

# Katrin Bentel

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## Education

- 09/2009–11/2013 **Norwegian University of Life Sciences, Ås, Norway**  
 PhD degree in Geodesy, Department for Mathematical Sciences and Technology
- 10/2003–06/2009 **University of Stuttgart, Stuttgart, Germany**  
 Diplom degree in Geodesy and Geoinformation
- 09/2007–09/2008 **University of Calgary, Calgary, Canada**  
 Transfer student in Geomatics Engineering

## Theses

- 11/2013 **PhD Thesis**
- title *Regional Gravity Modeling in Spherical Radial Basis Functions - On the Role of the Basis Function and the Combination of Different Observation Types*
- advisors *Dr.-Ing. Christian Gerlach*, Bavarian Academy of Sciences and Humanities, Munich, Germany  
*Prof. Dr. Bjørn Ragnvald Pettersen*, Norwegian University of Life Sciences, Ås, Norway  
*Prof. Dr. Cecilie Rolstad-Denby*, Norwegian University of Life Sciences, Ås, Norway  
*apl. Prof. Dr.-Ing. habil. Michael Schmidt*, German Geodetic Research Institute, Munich, Germany
- evaluation committee *Prof. Dr. Volker Michel*, Geomathematics Group, University of Siegen, Germany  
*Dr. Isabelle Panet*, Institut National de l'Information Géographique et Forestière (IGN), Paris, France  
*Dr. Ola Øvstedal*, Department of Mathematical Sciences and Technology, Norwegian University of Life Sciences, Ås, Norway
- description High-resolution gravity observations, which became available in the recent years, can be used for regional refinement of global Earth gravity models. Details of regional gravity modeling in spherical radial basis functions are investigated with a closed-loop simulation implemented in Matlab. Thereby, the selection of different parameters is tested, with emphasis on an appropriate spherical radial basis function. Furthermore, focus is on GRACE-type observations to study regional ice mass trends. But also other types of gravity observations are investigated. Satellite based, airborne, and terrestrial observations are used and combined in the regional modeling approach.
- 06/2009 **Diplom Thesis**
- title *Empirical Orthogonal Function Analysis for GRACE Gravity Data*
- supervisor Prof. Dr.-Ing. Nico Sneeuw, University of Stuttgart, Germany
- description One of the main problems in the gravity results from GRACE are the unphysical north-south stripes in the monthly gravity solutions. Empirical Orthogonal Function (EOF) Analysis together with a Kolmogorov-Smirnov hypothesis test is investigated to separate signal from noise and to determine sources of gravity changes as well as their behaviour in time. Global monthly data sets of gravity changes are used and all algorithms are implemented in Matlab.
- 08/2007 **Student Thesis**
- title *Detection of Vertical Structures in Terrestrial Laser Data*
- supervisor Dr.-Ing. Jan Böhm, University of Stuttgart, Germany
- description Terrestrial LiDAR data is completely different from airborne laser scanning data in terms of scanning geometry. Therefore, new analysis methods are required for terrestrial data. In this thesis, algorithms to detect vertical structures in terrestrial laser scanning data are implemented in C++ and demonstrated on a data example.

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## Awards

- 2012 **DAAD Doktorandenstipendium**, scholarship from the German Academic Exchange Service (DAAD)
- 2009 **Best degree in Geodesy and Geoinformation of the academic year**, awarded by the University of Stuttgart
- 2009 **Best thesis of the academic year**, awarded by F2GeoS
- 2007 **DAAD-ISAP grant for the academic year in Calgary**, scholarship from the German Academic Exchange Service (DAAD)

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## Research Experience

- 02/2014 - present **Postdoctoral scholar at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA**  
Main advisor: Dr. Felix Landerer  
Co-advisor: Dr. Carmen Boening
- 2011-present Member of the *IAG (International Association of Geodesy) - ICCT (Inter Commission Committee on Theory) Joint Study Group JSG 0.3 "Comparison of Current Methodologies in Regional Gravity Field Modeling"*
- 09/2009-11/2013 *Department for Mathematical Sciences and Technology, Norwegian University of Life Sciences, Ås, Norway, Commission of Geodesy and Glaciology, Bavarian Academy of Sciences and Humanities, Munich, Germany and German Geodetic Research Institute, Munich, Germany*  
Research work in a collaboration between the three institutions on the PhD project (personnel exchange funded through a Project Based Personnel Exchange Program, by the Research Council of Norway and the German Academic Exchange Service)
- 11/2008-06/2009 *Institute of Geodesy, University of Stuttgart, Germany*  
Preparation of Diplom Thesis under Prof. Dr.-Ing. Nico Sneeuw's direct supervision
- 06/2008-09/2008 *Department of Geomatics Engineering, University of Calgary, Canada*  
Research towards the Diplom Thesis topic with Prof. Dr. Michael G. Sideris and Dr. Elena Rangelova
- 05/2008 *Institute of Geodesy, University of Stuttgart, Germany and School of Geodesy and Geomatics, Wuhan University, Wuhan, China*  
Visit and consulting in Wuhan for the common project on future satellite gravimetry under the sponsorship of a Project Based Personnel Exchange Program (China Scholarship Council and German Academic Exchange Service)
- 04/2007-08/2007 *Institute of Photogrammetry, University of Stuttgart, Germany*  
Preparation of Student Thesis under Dr.-Ing. Jan Böhm's supervision
- 10/2006-04/2007 *Institute of Photogrammetry, University of Stuttgart, Germany*  
Research assistant for work on laser scanning data

