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Born October 22, 1979 in Toronto, Canada
Citizen of Canada, permanent residency in Germany
Married, two children

Professional Appointments & Education

06.2011-present (less parental leave from 01.2012-10.2012):

Research Scientist, Max Planck Institute for Biogeochemistry

- Group leader in Department of Biogeochemical Systems, Satellite-based remote sensing of greenhouse gases group
- Member of Scientific Advisory Board for planned EDF satellite MethaneSAT since 2019
- Member of Max Planck Partner Group “Top-down estimation of regional sources and sinks of greenhouse gases over the Indian subcontinent constrained by atmospheric observations and modeling”, coordinated by Dhayalekshmi Pillai, IISER, Bhopal, India
- Participant Scientific Advisory Board for DLR/CNES planned satellite mission MERLIN since 2011
- Member of ESA/Copernicus CO₂ Monitoring Task Force – Task A (2016-2018)
- Steering Committee Member for International Max Planck Research School – Global Biogeochemical Cycles since 2016
- Managed FP7 project IGAS (2013-2016)

02.2007-05.2011 (less parental leave from 07.2009-05.2010):

Postdoctoral Fellow, Max Planck Institute for Biogeochemistry

- Member of scientific consortia carrying out feasibility studies for proposed satellite missions MERLIN, CarbonSat, and A-SCOPE
- PI of GOSAT RA1 research project: “Quantification of the carbon cycle in Europe and Western Africa by the top-down method”
- Performed validation for greenhouse gas component of EU FP7 project GEMS (2007-2009)

2006

Postdoctoral Fellow, Canadian Centre for modelling and analysis

- Implemented new aerosol absorption scheme in the Canadian Atmospheric General Circulation Model

2001-2005

Ph.D. in Physics, Dalhousie University, Halifax, Canada

1997-2001 Thesis title: The Scattering and Absorption of Light by Aerosol Particles: Measurement and Modelling, supervised by Prof. Ulrike Lohmann
B.Sc. in Physics, McGill University, Montréal, Canada
Thesis title: Monte Carlo Simulation of 2-Dimensional Dendritic Crystal Growth

Teaching/supervisory Experience

2019-2020 **GEO 142: Einführung in die Statistik (Lehrauftrag)**
Teaching introductory statistics course for first semester geography students at the Friedrich-Schiller Universität Jena (in German)

2018 **ESA Earth Observation Summer School, ESRIN, Frascati, Italy**
Prepared and taught lectures on remote sensing of carbon dioxide and methane and their use in inverse modeling studies over three days

2018, 2014, 2011 **Earth Observation Techniques Course, International Max Planck Research School for Global Biogeochemical Cycles (IMPRS-gBGC)**
Prepared and taught atmospheric remote sensing component (five hours)

2016, 2014, 2011 **Atmosphere & Oceans Course, IMPRS-gBGC**
Prepared and taught remote sensing component (seven hours)

2010-present Currently (co-)supervising four Ph.D. students, one postdoc; previously supervised two Ph.D. students, another postdoc and one diploma student

2001-2004 **Teaching assistant, Physics Department, Dalhousie University**
Demonstrator and marker for laboratory component of first-year Introductory Physics course and second-year Electronics and Magnetism course

Recent third-party projects/funding

2019-2021 **Carbon+Methane**
ESA, 53 k€

2019-2022 **GHG-CCI+ (Greenhouse Gas Climate Change Initiative+)**
ESA, 36 k€

2017-2020 **MORGAN (Methane On Regional Grids through Adaptive Nesting)**
BMW, 348 k€

2017-2020 **CHE (CO₂ Human Emissions)**
EU H2020, 250 k€

2017-2020 **AIRSPACE-JIGIT (Aircraft Remote Sensing of Greenhouse Gases with combined Passive and Active instruments)**
BMBF, 587 k€

2017-2018 **SMARTCARB (use of Satellite Measurements of Auxiliary Reactive Trace gases for fossil fuel CARBOn dioxide emission estimation)**
ESA, 15 k€

2017-2018 **GHG-TCPS (Greenhouse Gas Total Column Performance Study)**
ESA, 17 k€

