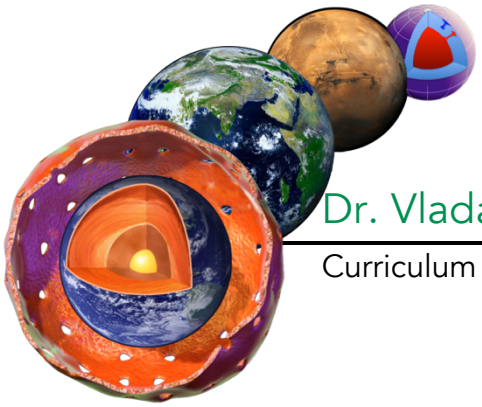
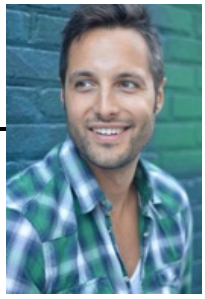


Dr. Vlada Stamenković

Curriculum Vitae



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Research Interests

I am a global geophysicist (PhD) and a theoretical physicist (MSc, BSc) who thrives across classic departmental borders. My vision is to understand how Earth evolved, why rocky planets develop differently, and to grasp life as a planetary phenomenon, from its origin till its end. To get closer to this goal, I study the fundamental principles behind mantle convection, plate tectonics, the formation and transport of volatiles through mantle and crust, and dynamo evolution – and explore how such processes co-evolve with life and climate from deep to modern times, on the Earth, and on rocky planets in our solar system and beyond. My tools are geodynamic models (1D/2D/3D), a pen, a piece of paper, and theoretical physics (thermodynamics, fluid dynamics, and condensed matter physics), as well as passion for field work and planet exploration (both with a focus on direct or indirect subsurface data).

US VISA STATUS

EB-1A ALIEN OF EXTRAORDINARY ABILITY IN THE SCIENCES

EMPLOYMENT

- **Simons Collaboration on the Origins of Life Fellow** — **08/2015-present**
  Postdoctoral Scholar in Geobiology & JPL Research Associate
  California Institute of Technology & NASA Jet Propulsion Laboratory (JPL)
- **Swiss National Science Foundation Postdoctoral Fellow** — **2012-07/2015**
  MIT – Department of Earth, Atmospheric & Planetary Sciences
- **European Space Agency (ESA) Graduate Student Fellow** — **2008-2012**
  Institute of Planetary Research @ the German Aerospace Center (DLR)
  European Space Research and Technology Center (ESTEC)
- **Visiting Scientist** — **2007-2008**
  Institute of Planetary Research @ German Aerospace Center

EDUCATION

- **PhD in Earth & Planetary Sciences, (*Dr. rer. nat., summa cum laude, 0.0*)** — **2012**
  The University of Münster, ESA & Institute of Planetary Research @ DLR
  Dissertation: *High-pressure thermal & transport properties of mantle rock & the thermal evolution of massive rocky planets. Advisors: Tilman Spohn, Doris Breuer, & Pietro Baglioni*
- **BSc/MSc in Physics (*Dipl. Phys. ETH*), Swiss Federal Institute of Technology (ETH)** — **2006**
  Thesis: *Dynamical analysis of generic signal transduction networks. Advisor: Sebastian Bonhoeffer*

SELECTED HONORS & AWARDS

- Simons Collaboration on the Origin of Life Fellowship **08/2015-08/2018**
- Swiss National Science Foundation Advanced Researcher Fellowship **2014-2015**
- Swiss National Science Foundation Prospective Researcher Fellowship **2012-2014**
- PhD Summa Cum Laude "0.0" by the University of Münster **2012**
- Nobel Laureate Symposium Award by German Aerospace Center **2009**
- European Space Agency & German Space Agency Doctoral Fellowship **2008-2012**

