

# Curriculum Vitae

## Personal Information

---

Email	<a href="mailto:rene.gassmoeller@mailbox.org">rene.gassmoeller@mailbox.org</a>
Website	<a href="https://gassmoeller.github.io">https://gassmoeller.github.io</a>
Address	One Shields Avenue, 2119 Earth and Planetary Sciences, Davis, CA-95616, USA
Date / Place of Birth	Jan 14 <sup>th</sup> 1987, Hamm, Germany

## Education

---

2006 - 2007	Study of Physics at Friedrich-Schiller-University Jena
2007 - 2011	Study of Geophysics at Friedrich-Schiller-University Jena, Diplom (B.Sc. & M.Sc.) in Geophysics "with distinction" Thesis: "Stress- and strain distribution at curved subduction zones"
2011 - 2015	Ph.D. at the GFZ German Research Centre for Geosciences, Section 2.5 Geodynamic Modeling Degree: Dr.rer.nat. (Ph.D.) in Geophysics Thesis: "The interaction of subducted slabs and plume generation zones in geodynamic models"

## Professional Appointments

---

2015 - 2016	Postdoctoral Research Associate at German Research Centre for Geosciences (GFZ)
2015 - 2017	Postdoctoral Research Associate at Dept. of Mathematics, Texas A&M University
2017 - 2018	Postdoctoral Fellow at Dept. of Mathematics, Colorado State University
2018 -	Assistant Project Scientist at the Dept. of Earth and Planetary Sciences (Computational Infrastructure for Geodynamics), University of California, Davis
2019-	Courtesy Appointment as Assistant Professor, Department of Geological Sciences, University of Florida

## Peer Reviewed Publications

---

2011	van Hinsbergen et al. (2011): Acceleration and deceleration of India-Asia convergence since the Cretaceous: Roles of mantle plumes and continental collision. <i>Journal of Geophysical Research</i> . Doi: 10.1029/2010JB008051
2014	Zeumann et al. (2014): New Finite-Element Modelling of Subduction Processes in the Andes Using Realistic Geometries. <i>Proceedings of the IAG General Assembly</i> . Doi: 10.1007/978-3-642-37222-3_13
2016	Gassm�ller et al. (2016): Major influence of plume-ridge interaction, lithosphere thickness variations, and global mantle flow on hotspot volcanism – The example of Tristan. <i>Geochemistry, Geophysics, Geosystems</i> . Doi: 10.1002/2015GC006177

- 2017 Dannberg et al.: The importance of grain size to mantle dynamics and seismological observations. *Geochemistry, Geophysics, Geosystems*. Doi: 10.1002/2017GC006944
- Bredow et al.: How plume-ridge interaction shapes the crustal thickness pattern of the Réunion hotspot track. *Geochemistry, Geophysics, Geosystems*. Doi: 10.1002/2017GC006875
- Heister et al.: High Accuracy Mantle Convection Simulation through Modern Numerical Methods. II: Realistic Models and Problems. *Geophys. J. Int.* Doi: 10.1093/gji/ggx195
- 2018 Alzetta et al.: The deal. II Library, Version 9.0. *Journal of Numerical Mathematics*. Doi: 10.1515/jnma-2018-0054
- Dannberg & Gassmüller: Chemical trends in ocean islands explained by plume–slab interaction. *Proceedings of the National Academy of Sciences*. Doi: 10.1073/pnas.1714125115
- Gassmüller et al.: Flexible and scalable particle in cell methods with adaptive mesh refinement for geodynamic computations. *Geochemistry, Geophysics, Geosystems*. Doi: 10.1029/2018GC007508
- 2019 Kellogg et al.: The role of scientific communities in creating reusable software: Lessons from geophysics. *Computing in Science & Engineering*, 21(2), 25-35.
- Dannberg et al.: A new formulation for coupled magma/mantle dynamics. *Geophys. J. Int.* Doi: 10.1093/gji/ggz190
- Gassmüller et al.: Evaluating the accuracy of hybrid finite element / Particle-In-Cell methods for modeling incompressible Stokes flow. *Geophys. J. Int.* Doi: 10.1093/gji/ggz405
- Gassmüller et al.: On Formulations of Compressible Mantle Convection. *Geophys. J. Int.* Accepted.