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## Teaching Experience

- 11/2012 *Department for Mathematical Sciences and Technology, Norwegian University of Life Sciences, Ås, Norway*  
Guest lectures in the course KLIMA100 - Climate Change, Research and Societal Impacts
- 01/2010 *Department of Geosciences, University of Oslo, Norway*  
Guest lectures in Satellite Gravimetry
- 10/2005-09/2006 *Institute for Analysis, Dynamics and Modeling, University of Stuttgart, Germany*  
Teaching assistant for weekly seminars in Advanced Mathematics I and II

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## Field experience, vocational experience and relevant courses

- 08/2010 *Norwegian University of Life Sciences und Norwegian Polar Institute, Ny-Ålesund, Norway*  
Assistant in a measurement campaign with ground based radar observations of a glacier calving front for Cecilie Rolstad Denby's project and presentation of my PhD project in Ny-Ålesund
- 06/2010 *Geophysical Institute, University of Alaska, Fairbanks, USA und Mc Carthy, Alaska, USA*  
Participation in the Summer School in Glaciology
- 03/2006, 09/2006, 03/2007 *Schreyer Engineering Office for Surveying, Echterdingen, Germany*  
Internship with focus on engineering projects, measuring in the locality as well as data analysis, processing and visualization
- 03/2006-08/2007 *Student Residence, University of Stuttgart, Germany* Student Life Administrator
- 06/2004-08/2004 *Institute for Physics, University of Stuttgart, Germany* Project-based student assistant

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## Publications

- 2014 **Combining Different Types of Gravity Observations in Regional Gravity Modeling in Spherical Radial Basis Functions**  
accepted for the International Association of Geodesy Symposia, Vol. 142, Proceedings of the VIII Hotine Marussi Symposium, Rome, June 17-21, 2013  
authors Katrin Bentel and Michael Schmidt
- 01/2014 **A Closed-Loop Simulation on Regional Modeling of Gravity Changes from GRACE**  
Earth on the Edge: Science for a Sustainable Planet, C. Rizos and P. Willis (eds.), International Association of Geodesy Symposia, Vol. 139  
authors Katrin Bentel and Christian Gerlach
- 09/2013 **Artifacts in Regional Gravity Representations with Spherical Radial Basis Functions**  
Journal of Geodetic Science, Volume 3, Issue 3, pp.173-187  
authors Katrin Bentel, Michael Schmidt, and Cecilie Rolstad Denby
- 05/2013 **Observation, Validation, Modeling - Historical Lines and Recent Results in Norwegian Gravity Field Research**  
Kart og Plan, Volume 73, pp. 128-150  
authors Christian Gerlach, Michal Šprlák, Katrin Bentel, and Bjørn R. Pettersen
- 04/2013 **Different Radial Basis Functions and their Applicability for Regional Gravity Field Representation on the Sphere**  
GEM - International Journal on Geomathematics, Springer, Volume 4, Issue 1, pp 67-96  
authors Katrin Bentel, Michael Schmidt, and Christian Gerlach
- 01/2011 **Observing Regional Ice Mass Changes with GRACE**  
Proceedings of the 16th Nordic Geodetic Commission General Assembly  
authors Katrin Bentel and Christian Gerlach
- 09/2010 **Observability of Regional Cryospheric Signals with Satellite Gravity Missions of GRACE-type**  
Proceedings of the ESA Living Planet Symposium Special Publication SP-686  
authors Katrin Bentel and Christian Gerlach

