

## Curriculum Vitæ – Richard Foa Katz

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### ACADEMIC POSITIONS

- 2015– **Professor of Geodynamics**, Department of Earth Sciences, Univ. Oxford, UK.  
2011–15 **Associate Professor**, Department of Earth Sciences, University of Oxford, UK.  
2012 **Visiting Researcher**, Earthquake Research Institute, Univ. Tokyo, Japan.  
2007–12 **Research Councils UK Academic Fellow**, Department of Earth Science, University of Oxford, UK.  
2006–08 **Senior Research Fellow**, Institute of Theoretical Geophysics, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, UK.  
2006 **Postdoctoral Researcher**, Lamont-Doherty Earth Obs., Columbia Univ., NY.

### EDUCATION

- 2006 **PhD with distinction**, Columbia University, NYC, NY, USA. Dissertation: *The Deep Roots of Volcanoes: Models of Magma Dynamics with Applications to Subduction Zones*, supervisor: Marc Spiegelman.  
2000 **BA Cum Laude**, Cornell University, Ithaca, NY, USA.

### AWARDS

- 2015 Editors' Citation for Excellence in Refereeing from *G-Cubed*.  
2013 Outstanding Reviewer award from *Geophysical Journal International*.  
2012 **The Philip Leverhulme Prize**.  
2012 The European Geosciences Union's **Division Outstanding Young Scientist Award for the Division on Geodynamics**.  
2008 My [paper](#) on wax tectonics is a **10th Anniversary Highlight** of *New J. Phys.*

### GRANTS AND FELLOWSHIPS

- 20/09/23 **Africa–Oxford Catalyst Grant**. [*expired*] £5k over 6 weeks to support an Oxford visit by PI Dr. Ikenna Obasi (Fed. Univ. Lokoja) to develop models of groundwater hydrology for the Abakaliki region of Nigeria.  
01/09/22 **Leverhulme Research Grant**. [*awarded*] £214k over three years to hire one PDRA to study tidally forced porous flow in planets and moons. With Co-Is Ian Hewitt (Oxford) & Bert Vermeersen (Delft). Leverhulme ref. RPG-2021-199.  
01/03/19 **European Research Council Consolidator Grant**. [*awarded*] €2M over five years to hire two PDRAs and one student to study magma-assisted tectonics of mid-ocean ridges and continental rifts. RIFT-O-MAT, ERC ref. 772255.  
01/04/18 **Deep Carbon Observatory of the Sloan Foundation grant**. [*expired*] \$750k over 18 months to continue development of two-phase simulations of carbon transport and a modelling forum for carbon circulation. With PI Prof. L. Kellogg (UC Davis).  
01/05/17 **NERC/NSF Collaborative Grant**. [*expired*] £240k over three years to develop two-phase models of temperate ice at ice-stream margins. Co-PIs Hewitt (Oxford), Iverson (Iowa State) and Zoet (Wisconsin). Ref. NE/R000026/1.  
01/11/15 **Deep Carbon Observatory of the Sloan Foundation grant**. [*expired*] \$700k over 2 years to develop two-phase simulations of carbon transport and a modelling forum for carbon circulation. With PI Prof. L. Kellogg and Co-I Prof. S. Mukhopadhyay (UC Davis).

- 01/03/15 **Royal Society International Exchanges Grant.** [*expired*] £12k over 2 years to develop 3D simulations of sea-ice formation and brine circulation with adaptive mesh refinement. With Prof. Andrew Wells, AOPP/Oxford.
- 01/09/14 **NERC Consortium Grant.** [*expired*] £2.25M over five years. ~20 Co-Is; To investigate terrestrial volatile cycles through the solid Earth. NERC ref. NE/M000427/1.
- 01/12/10 **NERC Standard Grant.** [*expired*] £338k over three years. Four PIs; collaborative between Cambridge and Oxford. To develop finite element models of magma dynamics. NERC ref. NE/I026995/1.
- 14/10/10 **European Research Council Starter Grant.** [*expired*] €1.4M over five years to hire two PDRAs and one student to study coupling of climate with magmatism at mid-ocean ridges. ISMAGiC, ERC ref. 279925.
- 04/09/10 **Royal Society Travel Grant.** [*expired*] £4000 to support a 1-month Oxford visit by Prof. Y. Takei of ERI, Tokyo in 2011.
- 01/08/09 **Natural Environmental Research Council New Investigator Grant.** [*expired*] “Coupled models of magma/mantle dynamics: melt transport at mid-ocean ridges and subduction zones.” £55k over two years for personal salary support, overhead, travel, consumables. NERC ref. NE/H00081X/1.
- 01/09/06 **US National Science Foundation International Research Fellowship Program.** [*expired*] \$163,057 over two years covering salary, travel, research expenses. NSF award #0602101.

