Tim Appelhans

Curriculum Vitae

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Education and Qualifications

since 08/2012	**Lecturer (Akad. Rat)**	Philipps University Marburg, Germany
2011 - 2012	**Post-Doctoral Fellow**	Philipps University Marburg, Germany
2010 - 2011	**Post-Doctoral Fellow**	University Bayreuth, Germany
2010	**Ph.D. Geography**	University of Canterbury, New Zealand
2008	**Lecturer**	University of Otago, New Zealand
2005	**Dipl. Geography**	Friedrich-Alexander University Erlangen-Nürnberg, Germany

Awards

2010 **Best Doctoral Thesis in Geography**. Presidents award, New Zealand Geographical Society.
2006 **Best oral student presentation**. Resource Management Under Stormy Skies Conference, Christchurch, New Zealand, 20 - 23 November 2006.

Research

My principle research interests lie in the fields of geography, atmospheric sciences and ecosystem research across a wide range of spatial and temporal scales. In particular I am interested in boundary layer climatology and its interaction with other aspects of the earth-atmosphere system, especially in complex terrain (primarily montane and urban environments). My research is application-oriented and, being a geographer, I approach it in an inter-disciplinary manner. Among other research tools, I primarily use computational statistics (R), remote sensing and general spatial analysis approaches for my scientific investigations.
To date, I have authored 25 papers, technical reports, conference contributions and software packages on various topics in the broad areas of environmental sciences, general geography and (applied) climatology. A list of these appears on pages 5–7.

Grants

2013 - 2016 *Ecological Climatology and Remote Sensing* **€145,600**

Together with Prof. Dr. Thomas Nauss from Philipps University Marburg I am leading this subproject which is part of the DFG research group FOR 1246 *Kilimanjaro ecosystems under global change: Linking biodiversity, biotic interactions and biogeochemical ecosystem processes.*

Teaching

Lectures

- Climatology, GEOG 286/392, Otago (S1 2008)
- Environmental hazards management, GEOG 305, Canterbury (S1 2009, S1 2010)
- Environmental Processes: Research Practice, GEOG 211, Canterbury (S1 2010)
- Research Methods in Geography, 309, Canterbury (S2 2010)
- Recourses and Sustainability, 108, Canterbury (S2 2010)

Seminars

- Fernerkundliche Erfassung und Analyse globaler raum-zeitlicher Umweltveränderungen, Marburg (SS 2016) *(Remote sening based analysis of global spatio-temporal environmental changes)*
- Die Geographie des Bieres – Nachhaltiges Wirtschaften in der Lebensmittelindustrie (SS 2014 & SS 2015) *(The Geography of Beer)*
- Erfassung und Analyse von Landschaftsmustern mit Geländemethoden und Fernerkundung, Marburg (WS 2013 – WS 2015) *(Collection and analysis of landscape patterns using field observations and remote sensing)*
- Analyse und Visualisierung von Umweltdatensätzen für den Einsatz in Beruf und Schule, Marburg (SS 2013) *(Analysis and visualisation of enviromental data sets for professional use)*
- Erfassung, Analyse und Visualsierung ausgewählter Umweltdatensätze, Marburg (WS 2012) *(Collection, analysis and visualisation of selected environmental data sets)*
- Aufbereitung, Analyse und Visualisierung von klima-ökologischen Datensätzen, Marburg (WS 2011) *(Handling, analysis and visualisation of eco-climatological data sets)*
- Projektarbeit Physische Geographie, Marburg (WS 2011) *(Project work physical Geography)*

Laboratory courses

- Climatology, GEOG 286/392, Otago (S1 2008)

Excursions/Practicals

- Field research methods (Science), GEOG380, Otago (S1 2008)
- 4-tägige Exkursion Berchtesgaden, Bayreuth (SS 2011)

Grad student supervision

Ph.D.	ongoing	I. Otte	Development of a new approach for cost-effective, ground-based fog remote sensing techniques at Mt. Kilimanjaro
	ongoing	F. Detsch	Quantification of evapo-transpiration in tropical ecosystems: an integrative approach using field observations and remote sensing techniques
	ongoing	E. Mwangomo	Classical spatial statistics vs. modern machine learning approaches for the generation of high-resolution climatological surfaces in complex terrain (Mt. Kilimanjaro)
	ongoing	H. Meyer	High resolution satellite- and machine learning based monitoring of climate and land cover dynamics in South African savannas
	completed	M. Kuehnlein	A machine learning based 24-h-technique for an area-wide rainfall retrieval using MSG SEVIRI data over Central Europe

Tertiary education training

Fortbildungszentrum Hochschullehre	Planung einer Lehrveranstaltung (structured course palnning) (12 AE/hrs)
Hochschuldidaktisches Netzwerk Mittelhessen	Fachliche und überfachliche Kompetenzen stärken durch reflektierte Projektarbeit in gemeinnützigen Kontexten: das Service Learning Konzept (project work and service learning) (16 AE/hrs)