2015-2018	GAIA-CLIM (Gap Analysis for Integrated Atmospheric ECV CLimate Monitoring) EU H2020, 71 k€
2015-2018	GHG-CCI 2 (Greenhouse Gas Climate Change Initiative Phase 2) ESA, 84 k€
2013-2016	IGAS (IAGOS for the GMES Atmosphere Service) EU FP7, 383 k€

Invited talks

AGU 2019: Detecting the Location and Magnitude of Point Source Emissions Based on Imaged CO₂ Data Using Machine Learning

DLR Jahreshauptversammlung, 2019: Fishbowl-Debate about climate

IUP University of Heidelberg Seminar, 2019: Global methane inversions: first results with TROPOMI data, and looking forward to MERLIN

Jena Science Pub, 2019: Chasing climate killers: Tracking down man-made greenhouse gas emissions

CEOS AC/VC Meeting, 2018: Case studies of CO and NO₂ as indicators of anthropogenic CO₂: Germany vs. India

Kick-off Workshop for Max Planck Partner Group, Bhopal, India, 2018: Carbon cycle measurements from space

German Science Hour, COP23, Bonn, 2017: Tracking down anthropogenic emissions

IISER Bhopal, India, 2017: Watching the Earth breathe

EGU 2016: Affect of a clear-sky bias on inversions of XCO₂

Opening Ceremony of the International Year of Global Understanding, University of Jena, 2016: Watching the Earth breathe

ESA Carbon from Space Workshop, 2016: Open questions on atmospheric carbon fluxes

AGU 2015: The role of sampling in the disparity between CO₂ fluxes inferred from GOSAT vs. surface measurements

AGU 2014: The importance of the spatial density of satellite measurements for the retrieval of spatial flux patterns

Workshop on future greenhouse gas mission challenges, ESA ESTEC, the Netherlands, 2014: The challenge of disentangling natural and anthropogenic sources and sinks

University of Bremen, 2011: Approaches for the detection of greenhouse gas point sources from space

Review activities

ESA Living Planet Symposium, 2019: Scientific Committee

ESA ATMOS, 2018: Scientific Committee

PhD Committee, 2018: Ingrid Super, Wageningen University and Research, the Netherlands

NASA ROSES Review Panel Member, 2017: Carbon Monitoring System

PhD Committee, 2017: Sudhanshu Pandey, Utrecht University, the Netherlands

Mail-in thesis review, 2018: Alecia Nickless, University of Cape Town, South Africa

Regular reviewer of journal articles: nature, nature geosciences, ACP, AMT, GMD, Biogeosciences, JGR, GRL, Remote Sensing, among others

Language skills

English	native speaker
German	fluent, certification DSH-3 (C1.2) from 2010, further study since
French	advanced, estimated B2+ level

Publications

Kuhlmann, G., Broquet, G., Marshall, J., Clément, V., Löscher, A., Meijer, Y., Brunner, D. (2019). Detectability of CO₂ emission plumes of cities and power plants with the Copernicus Anthropogenic CO₂ Monitoring (CO₂M) mission. *Atmospheric Measurement Techniques Discussions*. doi:[10.5194/amt-2019-180](https://doi.org/10.5194/amt-2019-180).

Botía, S. B., Gerbig, C., Marshall, J., Lavric, J. V., Walter, D., Fisch, G., Araujo, A. C., Sá, M. O., Teixeira, P. R., Resende, A. F., Dias-Junior, C. Q., van Asperen, H., Oliveira, P. S., Stefanello, M., and Acevedo, O. A. (2019). Understanding nighttime methane signals at the Amazon Tall Tower Observatory (ATTO), *Atmospheric Chemistry and Physics Discuss.*, doi:10.5194/acp-2019-977, submitted, 2019.

Brunner, D., Kuhlmann, G., Marshall, J., Clement, V., Fuhrer, O., Broquet, G., Loscher, A., Meijer, Y. (2019). Accounting for the vertical distribution of emissions in atmospheric CO₂ simulations. *Atmospheric Chemistry and Physics*, 19(7), 4541-4559. doi:[10.5194/acp-19-4541-2019](https://doi.org/10.5194/acp-19-4541-2019).