#### MANUSCRIPTS IN REVIEW/REVISION/PRESS

- Turner, S.J., I.P. Savov, T.A. Mather, **R.F. Katz**, D.W. Rees Jones, D.M. Pyle, J.C.M. de Hoog, S.F.L. Watt. Volcanic arc structure controlled by liquid focusing from the slab—evidence from boron isotopes and trace elements. [10.31223/X5MM7V](https://doi.org/10.31223/X5MM7V)
- Kiernan, M.B.C., H.C.F.C. Hay, D.W. Rees Jones, J.F.J. Bryson & **R.F. Katz**. Lunar tides of Earth’s core and basal magma ocean.

#### PUBLICATIONS

- 2026 Davis, T., Y. Li, A.E. Pusok, **R.F. Katz**. Megadyke propagation down dynamic topography. *Proc. Roy. Soc. A.* [10.1098/rspa.2025.0733](https://doi.org/10.1098/rspa.2025.0733)
- 2025 Hay, H.C.F.C, I. Hewitt, M. Rovira-Navarro & **R.F. Katz**. Poro-viscoelastic tides of Io. *Proc. Roy. Soc. A.* [10.1098/rspa.2025.0607](https://doi.org/10.1098/rspa.2025.0607)
- Haseloff, M., I. Hewitt & **R.F. Katz**. Subglacial hydrology regulates oscillations in marine ice streams. *The Cryosphere.* [10.5194/tc-19-5939-2025](https://doi.org/10.5194/tc-19-5939-2025)
- Zhang, H., **R.F. Katz** and L.A. Stevens. Viscoelastic mechanics of tidally induced lake drainage in the Amery grounding zone. *The Cryosphere.* [10.5194/tc-19-2087-2025](https://doi.org/10.5194/tc-19-2087-2025).
- Pusok, A.E., Y. Li, T. Davis, D. May & **R.F. Katz**. Inefficient melt transport across a weakened lithosphere led to reduced magmatism in the Turkana Depression. *Geophys. Res. Lett.* [10.1029/2025GL115228](https://doi.org/10.1029/2025GL115228).
- Li, Y., T. Davis, A.E. Pusok & **R.F. Katz**. Models of buoyancy-driven dykes using continuum plasticity and fracture mechanics: a comparison. *Geosci. Model Devel.* [10.5194/egusphere-2024-3504](https://doi.org/10.5194/egusphere-2024-3504)
- 2024 **Katz, R.F.**, J.F. Rudge and L.N. Hansen. Dilatancy and non-local fluidity of partially molten rock. *J. Fluid Mech.* [10.1017/jfm.2023.1003](https://doi.org/10.1017/jfm.2023.1003).