FUNDED GRANTS AND PROPOSALS

- Simons Collaboration on the Origin of Life Fellowship (**PI**, **$342 k**) **2015-2018**
  Life from inside out *– geodynamic drivers for the origins of life.*
- Swiss National Science Foundation Advanced Researcher Fellowship (**PI**, **$100 k**) **2014-2015**
  The Caladan-Dune project *– deep water cycle and planet evolution.*
- Swiss National Science Foundation Prospective Researcher Fellowship (**PI**, **$90 k**) **2012-2014**
  Planetary geofluxes with importance to the question of life *– geophysical biosignature gases.*
- Kepler: GO Cycle 5 (on ultra-cool stars) (**Co-I**, PI Brice Demory) **2013**
  Searching for terrestrial planets orbiting cool stars and brown dwarfs with K2.
- Spitzer: Cycle-9 (**Co-I**, PI Brice Demory, **$5 k**) **2013**
  55 Cnc e phase curve *– first heat map of an exoplanet.*
- European Space Agency & German Space Agency doctoral grant (**PI**, **$180 k**) **2008-2012**
  High pressure physics and planet evolution/Zones of extinct and extant life on Mars *– I) developing thermal and transport properties for mantle rock from basic physical principles up to 1 TPa and implications for the evolution of Earth and other rocky planet. II) Landing site selection with focus on extinct or extant life on Mars.*
- Space experiment Chondro II on Cervantes Mission to ISS (**Science PI**, **~ $5 Million**) **2003-2006**
  Chondro II *– tissue engineering/fluid mixing on the International Space Station to improve cartilage transplants and explore fluid dynamics and cellular matrix formation in microgravity.*
- Space experiment Chondro I (**Science PI**, **~ $5 Million**) **2001-2002**
  Chondro I *– tissue engineering/fluid mixing on the Russian space satellite Foton M1 to improve cartilage transplants and explore fluid dynamics and cellular matrix formation in microgravity.*
- Microgravity experiment Lidia on parabolic flights (**PI**, **~ $20 k**) **2000-2001**
  Lidia *– fluid dynamics in test units for T-lymphocyte apoptosis studies in microgravity.*

Publications

Published Peer-Reviewed

1. **Stamenković, V.**, Höink, T., Lenardic, T., 2016. The importance of temporal stress variation for the initiation of plate tectonics. JGR Planets, 121, 1–20.
   Find on: http://onlinelibrary.wiley.com/doi/10.1002/2016JE004994/abstract
   - *Summary: bottom-up approach for the drivers of plate tectonics, showing that temporal variation of basal shear stresses and asthenospheric channels drive the initiation of plate tectonics, and that classic self-determined boundary layer analysis cannot be used to model the evolution of the Earth.*

2. **Stamenković, V.**, Seager, S., 2016. Emerging possibilities and insuperable limitations of exogeodynamics: the example of plate tectonics. The Astrophysical Journal, 825, 78-95.
   Find on: http://dx.doi.org/10.3847/0004-637X/825/1/78
   - *Summary: showing how the initiation and maintenance of plate tectonics depend on planet composition (i.e., concentration of radioactive elements, iron, and carbon), initial conditions, and core and planet size.*

3. Demory, B., Gillon, M., de Wit, J., Madhusudhan, N., Bolmont, E., Heng, K., Kataria, T., Lewis, N., Hu, R., Krick, J., **Stamenković, V.**, Benneke, B., Kane, S. Queloz, D., 2016. A map of the large day–night temperature gradient of a super-Earth exoplanet. Nature 532, 207-209.
   Find on: http://www.nature.com/nature/journal/v532/n7598/abs/nature17169.html
   - *Summary: I was responsible for the geophysical interpretation of the data with a focus on modeling the heat distribution in a partial magma ocean for a tidally-locked planet.*

4. **Stamenković, V.**, 2011, 2015. Serpentinization (Mars). In: Gargaud, M., et al., (Eds.), Encyclopedia of Astrobiology, Part 19. Springer, 1505-1506.
   Find on: http://www.springer.com/us/book/9783662441848
   - *Summary: serpentinization chemistry focused on Mars and Earth.*