Zhao, X., Marshall, J., Hachinger, S., Gerbig, C., Chen, J. (2019). Analysis of total column CO₂ and CH₄ measurements in Berlin with WRF-GHG. *Atmospheric Chemistry and Physics*, 19(17), 11279-11302. doi:[10.5194/acp-19-11279-2019](https://doi.org/10.5194/acp-19-11279-2019).

Chen, J., Gerbig, C., Marshall, J., and Totsche, K. U.: Short-term forecasting of regional biospheric CO₂ fluxes in Europe using a light-use-efficiency model, *Geosci. Model Dev. Discuss.*, <https://doi.org/10.5194/gmd-2019-173>, in review, 2019.

Boschetti, F., Thouret, V., Maenhout, G. J., Totsche, K. U., Marshall, J., Gerbig, C. (2018). Multi-species inversion and IAGOS airborne data for a better constraint of continental-scale fluxes. *Atmospheric Chemistry and Physics*, 18(13), 9225-9241. doi:[10.5194/acp-18-9225-2018](https://doi.org/10.5194/acp-18-9225-2018).

Whelan, M. E., Lennartz, S. T., Gimeno, T. E., Wehr, R., Wohlfahrt, G., Wang, Y., Kooijmans, L. M. J., Hilton, T. W., Belviso, S., Peylin, P., Commane, R., Sun, W., Chen, H., Kuai, L., Mammarella, I., Maseyk, K., Berkelhammer, M., Li, K.-F., Yakir, D., Zumkehr, A., Katayama, Y., Ogée, J., Spielmann, F. M., Kitz, F., Rastogi, B., Kesselmeier, J., Marshall, J., Erkkilä, K.-M., Wingate, L., Meredith, L. K., He, W., Bunk, R., Launois, T., Vesala, T., Schmidt, J. A., Fichot, C. G., Seibt, U., Saleska, S., Saltzman, E. S., Montzka, S. A., Berry, J. A., Campbell, J. E. (2018). Reviews and syntheses: carbonyl sulfide as a multi-scale tracer for carbon and water cycles. *Biogeosciences*, 15(12), 3625-3657. doi:[10.5194/bg-15-3625-2018](https://doi.org/10.5194/bg-15-3625-2018).

Bousquet, P., Pierangelo, C., Bacour, C., Marshall, J., Peylin, P., Ayar, P. V., Ehret, G., Bréon, F.-M., Chevallier, F., Crevoisier, C., Gibert, F., Rairoux, P., Kiemle, C., Armante, R., Bès, C., Cassé, V., Chinaud, J., Chomette, O., Delahaye, T., Edouard, D., Estève, F., Fix, A., Friker, A., Klonecki, A., Wirth, M., Alpers, M., Millet, B. (2018). Error budget of the MEthane Remote Lidar mission (MERLIN) and its impact on the uncertainties of the global methane budget. *Journal of Geophysical Research: Atmospheres*, 123, 11766-11785. doi:[10.1029/2018JD028907](https://doi.org/10.1029/2018JD028907).

Kuhlmann, G., Clément, V., Fuhrer, O., Marshall, J., Broquet, G., Meijer, Y., Löscher, A., Brunner, D. (2018). Using NO₂ Satellite Observations to Support Satellite-based CO₂ Emission Estimates of Cities and Power Plants. *Light, Energy and the Environment 2018 (E2, FTS, HISE,*

SOLAR, SSL), OSA Technical Digest (Optical Society of America, 2018), paper HW3C.3. doi: 10.1364/HISE.2018.HW3C.3.

Verma, S., Marshall, J., Gerbig, C., Rödenbeck, C., Totsche, K. U. (2017). The constraint of CO₂ measurements made onboard passenger aircraft on surface–atmosphere fluxes: the impact of transport model errors in vertical mixing. *Atmospheric Chemistry and Physics*, 17(9), 5665-5675. doi:[10.5194/acp-17-5665-2017](https://doi.org/10.5194/acp-17-5665-2017).