- Hay, H.C.F.C., I. Hewitt and **R.F. Katz**. Tidal forcing in icy-satellite oceans drives mean circulation and ice-shell torques. *J. Geophys. Res. Planets*, [10.1029/2024JE008408](https://doi.org/10.1029/2024JE008408).
- Kearney, L.M., **R.F. Katz**, C.W. MacMinn, C. Kirkham and J. Cartwright. Episodic fluid venting from sedimentary basins fuelled by pressurised mudstones. *PNAS*. [10.1073/pnas.2312152121](https://doi.org/10.1073/pnas.2312152121).
- 2023 Breithaupt, T., **R.F. Katz**, L. Hansen and K. Kumamoto. Dislocation theory of steady and transient creep of crystalline solids: predictions for olivine. *PNAS*. [10.1073/pnas.2203448120](https://doi.org/10.1073/pnas.2203448120).
- Kearney, L.M., C.W. MacMinn, **R.F. Katz**, C. Kirkham and J. Cartwright. Episodic, compression-driven fluid venting in layered sedimentary basins. *Proc. Roy. Soc. A*. [10.1098/rspa.2022.0654](https://doi.org/10.1098/rspa.2022.0654).
- Li, Y., A. Pusok, T. Davis, D.A. May, **R.F. Katz**, Continuum approximation of dyking with a theory for poro-viscoelastic–viscoplastic deformation. *Geophys. J. Int.* [10.1093/gji/ggad173](https://doi.org/10.1093/gji/ggad173).
- Davis, T., E. Rivalta, D. Smittarello and **R.F. Katz**. Ascent rates of 3D fractures driven by a finite batch of buoyant fluid. *J. Fluid Mech.* [10.1017/jfm.2022.986](https://doi.org/10.1017/jfm.2022.986).
- Hooker J.N., **R.F. Katz**, S.E. Laubach, J. Cartwright, P. Eichhubl, E. Ukar, D. Bloomfield, T. Engelder. Fracture-pattern growth in the deep, chemically reactive subsurface. *J. Structural Geol.* [10.1016/j.jsg.2023.104915](https://doi.org/10.1016/j.jsg.2023.104915).
- 2022 **Katz, R.F.** The Dynamics of Partially Molten Rock, Princeton University Press. [Website](#).
- Huybers, P., P. Liautaud, C. Proistosescu, B. Boulahanis, S. Carbotte, **R.F. Katz** and C. Langmuir. Influence of late Pleistocene sea-level variations on mid-ocean ridge spacing in faulting simulations and a global analysis of bathymetry. *PNAS*. [10.1073/pnas.2204761119](https://doi.org/10.1073/pnas.2204761119).
- **Katz, R.F.**, D.W. Rees Jones, J.F. Rudge and T. Keller. Physics of melt extraction from the mantle: speed and style. *Ann. Rev. Earth Planet. Sci.* [10.1146/annurev-earth-032320-083704](https://doi.org/10.1146/annurev-earth-032320-083704).
- Zhang, H., T. Davis, **R.F. Katz**, L.A. Stevens and D.A. May. Basal hydrofractures near sticky patches. *J. Glaciology*. [10.1017/jog.2022.75](https://doi.org/10.1017/jog.2022.75).
- Pusok, A., **R.F. Katz**, Y. Li and D. May. Chemical heterogeneity, convection and asymmetry beneath mid-ocean ridges. *Geophys. J. Int.* [10.1093/gji/ggac309](https://doi.org/10.1093/gji/ggac309).
- Rovira-Navarro, M., **R.F. Katz**, Y. Liao, W. van der Wal, F. Nimmo. The tides of Enceladus’ porous core. *JGR Planets* [10.1029/2021JE007117](https://doi.org/10.1029/2021JE007117).
- 2021 Rees Jones, D.W., H. Zhang and **R.F. Katz**. Magmatic channelisation by reactive and shear-driven instabilities at mid-ocean ridges: a combined analysis. *Geophys. J. Int.* [10.1093/gji/ggab112](https://doi.org/10.1093/gji/ggab112).
- Breithaupt, T., L. Hansen, S. Toppaladoddi and **R.F. Katz**. The role of grain-environment heterogeneity in normal grain growth: a stochastic approach. *Acta Materialia*. [10.1016/j.actamat.2021.116699](https://doi.org/10.1016/j.actamat.2021.116699).
- Spencer, D., **R.F. Katz** and I.J. Hewitt. Tidal controls on the lithospheric thickness and topography of Io from magmatic segregation and volcanism modelling. *Icarus*. [10.1016/j.icarus.2021.114352](https://doi.org/10.1016/j.icarus.2021.114352).
- 2020 Spencer, D., **R.F. Katz** and I.J. Hewitt. Magmatic intrusions control Io’s crustal thickness. *JGR Planets*. [10.1029/2020JE006443](https://doi.org/10.1029/2020JE006443).