5. **Stamenković, V.,** Frank, S., 2011, 2015. Rheology of planetary interiors. In: Gargaud, M., et al., (Eds.), Encyclopedia of Astrobiology, Part 19. Springer, 1452-1455.
   Find on: http://www.springer.com/us/book/9783662441848
   - *Summary: rheological models of the Earth's interior.*

6. **Stamenković, V.**, Breuer, D., 2014. The tectonic mode of rocky planets, Part 1: driving factors, models & parameters. Icarus 234, 174-193.
   Find on: http://www.sciencedirect.com/science/article/pii/S0019103514000736
   - *Summary: showing that the type of driving stress for plate failure (normal lithospheric or basal shear) controls surface recycling mechanisms on the Earth and other rocky planets.*

7. Zsom, A., Seager, S., De Wit, J., **Stamenković, V.**, 2013. Towards the minimum inner edge distance of the habitable zone. The Astrophysical Journal, 778, 109-126.
   Find on: http://iopscience.iop.org/article/10.1088/0004-637X/778/2/109
   - *Summary: I was responsible for computing the geophysical sinks and sources for water in order to estimate when a "dry Earth" without large oceans can still maintain those scarce liquid water reservoirs on its surface.*

8. **Stamenković, V.**, Noack, L., Breuer, D., Spohn, T., 2012. The influence of pressure-dependent viscosity on the thermal evolution of super-Earths. The Astrophysical Journal, 748, 41-63.
   Find on: http://iopscience.iop.org/article/10.1088/0004-637X/748/1/41
   - *Summary: I revised parameterized thermal evolution models to include also pressure-dependent rheologies with basic instability theory and 2D full mantle convection models. This allowed us to show that the current constraints for the Earth's CMB temperature and core heat flux can only be explained when the activation volume of the Earth's viscosity is significant. We also showed that planets more massive than the Earth remain super-heated or molten for many billions of years, and that mantle convection can be highly sluggish.*

9. **Stamenković, V.**, Breuer, D., Spohn, T., 2011. Thermal and transport properties of mantle rock at high pressure: applications to super-Earths. Icarus, 216, 572–596.
   Find on: http://www.sciencedirect.com/science/article/pii/S0019103511003824
   - *Summary: I developed from first principles and updated scaling theorems new models for the temperature- and pressure-dependent viscosity and the melting curve as a function of pressure for perovskites, MgO, and post-perovskites for the Earth and higher pressures up to 1 TPa. The melting predictions were later confirmed by experiments. The implication is that viscosity is strongly pressure-dependent and that this pressure dependence allows to better explain our current rheological constraints of the deep Earth.*

10. **Stamenković, V.**, Keller, G., Nesic, D., Cogoli, A., Grogan, S.P., 2010. Neocartilage formation in 1 g, simulated, and microgravity environments: implications for tissue engineering. Tissue Engineering: part A, 16 (5), 1729-1736.
    Find on: http://online.liebertpub.com/doi/abs/10.1089/ten.tea.2008.0624
    - *Summary: I was PI for two space experiments with NASA, ESA, and Roscosmos, investigating the growth of cartilage matrices and cell-fluid interactions in microgravity on the International Space Station and a Russian Space Satellite.*

Peer-Reviewed Papers in Preparation or Submitted

11. **Stamenković, V.**. Water Distribution and plate tectonics.
    - *Summary: surface water supports but sub-lithospheric mantle water suppresses plate tectonics. A late exogenic delivery of water and dry planet formation are ideal to support the initiation and maintenance of plate tectonics on Earth.* ***Soon to be submitted.***
12. **Stamenković, V.**. Surface temperature variations and plate tectonics.
    - *Summary: increasing surface temperature support the initiation but not the maintenance of plate tectonics. Earth's moderate temperatures are critical for the occurrence of plate tectonics. Episodic surface recycling on Venus can be explained with the higher surface temperature allowing an unstable cycle of initiating subduction but not maintaining it on geological timescales until plate tectonics comes to a halt but then re-initiates thanks to the elevated surface temperatures.* ***Soon to be submitted.***

