Andreas Hilboll

Personal information

Born November 14, 1977 in Aachen (Germany)
German cityzenship
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Education

2008 – present **PhD student**, *Institute of Environmental Physics, University of Bremen*, Bremen.
1999 – 2007 **Diplom-Mathematiker**, *Rheinische Friedrich-Wilhelms-Universität*, Bonn.
1997 **Abitur**, *Geschwister Scholl Gymnasium*, Pulheim.

PhD thesis

title *Observation of Megacity pollution from space*

supervisors Prof. Dr. John P. Burrows, Dr. Andreas Richter

abstract One of the largest changes over the last century is the massive increase in human population globally. At the same time, the percentage of people living in large cities is increasing rapidly. These cities account for a large fraction of the total anthropogenic emissions to the atmosphere. As a result, they are hotspots of pollution problems and at the same time have a significant impact on air quality on a global scale.
Using measurements from satellite based spectrometers, the spatial distribution and the temporal evolution of nitrogen dioxide (NO_2), an important ozone precursor, can be determined. These measurements can be applied to validate results of chemistry transport models such as MOZART and also combined with these to assess the impact of pollution from large cities on the atmosphere and to estimate future developments.
In this PhD project, data from the GOME, SCIAMACHY and GOME-2 satellite instruments will be used to derive a consistent dataset of tropospheric columns of NO_2, to study their evolution and the importance of large cities on its global budget. The work will be performed in close collaboration with the European project *megaCITY – Zoom for the Environment (CITYZEN)*, an international project on the impact of megacities.

Diploma thesis

title *Dynamik und Interaktion von Aktin-Filamenten*

supervisors Prof. Dr. Wolfgang Alt, Prof. Dr. Rolf Krause

abstract The movement and interaction of Actin filaments as semi flexible, inextensible rods can be represented by the dynamics of a few nodes along each filament, interpolated by cubic spline curves. Forces acting on any filament point are condensed to the nearest nodes and can consist of bending, friction, random, and interaction forces, so that a system of stochastic ordinary differential equations for positions and velocities of all nodes arises. Resulting simulations reproduce the flickering behaviour of single Actin filaments with a mean directional persistence length of several micrometers. Applying a newly developed, model based, adaptive image analysis procedure to film recordings of Actin filaments, these statistical properties are identified and compared to those derived from simulations. In the easiest case, interactions between two filaments, e.g. via binding of cross linking dimers, such as Myosin, can be modelled by attractive forces between nodes of different filaments, given their distance falls into a certain interaction range. More generally, the stochastic interaction forces by transient binding and unbinding of cross linkers can be lumped together into a mean interaction kernel. Resulting numerical analysis and simulations show partial alignment with deviations depending on the type of stochastic inputs.

Publications

Igor Konovalov, Matthias Beekmann, Andreas Richter, John P. Burrows, and Andreas Hilboll, **Multi-annual changes of NOx emissions in megacity regions: nonlinear trend analysis of satellite measurement based estimates**, Atmos. Chem. Phys. Discuss. **10** (2010), 10925–10968.

Presentations

Andreas Hilboll, Andreas Richter, Mihalis Vrekoussis, John P. Burrows, E. Gerasopoulos, C. Zerefos, Tayfun Kindap, U. Im, N. Mihalopoulos, and Maria Kanakidou, **Trends in tropospheric nitrogen dioxide (NO2) over megacities and large conurbations in the mediterranean and middle east from GOME and SCIAMACHY**, 11th IGAC Science Conference (Halifax, Canada), July 2010.

Andreas Hilboll, Andreas Richter, Mihalis Vrekoussis, and John P. Burrows, **Trends in tropospheric NO2 over megacities in the Mediterranean and Middle East regions from GOME and SCIAMACHY**, EGU General Assembly (Vienna, Austria), May 2010.