- Spencer, D., **R.F. Katz**, I.J. Hewitt, D.A. May and L. Keszthelyi. Compositional layering in Io driven by magmatic segregation and volcanism. *JGR Planets*. [10.1029/2020JE006604](https://doi.org/10.1029/2020JE006604).
- 2019 Cerpa, N., D.W. Rees Jones and **R.F. Katz**. Consequences of glacial cycles for magmatism and carbon transport at mid-ocean ridges. *EPSL*. [10.1016/j.epsl.2019.115845](https://doi.org/10.1016/j.epsl.2019.115845)
- Haseloff, M., I.J. Hewitt and **R.F. Katz**. Englacial pore-water localises shear in temperate ice-stream margins. *JGR Earth Surface*. [10.1029/2019JF005399](https://doi.org/10.1029/2019JF005399)
- Tian, M., **R.F. Katz**, D.W. Rees Jones. Devolatilization of Subducting Slabs, Part I: Thermodynamic Parameterization and Open System Effects. *G-cubed*. [10.1029/2019GC008488](https://doi.org/10.1029/2019GC008488)
- Tian, M., **R.F. Katz**, D.W. Rees Jones, D. May. Devolatilization of Subducting Slabs, Part II: Volatile Fluxes and Storage. *G-cubed*. [10.1029/2019GC008489](https://doi.org/10.1029/2019GC008489)
- Parkinson, J., D. Martin, A. Wells and **R.F. Katz**. Modelling binary alloy solidification with Adaptive Mesh Refinement. *J. Comp. Phys*. [10.1016/j.jcp.2019.100043](https://doi.org/10.1016/j.jcp.2019.100043)
- Lichtenberg T., T. Keller, **R.F. Katz**, G. Golabek and T. Gerya, Magma ascent in planetesimals: control by grain size. *EPSL*. [10.1016/j.epsl.2018.11.034](https://doi.org/10.1016/j.epsl.2018.11.034)
- 2018 Rees Jones D.W., **R.F. Katz**, J.F. Rudge and M. Tian, Thermal impact of magmatism in subduction zones. *EPSL*. [10.1016/j.epsl.2017.10.015](https://doi.org/10.1016/j.epsl.2017.10.015)
- Bo, T., **R.F. Katz**, O. Shorttle and J.F. Rudge. The melting column as a filter of mantle trace-element heterogeneity. *G-cubed*. [10.1029/2018GC007880](https://doi.org/10.1029/2018GC007880)
- Rees Jones D.W. and **R.F. Katz**. Reaction-infiltration instability in a compacting porous medium. *J. Fluid Mech*. [10.1017/jfm.2018.524](https://doi.org/10.1017/jfm.2018.524)
- 2017 Keller T., **R.F. Katz** and M.M. Hirschmann. Volatiles beneath mid-ocean ridges: Deep melting, channelised transport, focusing, and metasomatism. *EPSL*. [10.1016/j.epsl.2017.02.006](https://doi.org/10.1016/j.epsl.2017.02.006).
- Turner A.J., **R.F. Katz**, M.D. Behn and T. Keller, Magmatic focusing to mid-ocean ridges: the role of grain size variability and non-Newtonian viscosity. *G-cubed*. [10.1002/2017GC007048](https://doi.org/10.1002/2017GC007048)
- 2016 Keller, T., and **R.F. Katz**; The Role of Volatiles in Reactive Melt Transport in the Asthenosphere. *J. Petrology* [10.1093/petrology/egw030](https://doi.org/10.1093/petrology/egw030).
- Turner S., C. Langmuir, **R.F. Katz**, M.A. Dungan and S. Escrig; Parental arc magma compositions dominantly controlled by mantle-wedge thermal structure. *Nature Geosci*. [10.1038/ngeo2788](https://doi.org/10.1038/ngeo2788).
- Huybers, P., C. Langmuir, **R.F. Katz**, D. Ferguson, C. Proistosescu and S. Carbotte. Comment on “Sensitivity of seafloor bathymetry to climate-driven fluctuations in mid-ocean ridge magma supply.” Technical comment, *Science*. [10.1126/science.aae0451](https://doi.org/10.1126/science.aae0451).
- Alisic L., S. Rhebergen, J.F. Rudge, **R.F. Katz**, and G.N. Wells, Torsion of a cylinder of partially molten rock with a spherical inclusion: theory and simulation. *Geochem. Geophys. Geosys*. [10.1002/2015GC006061](https://doi.org/10.1002/2015GC006061).
- S. Weatherley and **R.F. Katz**. Melt transport rates in heterogeneous mantle beneath mid-ocean ridges. *Geochim. Cosmochim. Acta*. [10.1016/j.gca.2015.09.029](https://doi.org/10.1016/j.gca.2015.09.029).
- 2015 Crowley, J., **R.F. Katz**, P. Huybers, C. Langmuir, and S.-H. Park; Glacial cycles drive variations in the production of oceanic crust. *Science*. [10.1126/science.1261508](https://doi.org/10.1126/science.1261508).

