



# Jan Philipp Dietrich

## Curriculum Vitae

### Experience

#### Vocational

- since 10/2008 **Researcher**, *Potsdam Institute for Climate Impact Research (PIK)*.  
Research software engineering and development of an economic land-use model
- 12/2011–12/2018 **Group leader**, *research software engineering group "model operations"*,  
Sustainable Solutions, Potsdam Institute for Climate Impact Research (PIK).  
Increasing efficiency, transparency and reproducibility of models and model development,  
achieving synergies in model development, standardization, technical support
- since 01/2019 **Group leader**, *"Research Software Engineering for Transformation Pathways"*,  
Transformation Pathways, Potsdam Institute for Climate Impact Research (PIK).  
Increase quality of software-driven research, including but not exclusive to their usability,  
credibility, performance, reproducibility and robustness.

#### Miscellaneous

- 7/2002–5/2003 **civilian service**, *"Christliche Erholungshäuser Bethanien"*,  
Langeoog (Niedersachsen, Germany).
- 2/2004–7/2005 **research assistant**, *research group "Applied Condensed-Matter Physics"*  
*of Prof. Dr. Reimund Gerhard*, Potsdam University.  
Charging and measuring the properties of charge-storing polymers
- 2006–2007 **webmaster**, *"Physikalisches Grundpraktikum"*, Potsdam University.

### Education

#### school education

- 1989–1993 **primary school**, *"Jung-Stilling-Schule"*, Ewersbach (Hessen, Germany).
- 1993–2002 **secondary school**, *"Wilhelm-von-Oranien-Gymnasium"*,  
Dillenburg (Hessen, Germany).
- 6/2002 **Abitur**, *advanced courses in mathematics and chemistry*, mark 2.2.

#### academic studies

- 10/2003–7/2008 **studying physics**, *Potsdam University*, Potsdam (Brandenburg, Germany).  
specialisation in Nonlinear Dynamics
- summer 2005 **intermediate diploma**, mark 1.7.

- 8/2007–2/2008 **semester abroad**, *Umeå University*, Umeå (Sweden).  
attending courses in Nanotechnology and Robotics
- 2/2008–7/2008 **diploma thesis**, *mark 1.1*.
- 7/2008 **graduation in physics (diploma)**, *mark 1.2 "with distinction"*.
- 10/2008–10/2011 **Ph.D. student**, *Humboldt University Berlin / Potsdam Institute for Climate Impact Research (PIK)*.
- 10/2011 **Ph.D. in physics**, *Humboldt University Berlin, magna cum laude*.

## Diploma thesis - University of Potsdam

- title *Phase Space Reconstruction using the frequency domain - a generalization of actual methods*
- supervisors Prof. Dr. Frank Spahn – Potsdam University  
Prof. Dr. Bernd Blasius – University of Oldenburg (ICBM)
- URN urn:nbn:de:kobv:517-opus-50738
- description Phase Space Reconstruction is a method that allows to reconstruct the phase space of a system using only an one dimensional time series as input. There are several functions that can be used for reconstruction. I demonstrate that all these different transformations can be expressed in frequency space as  $\tilde{x}_n(\omega) = f(\omega) \cdot \tilde{x}(\omega)$ , where  $\tilde{x}$  is a known input  $\tilde{x}_n$  the reconstructed output and  $f(\omega)$  a generalized reconstruction function.

## PhD thesis - Humboldt University Berlin

- title *Efficient treatment of cross-scale interactions in land-use model*
- supervisors Prof. Dr. Dr. h.c. Jürgen Kurths – Humboldt University  
Prof. Dr. Hermann Held – University of Hamburg  
Prof. Dr. Karlheinz Erb – Alpen-Adria University
- DOI 10.18452/16395
- description Computer models have become a common tool in various disciplines. A challenge is the linking of processes on different scales where negligence can lead to biases in model projections. A good balance between accuracy and abstraction is essential. I investigate efficient implementations of cross-scale interactions in agricultural land-use models. I focus on two aspects: First, the inclusion of spatially explicit data in a global model; second, technological change as a driver for land use change. Due to limitations in complexity of global optimization models the problem arises that high-resolution data cannot be used directly as model input. Typically, the spatially explicit data is upscaled via simple upscaling rules. An alternative is the use of clustering methods. I provide a general framework including the creation of clusters, the upscaling of inputs, and the downscaling of outputs. My investigations show that the information loss due to upscaling decreases significantly with cluster methods compared to static grids. Another important process in agriculture is technological change. Whereas in the past increases in agricultural production were mainly achieved by agricultural land expansion, nowadays most increases in total production are outcome of intensification due to technological change. To model this feedback I introduce a measure for agricultural land-use intensity. Based on this measure I show that the effectiveness of investments in technological change decreases with the agricultural land-use intensity. My findings imply that apart from detailedness especially the implementation has a significant impact on general model quality. Therefore, in model development the framework used for implementation should be emphasized to a greater extent.