Skills

Advanced knowledge	of statistical programming including data mining and machine learning applications (R)
Advanced knowledge	of Geographical Information Systems (R, IDRISI, QGIS, SAGA GIS, ESRI, GDAL, TNTmips) and other spatial/atmospheric analysis tools (incl. Surfer, IDV, Vapor)
Proficient knowledge	of UNIX/LINUX shell environment
Basic knowledge	of meso-scale numerical modelling (The Air Pollution Model - TAPM, WRF) and programming languages C++, javascript

Software

Since 2011 I have authored and contributed to various open source software programs/packages. Details below.

julendat	JULENDAT Utilities for Environmental Data `https://github.com/environmentalinformatics-marburg/julendat`
remote	Empirical Orthogonal Teleconnections in R `https://cran.r-project.org/web/packages/remote/index.html`
satellite	Various Functions for Handling and Manipulating Remote Sensing Data `https://cran.r-project.org/web/packages/satellite/index.html`
mapview	Interactive viewing of spatial objects in R `https://cran.r-project.org/web/packages/mapview/index.html`
Rsenal	magic R functions for things various `https://github.com/environmentalinformatics-marburg/Rsenal`
gpm	Geospatial predictive modeling using parameterized and unparameterized models `https://github.com/environmentalinformatics-marburg/gpm`

Administrative and community involvement

Administrative duties

since 2015	Member of the Marburg Research Academy board of directors
2010	Administration of all laboratory courses at 100 level in Geography, Department of Geography, University of Canterbury.
2007 - 2008	PhD representative. Department of Geography, University of Canterbury, Christchurch, New Zealand.

Peer-review activities

I have delivered peer-reviews for the following journals:

Climate	`http://www.mdpi.com/journal/climate`
Spatial Statistics	`http://www.journals.elsevier.com/spatial-statistics`
STOTEN	`http://www.journals.elsevier.com/science-of-the-total-environment`

References

Prof. Andrew Sturman	Department of Geography, University of Canterbury, Private Bag 4800, Christchurch, New Zealand. email: andrew.sturman@canterbury.ac.nz phone: +64 3 364 2502
Prof. Dr. Thomas Nauss	Environmental Informatics, Department of Geography, Philipps University Marburg, Deutschhausstr. 12, 35032 Marburg, Germany. email: thomas.nauss@staff.uni-marburg.de phone: +49 6421 28 25980
Dr. Nicolas Cullen	Department of Geography, University of Otago, PO Box 56, Dunedin, New Zealand. email: njc@geography.otago.ac.nz phone: +64 3 479 3069

Publications

Refereed research papers

1. **Appelhans, Tim**, A. Sturman, and P. Zawar-Reza (2010). Modelling emission trends from non-constant time series of PM_{10} concentrations in Christchurch, New Zealand. *International Journal of Environment and Pollution* **43**(4), 354–363.
2. **Appelhans, Tim** and P. Zawar-Reza (2010). A modelling study of particulate matter dispersion under dominant surface wind regime modes in Christchurch, New Zealand. *Air Quality and Climate Change* **44**(1), 24–29.
3. Zawar-Reza, P., **T. Appelhans**, M. Gharaylou, and A. Shamsipour (2010). Mesoscale controls on particulate matter pollution for a mega city in a semi-arid mountainous environment: Tehran, Iran. *International Journal of Environment and Pollution* **41**(1), 166–183.
4. **Appelhans, Tim**, A. Sturman, and P. Zawar-Reza (2012). Synoptic and climatological controls of particulate matter pollution in a Southern Hemisphere coastal city. *International Journal of Climatology* **33**(2), 463–479.
5. Kuehnlein, M., **T. Appelhans**, B. Thies, A. A. Kokhanovsky, and T. Nauss (2013). An evaluation of a semi-analytical cloud property retrieval using MSG SEVIRI, MODIS and CloudSat. *Atmospheric Research* **122**, 111–135.
6. Kuehnlein, M., **Appelhans, Tim**, B. Thies, and T. Nauss (2014). Precipitation Estimates from MSG SEVIRI Daytime, Nighttime, and Twilight Data with Random Forests. *Journal of Applied Meteorology and Climatology* **53**(11), 2457–2480.
7. Kuehnlein, M., **Tim Appelhans**, B. Thies, and T. Nauss (2014). Improving the accuracy of rainfall rates from optical satellite sensors with machine learning – A random forests-based approach applied to MSG SEVIRI. *Remote Sensing of Environment* **141**, 129–143.
8. **Appelhans, Tim**, F. Detsch, and T. Nauss (2015). remote: Empirical Orthogonal Teleconnections in R. *Journal of Statistical Software* **65**(10), 1–19.
9. **Appelhans, Tim**, E. Mwangomo, I. Otte, F. Detsch, T. Nauss, and A. Hemp (2015). Eco-meteorological characteristics of the southern slopes of Mt. Kilimanjaro, Tanzania. *International Journal of Climatology*.
10. Classen, A., M. K. Peters, W. J. Kindeketa, **Appelhans, Tim**, C. D. Eardley, M. W. Gikungu, A. Hemp, T. Nauss, and I. Steffan-Dewenter (2015). Temperature versus resource constraints: which

factors determine bee diversity on Mount Kilimanjaro, Tanzania? *Global Ecology and Biogeography* **24**(6), 642–652.