- Qi, C., D. Kohlstedt, **R.F. Katz**, and Y. Takei; An experimental test of the viscous anisotropy hypothesis for partially molten rocks. *Proc. Nat. Acad. Sci.* [10.1073/pnas.1513790112](https://doi.org/10.1073/pnas.1513790112).
- Y. Takei and **R.F. Katz**. Consequences of viscous anisotropy in a deforming, two-phase aggregate. Why is porosity-band angle lowered by viscous anisotropy? *J. Fluid Mech.* [10.1017/jfm.2015.592](https://doi.org/10.1017/jfm.2015.592).
- Taylor-West, J. and **R.F. Katz**; Melt-preferred orientation, anisotropic permeability, and melt-band formation in a deforming, partially molten aggregate. *Geophys. J. Int.* [10.1093/gji/ggv372](https://doi.org/10.1093/gji/ggv372).
- Rhebergen, S., G.N. Wells, A.J. Wathen, and **R.F. Katz**. Optimal three-field block-preconditioners for models of coupled magma/mantle dynamics. *SIAM J. Sci. Comput.* [10.1137/14099718X](https://doi.org/10.1137/14099718X).
- Kyrke-Smith, T., **R.F. Katz**, and A. Fowler. Subglacial hydrology as a control on emergence, scale, and spacing of ice streams. *J. Geophys. Res. Earth Sfc.* [10.1002/2015JF003505](https://doi.org/10.1002/2015JF003505).
- Burley, J. and **R.F. Katz**. Variations in mid-ocean ridge CO<sub>2</sub> emissions driven by glacial cycles. *EPSL*. [10.1016/j.epsl.2015.06.031](https://doi.org/10.1016/j.epsl.2015.06.031).
- Turner, A., **R.F. Katz** and M.D. Behn. Grain-size dynamics beneath mid-ocean ridges: Implications for permeability and melt extraction. *Geochem. Geophys. Geosys.* [10.1002/2014GC005692](https://doi.org/10.1002/2014GC005692).
- Hooker J.N. and **R.F. Katz**; Vein spacing in extending, layered rock: the effect of synkinematic cementation. *Am. J. Sci.*. [10.2475/06.2015.03](https://doi.org/10.2475/06.2015.03).
- Lacey, A.A., M.G. Hennessy, P. Harvey and **R.F. Katz**; Mathematical Modelling of Tyndall Star Initiation. *Eur. J. App. Math.* [10.1017/S095679251500042X](https://doi.org/10.1017/S095679251500042X).
- 2014 Rhebergen, S., G. Wells, **R.F. Katz**, and A. Wathen; Analysis of block preconditioners for models of coupled magma/mantle dynamics. *SIAM Journal on Scientific Computing.* [10.1137/130946678](https://doi.org/10.1137/130946678).
- Allwright, J. and **R.F. Katz**; Pipe Poiseuille flow of viscously anisotropic, partially molten rock. *GJI*. [10.1093/gji/ggu345](https://doi.org/10.1093/gji/ggu345).
- Rivalta, E., B. Taisne, A. Bungler, and **R.F. Katz**; A review of mechanical models of dike propagation: schools of thought, results and future directions. *Tectonophysics.* [10.1016/j.tecto.2014.10.003](https://doi.org/10.1016/j.tecto.2014.10.003).
- Alisic, L., J.F. Rudge, **R.F. Katz**, G. Wells and S. Rhebergen; Compaction around a rigid, circular inclusion in partially molten rock. *JGR—Solid Earth.* [10.1002/2013JB010906](https://doi.org/10.1002/2013JB010906).
- Kyrke-Smith, T., **R.F. Katz** and A. Fowler, Subglacial hydrology and the formation of ice streams. *Proc. Roy. Soc. A.* [10.1098/rspa.2013.0494](https://doi.org/10.1098/rspa.2013.0494).
- 2013 Kyrke-Smith, T., **R.F. Katz** and A. Fowler, Stress balances of ice streams in a vertically integrated, higher-order formulation. *J. Glaciology,* [10.3189/2013JoG12J140](https://doi.org/10.3189/2013JoG12J140).
- Takei, Y. and **R.F. Katz**, Consequences of viscous anisotropy in a deforming, two-phase aggregate: 1. Governing equations and linearised analysis. *J. Fluid Mech.*, [10.1017/jfm.2013.482](https://doi.org/10.1017/jfm.2013.482).
- **Katz, R.F.** and Y. Takei, Consequences of viscous anisotropy in a deforming, two-phase aggregate: 2. Numerical solutions of the full equations. *J. Fluid Mech.*, [10.1017/jfm.2013.483](https://doi.org/10.1017/jfm.2013.483).