Selected Conference Proceedings

13. Sohl, F., Noack, L., **Stamenković, V.,** Breuer, D., Wagner, F.W., 2010. Thermal state of Earth-like exoplanets: Implications for CoRoT-7b. In: Eos Trans. AGU, 91 (26). The Meeting of the Americas, 8-12 Aug. 2010, Brazil.
14. Stamenković, V., & Breuer, D., 2009. Hades: Habitability of the deep subsurface, In: Origins of Life and Evolution of Biospheres, Springer.

Technology Publications

15. **Stamenković, V.**, & Keller, G., 2003. CHONDRO, ESA Erasmus Experiment Archive.
16. Keller, G., & **Stamenković, V.**, 2002. Study of the process of cartilage structure formation in microgravity, ESA Erasmus Experiment Archive.
17. **Stamenković, V.**, Keller, G., Walser, S., Fuchsberger, G., 2001. LYMPHOSIG - LIDIA3 Hardware test and behavior of two fluids mixing for T-Lymphocyte investigation on MASER, ESA Erasmus Experiment Archive.

SELECTED INVITED COLLOQUIA & SEMINARS

- NASA Goddard, Planetary Seminar, 2016
- University of California in Los Angeles, Center for Planets iPLEX, 2016
- Tokyo Institute of Technology, ELSI Seminar, 2016
- Massachusetts Institute of Technology, PICS Seminar, 2015
- California Institute of Technology, Department of Geological and Planetary Sciences, Yuk Yung Seminar, 2015
- NASA Jet Propulsion Laboratories, Planet Seminar, 2015
- Harvard University, Center for Astrophysics, 2014
- California Institute of Technology, Department of Geological and Planetary Sciences, Yuk Yung Seminar, 2013
- University of California in Los Angeles, Department of Earth and Planetary Sciences, 2013
- Berkeley University, Departments of Earth & Planetary Sciences and Astronomy, 2013

SELECTED CONFERENCE PRESENTATIONS

- **Stamenković, V.**, 2016. ***INVITED.*** Impact of Exoplanetary Space Weather on Climate and Habitability, New Orleans, USA.
- **Stamenković, V.**, 2015 & 2016. ***INVITED.*** Keck Institute for Space Studies, Methane on Mars, Pasadena, USA.
- **Stamenković, V.**, 2015. ***INVITED KEYNOTE SPEAKER,*** Space Vision SEDS, Boston, USA.
- **Stamenković, V.**, 2015. ***INVITED KEYNOTE SPEAKER.*** GeoBerlin: 100 Years of Plate Tectonics, Berlin, Germany.
- **Stamenković, V.**, 2015. ***INVITED.*** Early Earth Dynamo, Kawaguchiko Lake, Japan.
- **Stamenković, V.**, Höink, Tobias, Lenardic, A., 2015. ***INVITED.*** Spring AGU, Montreal, Canada.
- **Stamenković, V.**, 2014. AGU, San Francisco, USA.
- **Stamenković, V.**, 2014. AAS Division of Planetary Sciences, Tucson, USA.
- **Stamenković, V.**, 2014. Habitability through time and space, Spring Symposium, Space Telescope Science Institute, Baltimore, USA.
- **Stamenković, V.**, Seager, S., Breuer, D., 2013. Deep Earth, Gordon Research Conference, Holyoke, USA.