Andreas Hilboll, **Trends in tropospheric nitrogen dioxide (NO2) over megacities in the Mediterranean and Middle East from GOME and SCIAMACHY**, Seminar Ocean, Ice, and Atmosphere at the Institute of Environmental Physics, University of Bremen (Bremen, Germany), April 2010.

_____, **Satellite measurements of tropospheric trace gases in the CHARMEX project**, CHARMEX WP1 Trends workshop (Paris, France), October 2009.

Andreas Richter, Andreas Hilboll, and John P. Burrows, **Improvements in GOME-2 retrievals of NO2**, O3M SAF User & Algorithm Forum (Halkidiki, Greece), June 2009.

Andreas Hilboll, **Projekt "atmosfair" – eine Antwort auf die Klimafolgen des Flugreisens?**, International summer school "Prima Klima! Auswirkungen des Klimawandels auf Freizeit und Tourismus" (Bremen, Germany), July 2008.

Posters

Andreas Hilboll, Andreas Richter, and John P. Burrows, **Intercomparison of different stratospheric correction schemes for the retrieval of tropospheric nitrogen dioxide columns from satellite**, 38th COSPAR Scientific Assembly (Bremen, Germany), July 2010.

Andreas Hilboll, **Observation of megacity pollution from space: Trends in tropospheric NO2 in mediterranean megacities**, 2nd ESSReS annual retreat (Bremen, Germany), June 2010.

Andreas Hilboll, Joana Leitão, Mihalis Vrekoussis, Andreas Richter, and John P. Burrows, **Trends in tropospheric NO2 from SCIAMACHY over megacities in the mediterranean and middle east**, ESA Atmospheric Science Conference (Barcelona, Spain), September 2009.

Andreas Hilboll, **Observation of megacity pollution from space**, 1st ESSReS annual retreat (Bremerhaven, Germany), August 2009.

Andreas Hilboll, Nadine Wieters, Andreas Richter, Björn-Martin Sinnhuber, and John P. Burrows, **The impact of the stratospheric correction on tropospheric NO2 measurements from satellites**, EGU General Assembly (Vienna, Austria), April 2009.

Participation in conferences / workshops

jul 2010 **38th COSPAR Scientific Assembly**, *Bremen (Germany)*.
jul 2010 **11th IGAC Science Conference**, *Halifax (Canada)*.
may 2010 **European Geosciences Union General Assembly**, *Vienna (Austria)*.
oct 2009 **CHARMEX WP1 Trends workshop**, *Paris (France)*.
sep 2009 **1st annual CityZen workshop**, *Vienna (Austria)*.
sep 2009 **ESA Atmospheric Science Conference**, *Barcelona (Spain)*.
jun 2009 **EUMETSAT O3M-SAF Users and Algorithms Forum**, *Halkidiki (Greece)*.
apr 2009 **European Geosciences Union General Assembly**, *Vienna (Austria)*.
mar 2009 **7th International Conference on Air Quality**, *Istanbul (Turkey)*.
sep 2008 **7th ACCENT AT2 Workshop**, *Helsinki (Finland)*.

Scholarships / awards

jul 2010 **Young Scientist Travel Grant**.
11th IGAC Science Conference, Halifax (Canada)

2008 – 2011 **Helmholtz Research School on Earth System Science**.
full PhD scholarship

2002 – 2003 **Erasmus scholarship**.
Université Joseph Fourier, Grenoble

Organizational activities

2008 – present **PhD student representative**, *Academic Council of the Helmholtz Research School on Earth System Science (ESSReS)*.

Teaching

2002 – 2004 **Rheinische Friedrich Wilhelms Unitersität**, *Bonn*.
Tutorials in Linear Algebra and Music Theory for first and second year students.

International experience

2002 – 2003 **Université Joseph Fourier**, *Grenoble, France*.
Two semesters of studies in Mathematics in the *ERASMUS*-programme.

1994 – 1995 **Belmont High School**, *Belmont, NH, USA*.
Senior year at an American high school as an exchange student in the *Youth for Understanding* programme.