- 2012 Weatherley, S. and **R.F. Katz**, Melting and channelized magmatic flow in chemically heterogeneous, upwelling mantle. *Geochem. Geophys. Geosys.*, [10.1029/2011GC003989](https://doi.org/10.1029/2011GC003989).
- **Katz, R.F.** and S. Weatherley, Consequences of mantle heterogeneity for melt extraction at mid-ocean ridges. *EPSL*. [10.1016/j.epsl.2012.04.042](https://doi.org/10.1016/j.epsl.2012.04.042).
  - Gregg, P.M., L.B. Hebert, L.G.J. Montési, and **Katz, R.F.**, Geodynamic models of melt generation and extraction at mid-ocean ridges. *Oceanography*. [10.5670/oceanog.2012.05](https://doi.org/10.5670/oceanog.2012.05).
- 2011 **Katz, R.F.** and J. Rudge, The energetics of melting fertile heterogeneities within the depleted mantle. *Geochem. Geophys. Geosys.*, [10.1029/2011GC003834](https://doi.org/10.1029/2011GC003834).
- 2010 England, P.C. and **R.F. Katz**, Dry melting and thermal advection in the mantle wedge control the location of volcanic arcs. *Nature*, [10.1038/nature09417](https://doi.org/10.1038/nature09417).
- England, P.C. and **R.F. Katz**, (Brief Communication Arising) Global systematics of arc volcano position. *Nature*, [10.1038/nature09154](https://doi.org/10.1038/nature09154).
  - **Katz, R.F.** Porosity-driven convection and asymmetry beneath mid-ocean ridges. *Geochem. Geophys. Geosys.*, [10.1029/2010GC003282](https://doi.org/10.1029/2010GC003282).
  - Weatherley, S. and **R.F. Katz**. Plate-driven dynamics and global patterns of mid-ocean ridge bathymetry. *Geochem. Geophys. Geosys.*, [10.1029/2010GC003192](https://doi.org/10.1029/2010GC003192).
  - **Katz, R.F.** and M.G. Worster. Stability of ice-sheet grounding lines. *Proc. Roy. Soc. A*, [10.1098/rspa.2009.0434](https://doi.org/10.1098/rspa.2009.0434).
- 2008 **Katz, R.F.** Magma dynamics with the Enthalpy Method: benchmark solutions and magmatic focusing at mid-ocean ridges. *J. Petrology*, [10.1093/ptrology/egn058](https://doi.org/10.1093/ptrology/egn058).
- **Katz, R.F.** and M.G. Worster. Simulation of directional solidification, thermochemical convection and chimney formation in a Hele-Shaw cell. *J. Comp. Phys.*, [10.1016/j.jcp.2008.06.039](https://doi.org/10.1016/j.jcp.2008.06.039).
  - van Keken, P., C. Currie, S.D. King, M.D. Behn, A. Cagnioncle, J. He, **R.F. Katz**, S. Lin, E.M. Parmentier, M. Spiegelman, K. Wang, A community benchmark for subduction zone modelling. *Phys. of the Earth and Planetary Interiors*, [10.1016/j.pepi.2008.04.015](https://doi.org/10.1016/j.pepi.2008.04.015).
- 2007 **Katz, R.F.**, M. Knepley, B. Smith, M. Spiegelman, E. Coon. Numerical simulation of geodynamic processes with the Portable Extensible Toolkit for Scientific Computation, *Phys. of the Earth and Planetary Interiors*, [10.1016/j.pepi.2007.04.016](https://doi.org/10.1016/j.pepi.2007.04.016).
- 2006 **Katz, R.F.**, M. Spiegelman, and B. Holtzman, The dynamics of melt and shear localisation in partially molten aggregates. *Nature*, [10.1038/nature05039](https://doi.org/10.1038/nature05039).
- Knepley, M.G., **R.F. Katz**, and B.F. Smith. Developing a geodynamics simulator with PETSc. In Numerical Solution of Partial Differential Equations on Parallel Computers, Series: Lecture Notes in Computational Science and Engineering, Vol. 51, A.M. Bruaset and A. Tveito, editors. Springer-Verlag.
  - Spiegelman, M. and **R.F. Katz**. A semi-Lagrangian Crank-Nicolson algorithm for the numerical solution of advection-diffusion problems, *Geochem. Geophys. Geosys.*, [10.1029/2005GC001073](https://doi.org/10.1029/2005GC001073).
- 2005 **Katz, R.F.**, R. Ragnarsson, and E. Bodenschatz. Tectonic microplates in a wax model of sea-floor spreading, *New J. Phys.*, [10.1088/1367-2630/7/1/037](https://doi.org/10.1088/1367-2630/7/1/037)
- **Katz, R.F.** and E. Bodenschatz, Taking wax for a spin: tectonic microplates in an analog model of plate tectonics. *Europhys. News*, Vol. 5. (unrefereed)