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Verma, S., Marshall, J., Parrington, M., Agusti-Panareda, A., Massart, S., Chipperfield, M. P., Wilson, C., Gerbig, C. (2017). Extending methane profiles from aircraft into the stratosphere for satellite total column validation using the ECMWF C-IFS and TOMCAT/SLIMCAT 3-D model. *Atmospheric Chemistry and Physics*, 17(11), 6663-6678. doi:[10.5194/acp-2016-704](https://doi.org/10.5194/acp-2016-704).

Ehret, G., Bousquet, P., Pierangelo, C., Alpers, M., Millet, B., Abshire, J. B., Bovensmann, H., Burrows, J. P., Chevallier, F., Ciais, P., Crevoisier, C., Fix, A., Flamant, P., Frankenberg, C., Gibert, F., Heim, B., Heimann, M., Houweling, S., Hubberten, H. W., Jöckel, P., Law, K., Löw, A., Marshall, J., Agusti-Panareda, A., Payan, S., Prigent, C., Rairoux, P., Sachs, T., Scholze, M., Wirth, M. (2017). MERLIN: A french-german space lidar mission dedicated to atmospheric methane. *Remote Sensing*, 9(10): 1052. doi:[10.3390/rs9101052](https://doi.org/10.3390/rs9101052).

Pillai, D., Buchwitz, M., Gerbig, C., Koch, T., Reuter, M., Bovensmann, H., Marshall, J., Burrows, J. P. (2016). Tracking city CO₂ emissions from space using a high-resolution inverse modeling approach: a case study for Berlin, Germany. *Atmospheric Chemistry and Physics*, 16(15), 9591-9610. doi:[10.5194/acp-16-9591-2016](https://doi.org/10.5194/acp-16-9591-2016).

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Marshall, J. (2016). Der Kohlenstoff-Kreislauf aus einem anderen Blickwinkel. *Jahrbuch der Max-Planck-Gesellschaft*. doi: 10.17617/1.1Q.

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atmosphere monitoring by in-service aircraft - current achievements and future prospects of the European Research Infrastructure IAGOS. *Tellus, Series B - Chemical and Physical Meteorology*, 67: 28452. doi:[10.3402/tellusb.v67.28452](https://doi.org/10.3402/tellusb.v67.28452).

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Houweling, S., Baker, D., Basu, S., Boesch, H., Butz, A., Chevallier, F., Deng, F., Dlugokencky, E. J., Feng, L., Ganshin, A., Hasekamp, O., Jones, D., Maksyutov, S., Marshall, J., Oda, T., O'Dell, C., Oshchepkov, S., Palmer, P. I., Peylin, P., Poussi, Z., Reum, F., Takagi, H., Yoshida, Y., Zhuravlev, R. (2015). An intercomparison of inverse models for estimating sources and sinks of CO₂ using GOSAT measurements. *Journal of Geophysical Research-Atmospheres*, 120(10), 5253-5266. doi:[10.1002/2014JD022962](https://doi.org/10.1002/2014JD022962).

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Houweling, S., Aben, I., Breon, F.-M., Chevallier, F., Deutscher, N., Engelen, R., Gerbig, C., Griffith, D., Hungershoefer, K., Macatangay, R., Marshall, J., Notholt, J., Peters, W., Serrar, S. (2010). The importance of transport model uncertainties for the estimation of CO₂ sources and sinks using satellite measurements. *Atmospheric Chemistry and Physics*, 10(20), 9981-9992. doi:[10.5194/acp-10-9981-2010](https://doi.org/10.5194/acp-10-9981-2010).

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of satellite retrievals. *Atmospheric Chemistry and Physics*, 10(1), 83-94. doi:[10.5194/acp-10-83-2010](https://doi.org/10.5194/acp-10-83-2010).

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Marshall, J., Lohmann, U. Leaitch, W. R., Shantz, N., Phinney, L., Toom-Saunty, D., Sharma, S. (2005). Optical Properties of Aerosol Particles over the Northeast Pacific. *J. Appl. Meteor.*, 44, 1206–1220, doi:10.1175/JAM2267.1.