11. **Tim Appelhans**, E. Mwangomo, D. R. Hardy, A. Hemp, and T. Nauss (2015). Evaluating machine learning approaches for the interpolation of monthly air temperature at Mt. Kilimanjaro, Tanzania. *Spatial Statistics*, 91–113.
12. **Appelhans, Tim** and T. Nauss (2016). Spatial patterns of sea surface temperature influences on East African precipitation as revealed by empirical orthogonal teleconnections. *Frontiers in Earth Science - Atmospheric Science* **3**(4).
13. Detsch, F., I. Otte, **Appelhans, Tim**, and T. Nauss (2016). A Comparative Study of Cross-Product NDVI Dynamics in the Kilimanjaro Region – A Matter of Sensor, Degradation Calibration, and Significance. *Remote Sensing* **8**(2), 159.
14. Detsch, F., I. Otte, **Tim Appelhans**, A. Hemp, and T. Nauss (2016). Seasonal and long-term vegetation dynamics from 1-km GIMMS-based {NDVI} time series at Mt. Kilimanjaro, Tanzania. *Remote Sensing of Environment* **178**, 70–83.
15. Meyer, H., M. Kuehnlein, **Tim Appelhans**, and T. Nauss (2016). Comparison of four machine learning algorithms for their applicability in satellite-based optical rainfall retrievals. *Atmospheric Research* **169, Part B**, 424–433.

Papers in conference proceedings

1. **Tim Appelhans** (2008). Climate dynamics of the Kilimanjaro region: A field measurement campaign to investigate climatological drivers of a tropical montane ecosystem. In: *31st International Conference on Alpine Meteorology. 23 – 27 May 2011, Aviemore, Scotland*.
2. **Tim Appelhans** and T. Nauss (2013). East African rainfall and vegetation dynamics in response to a changing El Nino. In: *EGU General Assembly Conference Abstracts*. Vol. 15. EGU General Assembly Conference Abstracts, pp.12062.
3. **Tim Appelhans**, E. Mwangomo, D. Hardy, A. Hemp, and T. Nauss (2015). Evaluating dierent machine learning approaches for the interpolation of ambient air temperature at Mt. Kilimajaro, Tanzania. In: *EGU General Assembly Conference Abstracts*. Vol. 17. EGU General Assembly Conference Abstracts, pp.1280.
4. **Tim Appelhans**, E. Mwangomo, I. Otte, F. Detsch, T. Nauss, A. Hemp, and J. Ndyamkama (2015). Extending an operational meteorological monitoring network through machine learning and classical geo-statistical approaches. In: *EGU General Assembly Conference Abstracts*. Vol. 17. EGU General Assembly Conference Abstracts, pp.1279–1.

Technical reports

1. Sturman, A. and **Appelhans, T.** (2006). *Estimation of hourly solar radiation from 2nd July to 18th August 2003 in the area between Rangataik and Matea townships, east of Lake Taupo in the central North Island*. Tech. rep. unpublished. Ruakura Research Centre; Bisley Road; Private Bag 3115; Hamilton 3240; New Zealand: AgResearch, p. 14.
2. **Appelhans, T.**, J. Bluett, K. Dey, G. Fisher, A. Sturman, and E. Wilton (2007). *Using air quality data to track progress toward PM_{10} standards: Case study - Christchurch 1999 - 2006*. Tech. rep. CHC2007-135. 10 Kyle Street; PO Box 8602; Christchurch; New Zealand: National Institute of Water & Atmospheric Research Ltd, p. 77.
3. Wilton, E., **Appelhans, T.**, M. Baynes, and P. Zawar-Reza (2009). *Assessing long-term trends in PM_{10} concentrations in Invercargill*. Tech. rep. ESRC223. 11 Lachie Griffin Rise RD1; Lyttelton; Christchurch 8971: Environet Limited, p. 24.

CRAN R packages

1. Nauss, T., H. Meyer, F. Detsch, and **Tim Appelhans** (2016). *satellite: Manipulating satellite data with satellite*. R package version 0.2.0.
2. **Tim Appelhans**, F. Detsch, and T. Nauss (2016). *remote: Empirical Orthogonal Teleconnections in R*. R package version 1.0.0.

3. **Tim Appelhans**, F. Detsch, C. Reudenbach, and S. Woellauer (2016). *mapview: Interactive Viewing of Spatial Objects in R*. R package version 1.0.0.