- 2004 **Katz, R.F.**, M. Spiegelman and S. Carbotte. Ridge migration, asthenospheric flow and the origin of magmatic segmentation in the global mid-ocean ridge system. *Geophys. Res. Ltrrs.*, [10.1029/2004GL020388](https://doi.org/10.1029/2004GL020388)
- 2003 **Katz, R.F.**, M. Spiegelman and C.H. Langmuir. A new parameterisation of hydrous mantle melting. *Geochem. Geophys. Geosys.*, [10.1029/2002GC000433](https://doi.org/10.1029/2002GC000433)

#### CITATION METRICS

- [Google Scholar](#) h-index: 34 (accessed 5 April 2026).
- [Scopus](#) h-index: 30 (accessed 5 April 2026).

#### INVITED CONFERENCE LECTURES

- 2024 [Ada Lovelace workshop](#), Sète, France; Fall AGU meeting, Washington DC.
- 2023 [European Geoscience Union 2023](#), Vienna, Austria. Session [GMPV7.2](#).
- 2021 [GEOMOD conference](#), Utrecht, Netherlands. [MEREMA II School](#), Sestri Levante, Italy.
- 2019 Fluid Transport Modelling Workshop, Minneapolis, USA.
- 2015 AGU Fall Meeting, San Francisco, USA. [DCO Modeling and Visualization Workshop](#), Washington DC, USA.
- 2013 Two invited talks at [Fall AGU](#), SF, USA. Invited talk at [SIAM Geosciences conference](#), Padova, Italy.
- 2012 [Gordon Research Conference on Rock Deformation](#), Andover, New Hampshire, USA. Award lecture at [EGU](#) conference in Vienna.
- 2011 [AGU Fall Meeting](#), San Francisco, USA. Two invited talks. [VMSG Conference](#), Cambridge, UK. (program substitution).
- 2010 [American Geophysical Union](#), San Francisco, USA. [European Geosciences Union](#) conference in Vienna, Austria. Session [GMPV16/GD5.9](#)
- 2009 [11th International Workshop on Modelling of Mantle Convection and Lithospheric Dynamics](#), Braunwald, CH; [Water on Earth and Beyond](#) conference, Durham, UK; [In-situ Geophysical Studies of Planetary Surfaces: Past, Present, and Future](#), Roy. Astro. Soc. meeting, London.
- 2008 [Computational Infrastructure for Geodynamics \(CIG\) Workshop on Mathematical and Computational Issues in the Solid Earth Geosciences](#), Santa Fe, USA.
- 2006 [Penrose Conference on Arc Crustal Genesis and Evolution](#), Valdez, Alaska; [Western Pacific Geophysics Conference](#), Beijing, China.
- 2005 [Fall AGU meeting](#), San Francisco, USA.
- 2004 [Fall AGU meeting](#), San Francisco, USA.

#### PHD STUDENT SUPERVISION

- 2025– **Julia Johnson**. Project: Granular mechanics of faults.
- 2025– **Ambre Brabant**. Project: Granular mechanics of gravity currents.
- 2025– **Linus Miller**. Project: Theory for anisotropic dislocation-mechanics of olivine.
- 2023– **Rhiannon Ackland**. Project: Ore formation by percolative reactive flow.
- 2020–24 **Hanwen Zhang**. Project: Flow and fracture of ice sheets. On to postdoc in Oxford Dept. of Mathematics.
- 2020–24 **Luke Kearney**. Project: Fluid-escape pipes in the Levantine Basin. On to job as applied scientist at Viridian.
- 2017–21 **Tom Breithaupt**. Project: Modelling elements of microstructure in olivine. On to: 1851 Research Fellowship at Univ Cambridge.

- 2017–21 **Dan Spencer**. Project: Tidal dissipation and volcanism on Io. On to job as applied scientist at Sagentia Innovation.
- 2013–17 **Jonathan Burley**. Project: Ice ages, sea level, and magmatism: coupled oscillations.
- 2010–13 **Teresa Kyrke-Smith**. Project: Ice stream emergence in coupled models of ice sheets and subglacial hydrology. On to a postdoc at the British Antarctic Survey.
- 2009–13 **Samuel Weatherley**. Project: Reactive magmatic flow in a deforming mantle. On to a postdoc at the Danish Geological Survey.

