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Name: Sebastian Arthur Willem Ritterbex
Born: July 5th, 1986 Zierikzee, the Netherlands

Work address:
Unité Matériaux et Transformations at University of Lille 1
UMR CNRS 8207 – Bât C6
59655 Villeneuve d'Ascq Cedex – France
Phone number: +33(0)3 20 33 71 42
e-mail: sebastian.ritterbex@ed.univ-lille1.fr

Field of interest

Theoretical and computational mineral physics, in particular the physical properties and deformation processes of materials in the Earth's interior (from the atomic up to macroscopic scale). The methods I have been working with include first-principles DFT calculations, finite element modeling on dislocations, continuum elasticity modeling and finite element modeling on mantle convection. My main interest lies in applying (these) theoretical methods to study the intrinsic properties of Earth materials, crystalline defects and deformation at all scales to bridge the gap between geodynamics and the underlying microscopic processes.

Current position

2012 → 2015

PhD-candidate mineral physics at the Unité Matériaux et Transformations, University of Lille 1, Villeneuve d'Ascq, France

Numerical modeling of intracrystalline plasticity of the transition zone minerals from the atomic up to the grain scale to infer the contribution of dislocation activity in mantle convection. The main methodologies I use are first-principles DFT atomistic simulations, finite element modeling and continuum elasticity modeling.

Education and Degrees

2012 – **Master of Science:**

- **University Master Degree: Geophysics** (Faculty of Earth Sciences, Utrecht University)
Thesis Title: The significance of grain size dependent composite solid-state flow in upper mantle dynamics

Master course specifications:

Rheology and mechanisms of deformation and transport in rocks, kinetic processes, rock magnetism and paleomagnetism, dynamics of the Earth's mantle, structure and composition of the Earth's interior, foundations of statistical physics, seismology

2009 – **Bachelor of Science:**

- **University Bachelor Degree: Physics & Astronomy** (Faculty of Physics & Astronomy, Utrecht University)
Thesis Title: Grain size dependent composite solid-state flow of biminerale polycrystalline materials (Rheological implications for upper mantle peridotites)
- **Minor Degree: Geophysics** (Faculty of Earth Sciences, University Utrecht)

Bachelor and Minor course specifications:

(Geophysical) fluid dynamics, newtonian mechanics, thermodynamics and statistical physics, quantum mechanics, (modern) condensed matter, continuum mechanics and rheology, geodynamics, programming and modeling of Earth processes, seismology and seismics, planetology

2004 – **High school diploma (VWO):**

VWO Diploma (pre-University) at College Pieter Zeeman, Zierikzee, the Netherlands)

Profile track: Natuur en Techniek (Nature and Technology)

Profile track: Natuur en Gezondheid (Nature and Health)

Schools and Practicals attended

2014

- **Short course: Modeling Materials**

Continuum, atomistic and multiscale techniques given by Prof. Tadmor and dr. Miller.

2014

- **Short course: High-pressure experimental techniques and applications to the Earth's interior**

at the Bayerisches Geoinstitute, Bayreuth, Germany.

2012

- **Short course: Structure and dynamics of the Earth's deep mantle**

by Prof. Romanowicz, Collège de France, Paris

2006

- **Geological field work**

Field excursion Limburg/Ardennes: "Lithology and structure of Limburg and the Ardennes" (Faculty of Earth Sciences, Utrecht University)

2003

- **Practical internship**

1 month practical at Geologischer Dienst NRW, Krefeld, Germany

Computational skills

Programming languages:

- Fortran 90, Bash, Python, Maple, Mathematica, L^AT_EX, Excel

Numerical modeling:

- First-principles DFT atomistic simulations (VASP)
- Finite element modeling on dislocations using the PNG-method ¹
- Continuum elasticity modeling
- Finite element modeling using SEPRAN ²

Operating systems:

- Linux, Microsoft Windows
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Languages

- First languages: Dutch, German (Native speaking)
 - English (Fluent)
 - French (Fluent)
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Publications

under review

S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, *Modeling dislocation glide in Mg₂SiO₄ Ringwoodite: Towards rheology under transition zone conditions*. Submitted to: Physics of the Earth and Planetary Interiors – Submission date: May 21, 2015.

Communications

Invited oral presentations

1. **S. Ritterbex**, **Modelling the plasticity of transition zone minerals: ... from atoms to the mantle**, *Solid Rock Seminars, Utrecht University*, Utrecht, the Netherlands, 8th May, 2015.
2. **P. Cordier**, Ph. Carrez, A. Goryaeva, K. Gouriet, P. Hirel, A. Kraych, S. Ritterbex, **How modelling of Crystal Defects at the Atomic Scale can Provide Information on Seismic Anisotropy**, *AGU Fall Meeting 2014*, San Francisco, CA, United States, December 2014.
3. **S. Ritterbex**, Ph. Carrez, K. Gouriet, P. Cordier, **Modelling dislocation mobility of complex silicates in the Earth's mantle**, *European Materials Research Society (E-MRS) Fall Meeting 2014*, Warsaw, Poland, September 2014.

¹Peierls-Nabarro-Galerkin model, Denoual, 2007.

²Segal, A., Praagman, N., 1984. SEPRAN-user manual, Sepra, Leidschendam, the Netherlands.

Oral presentations

1. S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, **Modelling dislocation mobility in transition zone minerals**, *92nd Annual Meeting of the German Mineralogical Society (DMG)*, Jena, Germany, September 2014.
 2. Ph. Carrez, P. Cordier, K. Gouriet, P. Hirel, A. Kraych, S. Ritterbex, **Plasticité des minéraux du manteau terrestre**, *Réunion plénière du GDR CNRS 3532 MODMAT*, Marseille, France, February 2013.
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Poster presentations

1. S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, **Plastic Deformation of Transition zone Minerals: Effect of Temperature on Dislocation Mobility**, *AGU Fall Meeting 2014*, San Francisco, CA, United States, December 2014.
 2. S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, **Intracrystalline plasticity of Mg₂SiO₄ ringwoodite**, *Plasticité*, Lyon, April 2014.
 3. S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, **Numerical modelling of the plasticity of ringwoodite under transition zone conditions in the Earth's mantle**, *AGU Fall Meeting 2013*, San Francisco, CA, United States, December 2013.
 4. S. Ritterbex, Ph. Carrez, K. Gouriet, P. Cordier, **First principles atomistic calculations of the plastic properties of Mg₂SiO₄ ringwoodite at 20 GPa**, *Plasticité*, Paris, April 2013.
 5. S. Ritterbex, P. Cordier, Ph. Carrez, C.J. Spiers, A.P. v.d. Berg, **Towards a better understanding of mantle flow**, *Structure and Dynamics of the Earth's Deep Mantle*, Paris, France, November, 2012.
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