

# Dave A. May

dave.may@erdw.ethz.ch

Institut für Geophysik  
ETH Zürich  
NO H 9.3  
Sonneggstrasse 5  
CH-8092 Zürich  
Switzerland

Tel.: +41 (0)44 632 9742

Fax.: +41 (0)44 633 1065

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## Publications

### (Published)

**D. A. May**, J. Brown & L. Le Pourhiet, “pTatin3D: High-Performance Methods for Long-Term Lithospheric Dynamics”, Published in: *SC '14 Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, 274–284, 2014, DOI: 10.1109/SC.2014.28.

M. Fox, L. Goren, **D. A. May** and S. D. Willett, “Inversion of fluvial channels for paleo-rock uplift rates in Taiwan”, *Journal of Geophysical Research: Earth Surface*, 2014, DOI: 10.1002/2014JF003196.

M. Collignon, B. J. P. Kaus, **D. A. May** & N. Fernandez, “Influences of surface processes on fold growth during 3-D detachment folding”, *Geochemistry, Geophysics, Geosystems*, **15** (18), 3281–3303, 2014, DOI: 10.1002/2014GC005450.

M. Thielmann, **D. A. May** & B. J. P. Kaus, “Discretization errors in the hybrid finite element particle-in-cell method”, *Pure and Applied Geophysics*, **171**, 2165–2184, 2014, DOI: 10.1007/s00024-014-0808-9.

F. Marques, F. R. Cabral, T. V. Gerya, G. Zhu & **D. A. May**, “Subduction initiates at straight passive margins”, *Geology*, **42**, 331–334, 2014.

S. M. Lechmann, S. M. Schmalholz, G. Hetenyi, **D. A. May** & B. J. P. Kaus, “Quantifying the impact of mechanical layering and underthrusting on the dynamics of the modern India-Asia collisional system with 3-D numerical models”, *Journal of Geophysical Research-Solid Earth*, **119** (1), 616–644, 2014, DOI: 10.1002/2012JB009748.

**D. A. May**, W. P. Schellart & L. Moresi, “Overview of adaptive finite element analysis in computational geodynamics”, *Journal of Geodynamics*, **70**, 1–20, 2013.

T. V. Gerya, **D. A. May** & T. Duretz, “An adaptive staggered grid finite difference method for modeling geodynamic Stokes flows with strongly variable viscosity”, *Geochemistry, Geophysics, Geosystems*, **14** (4), 1200–1225, 2013.

T. Keller, **D. A. May** & B. J. P. Kaus, “Numerical modelling of magma dynamics coupled to tectonic deformation of lithosphere and crust”, *Geophysical Journal International*, DOI:10.1093/gji/ggt306, **195** (3), 1406–1442, 2013.

M. Fox, F. Herman, S. D. Willett, and **D. A. May**, “A linear inversion method to infer exhumation rates in

space and time from thermochronometric data”, *Earth Surface Dynamics*, **1** (1), 207–259, 2013.

J. Brown, M. G. Knepley, **D. A. May**, L. C. McInnes & B. Smith, “Composable linear solvers for multi-physics”, 2012 11th International Symposium on Parallel and Distributed Computing (ISPDC), IEEE, 55–62, 2012.

L. Le Pourhiet, B. Huet, **D. A. May**, L. Labrousse & L. Jolivet, “Kinematic interpretation of the 3D shapes of metamorphic core complexes”, *Geochemistry, Geophysics, Geosystems*, **13** Q09002, 2012.

**D. A. May**, “Volume reconstruction of point cloud data sets derived from computational geodynamic simulations”, *Geochemistry, Geophysics, Geosystems*, **13** Q05019, 2012.

F. Cramer, H. Schmeling, G. J. Golabek, T. Duretz, R. Orendt, S. J. H. Buitert, **D. A. May**, B. J. P. Kaus, T. V. Gerya & P. J. Tackley, “A comparison of numerical surface topography calculations in geodynamic modelling: an evaluation of the ‘sticky air’ method”, *Geophysical Journal International*, **189** (1), 38–54, 2012.

M. Furuichi, **D. A. May** & P. J. Tackley, “Development of a Stokes Flow Solver Robust to Large Viscosity Jumps Using a Schur Complement Approach with Mixed Precision Arithmetic”, *Journal of Computational Physics*, **230** (24), 8835–8851, 2011.

P. Yamato, R. Tartèse, T. Duretz & **D. A. May**, “Numerical modelling of magma transport in dykes”, *Tectonophysics*, **526-529**, 97–109, 2012.

S. M. Lechmann, **D. A. May**, B. J. P. Kaus & S. M. Schmalholz, “Comparing thin-sheet models with 3D multilayer models for continental collision”, *Geophysical Journal International*, **187** (1), 10–33, 2011.

**D. A. May** & M. G. Knepley, “Optimal, scalable forward models for computing gravity anomalies”, *Geophysical Journal International*, **187** (1), 161–177, 2011.