#### POSTDOCTORAL RESEARCH SUPERVISION

- 2022–25 **Hamish Hay**. Now postdoctoral researcher at University of St. Andrews.
- 2024–25 **Calum Braham**.
- 2020–25 **Yuan Li**.
- 2021–24 **Tim Davis**. Now postdoctoral researcher at University of Bristol.
- 2019–23 **Adina Pusok**. Now Royal Society University Research Fellow at Univ. Oxford.
- 2017–19 **Marianne Haseloff**. Now professor at University of Wisconsin.
- 2016–19 **Meng Tian**. Now staff scientist at LMU Munich.
- 2016–18 **David Rees Jones**. Now lecturer at University of St. Andrews.
- 2016–18 **Nestor Cerpa Gilvonio**. Now CNRS research scientist.
- 2013–16 **Tobias Keller**. Now Reader at Univ. Glasgow.
- 2013–16 **Andrew Turner**. Now employed in UK government scientific research.
- 2012–14 **Sander Rhebergen**. Now professor at the University of Waterloo, Canada.
- 2012–13 **John Crowley**. Now employed at Engineering Seismology Group Canada.

#### DEPARTMENTAL TEACHING

- 2023– **Vector calculus & continuum mechanics** for third-year students.
- 2015– **Mantle dynamics seminar** for fourth-year students.
- 2012– **Geodynamics** for third-year students.
- 2011–16 **Time-series analysis** for second-year students.
- 2010–16 **Introduction to Physical Thermodynamics** for first-year students.
- 2008–10 **Mathematics for Materials and Earth Sciences**. Tutor conducting weekly problem classes.
- 2008–14 Demonstrator for the **Oxford volcanology field trip** to Santorini, Greece.

#### OUTREACH AND EXTERNAL TEACHING

- 2023 Lecturer at the [Joint ICTP-EAIFR-IUGG Workshop on Computational Geodynamics](#) at the University of Rwanda, Kigali.
- 2022 [Invited seminar](#), East African Inst. for Fundamental Research, Univ. Rwanda.
- 2021– Internship supervisor for [Mfano Africa](#) programme and its successor [MIORPA](#) (1 intern annually).
- 2017– [Lecturer](#), Introduction to Fluid Dynamics, [African Institute for Mathematical Sciences](#), Cape Town, South Africa.
- 2016 Invited lecturer at the EMS School in Applied Mathematics [Mathematical Modelling, Numerical Analysis and Scientific Computing](#).
- 2012–19 Outreach lectures to A-level students taking Further Maths.
- 2011 Invited lecturer, Abdus Salam International Centre for Theoretical Physics [Advanced School on Mechanical and Thermal Processes in Geodynamics](#).
- 2009 Public lecture at [Science Oxford](#) on the L'Aquila earthquake.

## SERVICE, TRAINING, AND QUALIFICATIONS

- 2021–25 MPLS Divisional Board, representing Earth Sciences.
- 2021–23 Chair of Nursery Committee, St. Anne’s College.
- 2020–21 Co-founder and co-lead organiser, earth2earth remote seminar series for the UK geoscience community.
- Committee service in Department: Organiser of Departmental seminars (2010–20), IT committee (2014–22, chair); management committee (2014–23); examiner (2014, 2018, 2025, 2026), research committee (2013, 2023–).
- 2019–20 Project Sponsor, Research File Service project board, University of Oxford.
- 2016–23 Scientific Advisory Committee, [Institute for Computing and Data Sciences \(ISCD\)](#), Sorbonne University, Paris.
- 2014–20 Divisional representative on Research IT board (University-level committee).
- 2011–16 Oxford Supercomputing Centre Executive Committee (Chair, 2013–2016).
- 2014–16 Co-organiser of the Newton Institute for Mathematical Sciences programme [Melt in the Mantle](#).
- 2015 Co-organiser of the Deep Carbon Observatory meeting [Modelling and Visualization Workshop](#).
- 2008– Session convener at the Goldschmidt Conference (2008, 2012, 2018), the European Geosciences Union conference (2010, 2012, 2013).
- 2012– Member of NERC Peer Review College.
- Reviewer for journals including *Science*, *Nature*, *J. Petrology*, *J. Fluid Mechanics*, *EPSL* and for the European Research Council, UK Natural Environment Research Council, Swiss National Science Foundation and the US National Science Foundation. Guest editor for *PNAS*.
- 2007 Two-month training in peer-support counselling of graduate students, University of Cambridge.