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## Conference Contributions

- 06/2013 Combining Different Types of Gravity Observations for Regional Modeling in Spherical Radial Basis Functions  
Conference talk at the VIII Hotine Marussi Symposium, Rome, Italy  
Katrin Bentel, Michael Schmidt
- 04/2013 Regional Gravity Modeling in Spherical Radial Basis Functions - Different Types of Observations in a Closed-loop Simulation  
Conference talk at the European Geophysical Union General Assembly, Vienna, Austria  
Katrin Bentel, Michael Schmidt
- 12/2012 Regional Gravity Modelling from Satellite Observations - A Closed-Loop Simulation  
Conference poster at the American Geophysical Union Fall Meeting, San Francisco, USA  
Katrin Bentel
- 06/2012 Radial Basis Functions for Regional Modelling of Gravity Changes from GRACE - a Closed Loop Simulation  
Conference poster at the IGS Symposium on Glaciers and Ice Sheets in a Warming Climate, University of Alaska Fairbanks, Alaska, USA  
Katrin Bentel, Cecilie Rolstad Denby
- 04/2012 Different radial basis functions and their applicability for regional gravity representation on the sphere  
Conference poster at the European Geophysical Union General Assembly, Vienna, Austria  
Katrin Bentel, Michael Schmidt, Verena Lieb, Christian Gerlach
- 04/2012 Regional gravity field modeling via multi-resolution representation and the combination of various observation techniques  
Conference talk at the European Geophysical Union General Assembly, Vienna, Austria  
Verena Lieb, Michael Schmidt, Denise Dettmering, Katrin Bentel, Christian Gerlach
- 02/2012 Comparison of Different Radial Base Functions in Gravity Representations  
Conference talk at the Workshop on Regional Gravity and Geomagnetic Field Modelling, Bavarian Academy of Sciences and Humanities, Munich, Germany  
Katrin Bentel, Christian Gerlach
- 10/2011 Observing Ice Mass Changes with GRACE Satellite Gravimetry - a Simulation Study  
Conference talk at the International Glaciological Society Nordic Branch Meeting, Oslo, Norway  
Katrin Bentel
- 09/2011 Point Grid Positions for Radial Base Functions and their Effect in Regional Gravity Field Representations  
Conference talk at the "Jahrestagung der Deutschen Mathematikervereinigung", Cologne, Germany  
Katrin Bentel, Gabriel Goebel, Michael Schmidt, Christian Gerlach
- 07/2011 Observation of Cryospheric Mass Changes by Regional Gravity Field Modeling from the GRACE Gravity Mission - a Simulation Study  
Conference talk at the International Union of Geodesy and Geophysics General Assembly, Melbourne, Australia  
Katrin Bentel, Christian Gerlach
- 07/2011 Numerical Aspects of Regional Gravity Field Modeling  
Conference poster at the International Union of Geodesy and Geophysics General Assembly, Melbourne, Australia  
Majid Naeimi, Gabriel Goebel, Michael Schmidt, Katrin Bentel, Christian Gerlach, Jakob Flury, Jürgen Müller
- 04/2011 Artificial Effects in Regional Gravity Field Representation Caused by Point Grids of Input Data and Localizing Base Functions  
Conference talk at the European Geophysical Union General Assembly, Vienna, Austria  
Katrin Bentel, Gabriel Goebel, Michael Schmidt, Christian Gerlach

- 12/2010 Simulation Study for Regional Mass Changes in the Cryosphere Observed by the GRACE Gravity Mission  
Conference poster at the American Geophysical Union Fall Meeting, San Francisco, USA  
Katrin Bentel, Christian Gerlach
- 11/2010 New Regional Gravity Fields from GRACE in-situ observations  
Conference poster at the 6th TOPO-EUROPE Workshop, Hønefoss, Norway  
Martin Schmeer, Michael Schmidt, Christian Gruber, Katrin Bentel, Benoit Meyssignac, Luciana Fenoglio-Marc
- 09/2010 Low-Low Satellite-To-Satellite Tracking Revisited  
Conference poster at the Second International Symposium of the International Gravity Field Service, Fairbanks, USA  
Christian Gerlach, Katrin Bentel
- 09/2010 Observing regional ice mass changes with GRACE  
Conference talk at the Nordic Geodetic Commission General Assembly, Hønefoss, Norway  
Katrin Bentel, Christian Gerlach
- 07/2010 Observability of regional cryospheric signals with satellite gravity missions of GRACE-type  
Conference poster at the ESA Living Planet Symposium, Bergen, Norway  
Katrin Bentel, Christian Gerlach
- 04/2009 EOF-based Filtering of GRACE Gravity Field Solutions: A Comparison between Spectral and Spatial Approaches  
Conference poster at the European Geophysical Union General Assembly, Vienna, Austria  
Siavash Iran Pour, Katrin Bentel, Nico Sneeuw

Katrin Bentel, March 2014