### Other Publications

---

- 2014 Steinberger et al.: Manteldynamik und das Aufbrechen von Gondwana, *System Erde* (4), 14-19.
- 2016 Bangerth et al.: Computational Modeling of Convection in the Earth's Mantle, *SIAM News*.
- 2018 Gassmüller: It's just coding ... - Scientific software development in geodynamics. *EGU Geodynamics Blog*. <https://blogs.egu.eu/divisions/gd/2018/10/09/its-just-coding-scientific-software-development-in-geodynamics/>

### Selected (Invited) Presentations

---

- 2012 4<sup>th</sup> Colloquium of DFG priority programme SAMPLE. *Modelling the interaction between subducted slabs and thermo-chemical piles*
- 2013 Gordon Research Seminar: *Past plate motions and recent hotspot volcanism - Validating plate reconstructions by geodynamic modelling*
- 5<sup>th</sup> Colloquium of DFG priority programme SAMPLE. *Past plate motions and recent hotspot volcanism - Validating plate reconstructions by geodynamic modelling*
- AGU Fall Meeting: *Sensitivity of spatial distribution and dynamics of plume generation*
- 2014 Ludwig-Maximilians-University Munich, *Geoscience seminar: Sensitivity of spatial distribution and dynamics of plume generation*
- 6<sup>th</sup> Colloquium of DFG priority programme SAMPLE. *Geodynamic models and seismic observations of the South Atlantic lower mantle*

	GeoFrankfurt: <i>Geodynamic models and seismic observations of the South Atlantic lower mantle</i>
2016	8 <sup>th</sup> Colloquium of the DFG priority programme SAMPLE. <i>Major influence of lithosphere thickness variations and global mantle flow on Tristan hotspot volcanism</i>
2017	CU Boulder, <i>Computational Science seminar: Methods and Applications of the Finite-Element Software ASPECT in Geodynamics</i> UT Austin, <i>Seminar: The Geodynamic Modeling Code ASPECT: Structure, Methods and Plume-Ridge Interaction</i> Colorado State University, <i>Inverse problems seminar: Forward and inverse problems in geodynamic modeling: Part I Evolution of island chains in the South Atlantic and Indian Ocean</i>
2018	Earth-Life Science Institute (ELSI), Tokyo, <i>ASPECT tutorial</i> Christian-Albrechts-University Kiel, <i>Geoscience Seminar</i> University College London, <i>Global Geophysics Seminar: Geodynamic modeling with ASPECT: Applications for magma/mantle dynamics, grain size evolution and chemical zonation in mantle plumes</i> SIAM Parallel Processing, Tokyo, <i>Advances in Mantle Convection Modeling: Nonlinear Solvers, Multiphysics, Linking scales</i> CIDER Summer School, UC Santa Barbara: <i>Scientific Software Development 101: Fundamentals</i> AGU panel discussion member: <i>Community Forum: The Role of an Open-Source Software Initiative Within AGU</i>
2019	SIAM Geosciences, Houston: <i>Accurately utilizing particle-in-cell methods for adaptively refined finite-element models</i> University of Florida, <i>Geological Sciences Seminar: Computational geoscience between research application and software project: Lessons from studying grain-size effects on mantle flow and seismic velocities</i> HPC Best Practices Webinar of the IDEAS-Exascale Computing Project: <i>Discovering and Addressing Social Challenges in the Evolution of Scientific Software Projects</i>
2020	Exascale Computing Project Annual Meeting, Houston: <i>Discovering and Addressing Social Challenges in the Evolution of Scientific Software Projects</i>