- Breuer, D., **Stamenković, V.**, 2012. ***INVITED***. European Geosciences Union, Vienna, Austria.
- **Stamenković, V.**, 2012. European Science Congress, Madrid, Spain.
- **Stamenković, V.**, 2011. ***INVITED.*** Astronomical Society Meeting, Max Planck Institute, Heidelberg, Germany.
- **Stamenković, V.**, Spohn, T., Breuer, D., 2010. AGU Fall Meeting, San Francisco, USA.
- **Stamenković, V.**, Noack, L., Breuer, D., Spohn, T., 2010. IAU Symposium 276: The Astrophysics of Planetary Systems - Formation, Structure, and Dynamical Evolution, Turin, Italy.
- **Stamenković, V.**, Noack, L., Breuer, D., Spohn, T., 2010. Geodynamics Workshop, Münster, Germany.
- **Stamenković, V.**, & Breuer, D., 2010. European Planetary Science Congress, Rome, Italy.
- **Stamenković, V.**, 2010. ***INVITED.*** Astrobiology Graduate Student Conference, Tällberg, Sweden.
- **Stamenković, V.**, Noack, L., Breuer, D., 2010. European Geophysical Union, Vienna, Austria.
- **Stamenković, V.**, & Breuer, D., 2010. EGU General Assembly, Vienna, Austria.
- **Stamenković, V.**, Noack, L., Breuer, D., 2009. AGU Fall Meeting, San Francisco, USA.
- **Stamenković, V.**, Noack, L., Breuer, D., 2009. European Planetary Science Congress, Postdam, Germany.
- **Stamenković, V.**, & Breuer, D., 2008. European Astrobiology Network Conference, Neuchâtel, Switzerland.
- **Stamenković, V.**, 2008. AbSciCon and AbGradCon, Santa Clara, USA.
- **Stamenković, V.**, & Keller, G., 2004. ***INVITED***. 55th International Astronautical Congress, Vancouver, Canada.

TEACHING & MENTORING EXPERIENCE

- **Research Co-adviser,** MIT & Caltech **2013-now**
  Advised undergraduate student Mitchell Black Jr. (Tufts University) with Nikole Lewis (Space Telescope Science Institute) on coupling geodynamic evolution models to global circulation models. I currently co-advise graduate student Mary Knapp (PhD advisor Sara Seager, MIT) on magnetic field generation and evolution.
- **Main Instructor for new MIT EAPS/Harvard EPS class,** MIT **Fall 2014**
  I taught a new class between MIT and Harvard for graduate and undergraduate students entitled "Planets & Life – Human & Planetary Perspectives", focusing on the geodynamic & atmospheric processes impacting environmental stability. Class development, organization, lecturing, and research project advising for students.
- **Mentoring graduate and undergraduate students**, DLR Berlin **2008-2012**
- **Teaching Assistant**, ETH Zurich **2003-2004**
  Teaching assistant for undergraduate course in physics for environmental scientists. Holding a weekly class for 40 undergraduate students, as well as course work and exam grading and mentoring.
- **Teaching high school students physics and astronomy** **1996-2000**
  Weekly in the observatory of Bern.

PROFESSIONAL SOCIETIES & SERVICE ACTIVITIES

- Reviewer for Nature Geoscience; Icarus; Earth and Planetary Science Letters; PEPI; G-Cubed
- Panelist for NASA's NESSF Geophysics and NASA XRP Programs
- Member of the American Geophysical Union (AGU), the AAS Division for Planetary Sciences (DPS), and the American Astronomical Society (AAS)

SELECTED PRINT, TV, & PUBLIC OUTREACH

Scientific American, "First Heat Map of a super-Earth", 2016; Astrobiology Soap Box Series, "Life Beyond Earth", 2014; Astronomy Now, "The Plate Tectonics Wars", 2013; Physics World, "Slow-Cooling Super Earths Could Lack Life", 2012; Astrobiology Magazine, "How Hot are Super-Earths?", 2012; New Scientist, "Not Too Big, Not Too Small, Earth's Just Right for Life", 2009; Swiss National Television, Documentary, "Flying in Microgravity", 2001.

LANGUAGE SKILLS

Fluent Language Skills in: English, German, Serbian, French, Swiss-German
Basic Language Skills in: Italian, Russian