal evolution
Undergraduate Institution: Princeton University
Georgia Tech Presidential Fellowship
10. Amelia Winner, Granular Dynamics
Undergraduate Institution: Penn State

B2. Masters Students

1. Molly Lindle (Masters, 2011) Contact electrification and charge separation in volcanic plumes.

B3. Undergraduate Students

1. Dan Arrington (graduated)
2. Afshan Shaikh (graduated)
3. Kathleen Warrell (graduated)
4. Cindi Jackson (graduated)
5. Andrew Gase (graduated)
6. Chris Harper

B4. Postdoctoral Researchers

1. Chris Huber, Numerical investigations of pore-scale processes (2009-2011)
2. Domenico Doronzo, Pyroclastic Flow Dynamics (2011 - 2012)
3. Wim Degruyter, Conduit Dynamics (2013 - 2015)
4. Leah Courtland, Microphysics (2013 - 2015)
5. James Cowlyn, Pyroclastic Flow-Ice Interaction (2017 -)
6. Eric Breard, Multiphase Experiments and Simulations (2017 -)
7. Nathan Andersen, Magma Chamber Evolution, Laguna del Maule (2017 -)

VI. Service

A. Professional Activities

Associate Editor, Bulletin of Volcanology, 2016 - Present
AGU VGP Macelwane Committee Chair, 2014 - Present
Center Interdisciplinary Deep Earth Research (CIDER) Instructor of 2 week course in Berkeley, CA
Summer 2013
AGU VGP Education and Outreach Committee: 2010 – 2014.
AGU VGP Macelwane Committee: 2013 – Present.
AGU Ambassador Award Committee: 2013 – Present.
Computational Infrastructure for Geodynamics Representative: 2011 – Present
VHUB (Community wide cyber-infrastructure project) Steering Committee: 2009 – Present.

Journal Review

Earth and Planetary Science Letters, Journal of Geophysical Research, Journal of Volcanology and Geothermal Research, Bulletin of Volcanology, Journal of Theoretical and Computational Fluid

Dynamics, Journal of Geology, Journal of Petrology, Tectonophysics, Geophysical Research Letters, Journal of Applied Mathematics, Nature, Nature Geoscience, Icarus.

Proposal Reviewer:

- *National Science Foundation, Geochemistry and Petrology Program
And panel member for 1 year rotation*
- *National Science Foundation, Geophysics Program.*
- *National Science Foundation, CSEDI*
- *NASA Mars Fundamental Research Program*
- *NASA Outer Planets*
- *NASA Solar System Workings*

Membership in Professional Societies

American Geophysical Union, 2000- Present.

Geological Society of America, 2000- Present.

B. Public and Community Service

Government workshops:

Invited member of NRC group that produced a report on the future of volcanology (2012).

Participated in NRC meeting on future of volcanology and reviewed the report (2016).

Media outreach:

Conducted annual daylong workshops for media (held at CNN International Headquarters) on volcanology and volcanic hazards.

C. Institute Contributions

Associate Chair, Earth and Atmospheric Science, 2014 – 2018

EAS Promotion and Tenure (Co-Chair, 2014- Present)

EAS Faculty Search Committee: 2008-2009, 2012-2013 (Planetary and Solid Earth)

EAS Chair Search Committee: 2012-2014.

Physics Chair Search Committee: 2013

EAS Graduate Admissions Committee: 2008- Present.

EAS Graduate Admissions Committee, Chair, 2013 – Present.

EAS Awards Committee: 2009-2011.

EAS Postdoctoral Committee (Chair): 2010-Present.

EAS Chair Advisory Committee. 2011 – 2014

EAS Computing Committee, 2014 – Present