T. Duretz, **D. A. May**, T. V. Gerya & P. J. Tackley, “Discretization errors and free surface stabilization in the Finite Difference and Marker-In-Cell method for applied geodynamics: A numerical study”, *Geochemistry, Geophysics, Geosystems*, **12** (7) Q07004, 2011, DOI: 10.1029/2011GC003567.

T. J. M. Duretz, T. V. Gerya & **D. A. May**, “Numerical modelling of spontaneous slab breakoff and subsequent topographic response”, *Tectonophysics*, **502** (1-2), 244–256, 2011.

C. A. Mériaux, J. A. Mansour, L. N. Moresi, R. C. Kerr & **D. A. May**, “On the rise of strongly tilted mantle plume tails”, *Physics of the Earth and Planetary Interiors*, **184** (1-2), 63–79, 2011.

B. J. P. Kaus, H. Mühlhaus & **D. A. May**, “A stabilization algorithm for geodynamic numerical simulations with a free surface”, *Phys. Earth Planet. Interiors*, **181**, 12–20, 2010.

R. J. Farrington, D. R. Stegman, L. N. Moresi, M. Sandiford & **D. A. May**, “Interactions of 3D mantle flow and continental lithosphere near passive margins”, *Tectonophysics*, **483** (1-2), 20–28, 2010.

D. R. Stegman, J. Freeman & **D. A. May**, “Origin of ice diapirism, true polar wander, subsurface ocean, and tiger stripes of Enceladus driven by compositional convection”, *Icarus*, **202** (2), 669–680, 2009.

M. Véliz, **D. A. May** & L. Moresi, “A fast robust algorithm for computing discrete Voronoi diagrams”, *Journal of Mathematical Modelling and Algorithms*, **8**, 343–355, 2009, DOI: 10.1007/s10852-008-9097-6.

**D. A. May** & L. Moresi, “Preconditioned iterative methods for Stokes flow problems arising in computational geodynamics”, *Physics of the Earth and Planetary Interiors*, **171** (1-4), 33–47, 2008.

M. OzBench, K. Regenauer-Lieb, D. R. Stegman, G. Morra, R. Farrington, A. Hale, **D. A. May**, J. Freeman, L. Bourgooin, H. Mühlhaus & L. Moresi, “A model comparison study of large-scale mantle-lithosphere dynamics driven by subduction”, *Physics of the Earth and Planetary Interiors*, **171** (1-4), 224–234, 2008.

W. P. Schellart, J. Freeman, D. R. Stegman, L. Moresi & **D. May**, “Evolution and diversity of subduction zones controlled by slab width”, *Nature*, **446** (7133), 308–311, 2007.

L. N. Moresi, H. Mühlhaus, V. Lemaile. & **D. May**, *Incompressible viscous formulations for deformation and yielding of the lithosphere*, Ch. 19, 457–472, Special Publication - Geological Society of London, Geological Society, 5 July, 2007.

D. R. Stegman, J. Freeman, W. P. Schellart, L. Moresi & **D. May**, “Influence of trench width on subduction hinge retreat rates in 3-D models of slab rollback”, *Geochemistry, Geophysics, Geosystems*, **7** (3), 2006, DOI: 10.1029/2005GC001056.

J. Freeman, L. Moresi & **D. May**, “Thermal convection with a water ice I rheology: Implications for icy satellite evolution”, *Icarus*, **180**, (1), 251–264, 2006.

J. Freeman, L. Moresi & **D. A. May**, “Evolution into the stagnant lid convection regime with a non-Newtonian water ice rheology”. *Geophysical Research Letters*, **31** (11), 2004, DOI: 10.1029/2004GL019798.

L. Moresi, **D. May**, J. Freeman & B. Appelbe, ‘Mantle Convection Modeling with Viscoelastic/Brittle Lithosphere: Numerical and Computational Methodology’, In G. Goos and J. Hartmanis and J. van Leeuwen, editors, *Computational Science - ICCS 2003, Proceedings, Part III*, No. 2657 in Lecture Notes in Computer Science, 781–787, Springer Verlag, 2003.

**D. A. May** & J. J. Monaghan, “Can a single bubble sink a ship?”, *American Journal of Physics*, **71** (9), 842–849, 2003.

### **(Under review)**

**D. A. May**, J. Brown & L. Le Pourhiet, “A Scalable, Matrix-Free Stokes Discretisation for Geodynamic Applications”, *Computational Methods in Applied Mechanics and Engineering*, 2014.

P. Yamato, T. Duretz, Tartèse & **D. A. May**, “Quantifying magma segregation in dykes”, *Earth and Planetary Science Letters*, 2014.

M. Furuichi & **D. A. May**, “Implicit solution of the material transport in Stokes flow simulation: toward thermal convection simulation surrounded by free surface”, *Computer Physics Communications*, 2014.

G. Leone, P. J. Tackley, T. V. Gerya, **D. A. May** & G. Zhu, “3-D simulations of the Southern polar giant impact hypothesis for the origin of the Martian dichotomy”, *Geophysical Research Letters*, 2014.