### **Third-party Funding**

---

2014	North-German Supercomputing Alliance: <i>Plume-Plate interaction in 3D mantle flow – Revealing the role of internal plume dynamics on global hot spot volcanism (4.8 million CPU hours, 103,000 Euro)</i> NSF CIDER: <i>Investigating mantle dynamics using a composite rheology with grain-size evolution, tested using seismology (3,000 \$)</i>
2015	North-German Supercomputing Alliance: <i>Follow-up on Plume-Plate interaction in 3D mantle flow (3.2 million CPU hours, 70,460 Euro)</i>
2016	North-German Supercomputing Alliance: <i>Follow-up on Plume-Plate interaction in 3D mantle flow (3.7 million CPU hours, 79,300 Euro)</i>
2019 - 2020	Better Scientific Software (BSSw) fellow of the DoE IDEAS-ECP project: <i>Social challenges in the evolution of scientific software projects. (\$34,750)</i>
2019 - 2020	Responsible delegate for a community early access allocation: <i>Frontera (#5 fastest supercomputer 2019), Texas Advanced Computing Center (TACC) (15.12 million CPU hours)</i>

2019 NSF Frontier Research in Earth Sciences (FRES): *Development and Application of a Framework for Integrated Geodynamic Earth Models* (\$1.2m with 3 PIs at UFL; joint proposal, total \$2.8m)

## Teaching

---

2008 - 2011 Teaching assistant in geodynamics courses at Friedrich-Schiller-University Jena

2011 Student tutorials in „Mathematics for Geoscientists“, University Potsdam

2012 - 2014 ASPECT student courses in module „Computational Geodynamics“

2014 ASPECT tutorial at GeoMod 2014 conference

2016 ASPECT tutorial at CIG Allhands Meeting, UC Davis

2018 ASPECT tutorial at ELSI EON Winter School Tokyo

ASPECT tutorial at CGU/CIG annual meeting, Niagara Falls

ASPECT tutorial at CIDER summer school, UC Santa Barbara

“Version Control with Git” tutorial at CIDER summer school, UC Santa Barbara

Organization and teaching at the Rayleigh developer meeting (5 day developer meeting including teaching in scientific software development and open-source community management)

2015 - 2019 Organization and teaching at the yearly ASPECT hackathon (10 day summer school in scientific software development and development workshop)

2019 Certification as a Software Carpentry Instructor

Leader of the AGU scientific workshop: *Best Practices for Developing and Sustaining Your Open-Source Research Software*

## Service

---

2008 - 2009 Spokesperson of the student council at the Institute for Geosciences

2009 - 2010 Member of the student council and institute council at the Institute for Geosciences

2011 Member of the organizing team of the 12<sup>th</sup> International Workshop on Modeling of Mantle Convection and Lithosphere Dynamics.

Since 2014 Maintainer of the ASPECT geodynamic modeling software

2017 AGU Session Chair, Session: DI14A: Deep Mantle Dynamics and Its Surface Expressions III

2019 Department of Energy Review Panelist: Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs. Sub-topic: *Technologies for Extreme-Scale Computing*

AGU Session Convener:  
DI24A Thermochemical Nature and Structure of the Transition Zone and Lower Mantle,  
TH25I Update and Future Directions of the Open-Source Software Initiative,  
NS21A A Tour of Open-Source Software Packages for the Geosciences

Reviews for Journal of Open Source Software (JOSS),  
Geochemistry, Geophysics, Geosystems,  
ACM - Transactions on Mathematical Software,  
Chilean National Commission for Scientific and Technological Research (CONICYT)

## Relevant Professional Experience

---

Project maintainer	ASPECT ( <a href="https://aspect.geodynamics.org">https://aspect.geodynamics.org</a> ) Better Scientific Software Communities ( <a href="https://gassmoeller.github.io/BSSC/">https://gassmoeller.github.io/BSSC/</a> )
Software contributions	CitcomS ( <a href="https://geodynamics.org/cig/software/citcoms/">https://geodynamics.org/cig/software/citcoms/</a> ) deal.II ( <a href="https://dealii.org/">https://dealii.org/</a> ) Rayleigh ( <a href="https://github.com/geodynamics/Rayleigh">https://github.com/geodynamics/Rayleigh</a> ) FDPS_SPH ( <a href="https://github.com/NatsukiHosono/FDPS_SPH">https://github.com/NatsukiHosono/FDPS_SPH</a> ) and others, see <a href="https://github.com/gassmoeller">https://github.com/gassmoeller</a>
Software experience	Development tools: CMake, git, Eclipse, Sphinx, Qt, Docker, Jenkins, TravisCI Scientific software: GPlates, ArcGIS
Programming languages	C++, C, Python, Shell script, Fortran, HTML