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## List of conducted courses

- 2004–2005 **tutor**, *private tutoring in mathematics and theoretical physics*.  
support for fellow students during my undergraduate studies (SS2004, WS2004/2005, SS2005)
- 2005–2007 **tutor**, *"Tutorium für Erstsemester"*, Potsdam University.  
tutoring freshman students in their first year in Physics at Potsdam University (WS2005/2006, SS2006, WS2006/2007)

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## Languages

- German first language  
English fluidly *UNlcert III: mark 1.7*  
Swedish basics

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## Computer skills

- Numerical computing R, GAMS, MATLAB, gnuplot  
Programming C, C++, Python, QBasic, Visual Basic, Pascal, Delphi  
Webdesign HTML, JavaScript, PHP, Perl

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## Interests

- freeclimbing
- speedminton
- photography
- virtual reality

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## Awards

- 2008–2010 **Festival of Lights Berlin**, *photo competitions 2008–2010*, awarded for pictures "Deutscher Dom" (2008), "Oberbaumbrücke" (2009) and "Beisheim-Center" (2010).
- 2011 **PIK best dissertation of the year**, *awarded by the Society of Friends and Promoters of the Potsdam Institute for Climate Impact Research e.V.*

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## More information

- Profile @ PIK [pik-potsdam.de/members/dietrich](http://pik-potsdam.de/members/dietrich)  
GitHub [github.com/tscheypidi](https://github.com/tscheypidi)  
Google Scholar [scholar.google.de/citations?user=O4NrklAAAAAJ](https://scholar.google.de/citations?user=O4NrklAAAAAJ)  
Group @ PIK [pik-potsdam.de/research/transformation-pathways/research/research-software-engineering](http://pik-potsdam.de/research/transformation-pathways/research/research-software-engineering)

## Selected publications

**Dietrich J.P.**, Bodirsky B.L., Humpenöder F., Weindl I., Stevanović M., Karstens K., Kreidenweis U., Wang X., Mishra A., Klein D., Ambrósio G., Araujo E., Yalew A.W., Baumstark L., Wirth S., Giannousakis A., Beier F., Chen D. M.-C., Lotze-Campen H., and Popp A. (2019): **"MAgPIE 4 – a modular open-source framework for modeling global land systems"**, Geoscientific Model Development, 12, 1299–1317, doi: 10.5194/gmd-12-1299-2019.

Kriegler E., Bauer N., Popp A., Humpenöder F., Leimbach M., Strefler J., Baumstark L., Bodirsky B., Hilaire J., Klein D., Mouratiadou I., Weindl I., Bertram C., **Dietrich J.P.**, Luderer G., Pehl M., Pietzcker R., Piontek F., Lotze-Campen H., Biewald A., Bonsch M., Giannousakis A., Kreidenweis U., Müller C., Rolinski S., Schultes A., Schwanitz J., Stevanovic M., Calvin K., Emmerling J., Fujimori S. and Edenhofer O. (2017): **"Fossil-fueled development (SSP5): An energy and resource intensive scenario for the 21st century"** Global Environmental Change, 42, 297-315 p. doi: 10.1016/j.gloenvcha.2016.05.015

Popp A., Calvin K., Fujimori S., Havlik P., Humpenöder F., Stehfest E., Bodirsky B. L., **Dietrich J.P.**, Doelmann J. C., Gusti M., Hasegawa T., Kyle P., Obersteiner M., Tabeau A., Takahashi K., Valin H., Waldhoff S., Weindl I., Wise M., Kriegler E., Lotze-Campen H., Fricko O., Riahi K. and Vuuren D. P. van (2017): **"Land-use futures in the shared socio-economic pathways"** Global Environmental Change, 42, 331-345 p. doi: 10.1016/j.gloenvcha.2016.10.002

Stevanovic M., Popp A., Lotze-Campen H., **Dietrich J.P.**, Müller C., Bonsch M., Schmitz C., Bodirsky B., Humpenöder F. and Weindl I. (2016): **"The impact of high-end climate change on agricultural welfare"** Science Advances, 2, e1501452 doi: 10.1126/sciadv.1501452

**Dietrich J.P.**, Schmitz C., Lotze-Campen H., Popp A., Müller C. (2014): **"Forecasting technological change in agriculture - An endogenous implementation in a global land use model"**. Technological Forecasting & Social Change, Volume 81, Pages 236-249, ISSN 0040-1625, doi: 10.1016/j.techfore.2013.02.003 [Preprint]

Bodirsky B.L., Popp A., Lotze-Campen H., **Dietrich J.P.**, Rolinski S., Weindl I., Schmitz C., Müller C., Bonsch M., Humpenöder F., Biewald A., Stevanovic M. (2014): **"Reactive nitrogen requirements to feed the world in 2050 and potential to mitigate nitrogen pollution"**, Nature Communications, 5, 3858, doi: 10.1038/ncomms4858.

Popp A., Humpenöder F., Weindl I., Bodirsky B.L., Bonsch M., Lotze-Campen H., Müller C., Biewald A., Rolinski S., Stevanovic M., **Dietrich J.P.** (2014): **"Land use protection for climate change mitigation."** Nature Climate Change 4, 1095-1098. doi:10.1038/nclimate2444

**Dietrich J.P.**, Popp A., Lotze-Campen H. (2013): **"Reducing the loss of information and gaining accuracy with clustering methods in a global land-use model"**. Ecological Modelling, Volume 263, 10 August 2013, Pages 233-243, ISSN 0304-3800, 10.1016/j.ecolmodel.2013.05.009 [Preprint]

**Dietrich J.P.**, Schmitz C., Müller C., Fader M., Lotze-Campen H. and Popp A. (2012): **"Measuring agricultural land-use intensity – A global analysis using a model-assisted approach"**, Ecological Modelling, Volume 232, Pages 109-118, ISSN 0304-3800, 10.1016/j.ecolmodel.2012.03.002. [Preprint & Online Supporting Material]

Popp A., **Dietrich J.P.**, Lotze-Campen H., Klein D., Bauer N., Krause M., Beringer T., Gerten D. and Edenhofer O. (2011): **"The economic potential of bioenergy for climate change mitigation with special attention given to implications for the land system"** Environmental Research Letters 6 doi: 10.1088/1748-9326/6/3/034017