

G. Kirchengast – Curriculum Vitae (tabular scientific CV)

June 2018

Prof. Gottfried Kirchengast

Born: 14 July 1965, Nationality: Austrian

since 2016 also	Honorary Professor, National Space Science Center, Chinese Academy of Sciences
since 2012 also	Adjunct Professor, Geospatial Sciences School, RMIT Univ. Melbourne
2005 – present	Director, Wegener Center for Climate and Global Change, Univ. of Graz
2003 – present	Professor of Geophysics (Alfred Wegener's Chair), Univ. of Graz
1998 – present	Visiting Scientist/Professor at MPI for Meteorology Hamburg, UCAR Boulder, Univ. of Arizona Tucson, GFZ Potsdam, Univ. of Hawai'i Manoa/Honolulu, RMIT Univ. Melbourne, NSSC/CAS Beijing, etc. (typically 2-3 months summer visits)
1992 – 2002	Assist. Professor – Assoc. Professor (as of 1997), Univ. of Graz
1992 – 1994	Max-Planck Postdoc Fellow at MPI for Aeronomy Lindau/Göttingen
1988 – 1995	M.Sc. degree Geophysics (1988), Ph.D. degree Natural Sciences/Geophysics (1992), M.Sc. Physics (1995) (Univ. of Graz; all graduations with highest honors)
Experience and Expertise: (more information: http://homepage.uni-graz.at/gottfried.kirchengast/)	
Research. Since 1996 focus on atmospheric remote sensing from space and climate research. Atmospheric remote sensing expertise includes occultation methods (like GNSS radio occultation and LEO-LEO occultation) and other coherent-signal and spectroradiometric methods (in infrared and microwave), with the main aim to conceive and develop methods and algorithms, and to provide optimal climate utility of such data. Since 2006 also complementary work on ground-based methods with high resolution for climate applications (e.g., realization of the WegenerNet climate station network). Climate research expertise includes analysis of atmospheric change, validation and improvement of climate modeling by accurate observational constraints (benchmark data), climate change detection and attribution, and integrated climate analysis from global to local scale with a focus on precipitation and hydrological extremes in a warming climate. Methodological expertise includes advanced physical and statistical modeling, including forward and inverse modeling, as well as advanced data analysis, for simulations and optimal estimation in complex systems (e.g., parts of the climate&society system). Before 1996 his research focused on upper atmosphere physics including on thermosphere-ionosphere interactions, high-resolution ionospheric weather modeling, and ionospheric tomography. He is author/co-author of more than 125 peer-reviewed articles (ISI/Scopus/GoS h-index 27/26/35) and more than 175 further scientific articles and reports, and of several books.	
Teaching. Developed and delivered university courses (lectures, exercises, seminars, etc.) on many topics of geophysics, meteorology, environmental and space physics, modeling and data analysis, and environmental system sciences. Also supervised M.Sc. and Ph.D. students on a wide variety of topics. More than 35 Ph.D. students and as well more than 35 M.Sc. students have been given guidance to successful completion since 1992, many of whom are successful also in international careers.	
Leadership. Founder and leader (since 1996) of the Atmospheric Remote Sensing and Climate System (ARSCliSys) Research Group (about 15 scientists), also head of the Geophysics and Meteorology branch at the Institute of Physics (since 2003), later founder and director (since 2005) of the Wegener Center for Climate and Global Change (WEGC) including ARSCliSys and other partner research groups (about 40 scientists), and (co-)founder of various community network initiatives. Furthermore, he stands among the European pioneers in GNSS radio occultation science, has conceived and pioneer-explored infrared-laser occultation and reflectometry methods, and is leader of many international and national research projects or of the Univ. of Graz participation in them (with funds from ESA, EU, Austrian Space Application Programme, Austrian Science Fund, etc.). He is also member of many international scientific societies, bodies, and panels as well as scientific meeting organizer, reviewer, evaluator, and consultant in many international contexts and projects.	
Awards. Received numerous awards, including (selected main ones): the "START Preis 1998" for research on advanced satellite methods for atmospheric change analysis ["START" prizes are Austria's most prestigious funding awards for young researcher leaders]; the "J. Krainer Würdigungspreis 1999" for exceptional contributions to meteorology and geophysics; the "GRAWE Award 2006" for exceptional climate change research and leadership; the "Forschungspreis des Landes Steiermark 2012" [top state research prize of Styria/Austria] for pioneering work on monitoring the climate. Recognizing his merits so far he has been elected lifetime member of the Austrian Academy of Sciences in 2011.	
Languages: German, English, some French	

G. Kirchengast – selected achievements

June 2018 (for more descriptive-style information complementary to the tabular scientific CV, focus on sel.achievements)

Gottfried Kirchengast — Selected Achievements

1. 10 selected significant achievements (of whole scientific life) [Ph.D. received in 1992]
2. 5 selected recent key publications (in last 10 years since 2009)

1. 10 selected significant achievements (of whole scientific life)

(Introductory note: All ten selected achievements listed below were started from scratch by about 1993 as a young assistant professor and part time Max-Planck postdoc fellow, working in the field of ionospheric and space-related physics rather than in atmospheric remote sensing and climate research. This somewhat unorthodox path later led the University of Graz's professor search committee and Dean/Rectorate in 2003 to keep G. Kirchengast in Graz, via appointment to Alfred Wegener's Chair; in a highly selective and competitive candidate search and down-selection process 2001-2003)

1. Introduced climate physics, and atmospheric remote sensing from space for Earth observation of climate, as scientific field to Graz (and at the same time to himself, in fact) as of about 1993. Before that this field was neither part of the physics or geophysics curricula at undergraduate or graduate level in Graz nor was it part of research activities.

2. Pioneered as of 1994, together with P. Hoeg (DK), L. Bengtsson (DE), P. Silvestrin (ESA) and a few other essential people joining, the European activities for GPS radio occultation; leading, e.g., to the realization of the European GPS radio occultation instrument GRAS on the MetOp weather satellites 2006-2021. Co-pioneered and led also the advanced concept of microwave occultation in Europe as of 2001, e.g., Lead Investigator of the ESA "Atmosphere and Climate Explorer+" mission development 2002-2004 together with P. Hoeg (DK).

3. Pioneered as of 1998 the focus on using GPS radio occultation for climate monitoring and research and received for a related key proposal to get this going the "START Preis 1998" (~1.1 M€ funds; the highly competitive "START" and "Wittgenstein" prizes are Austria's most prestigious and best endowed research awards). This work 1999-2004 laid the basis for the recent successes in GPS radio occultation climate monitoring and for the international lead in this field, e.g., by now coordinating the "International RO climate trends group".

4. Idea for and founding in 2002 the meanwhile well established "Occultations for Probing Atmosphere and Climate" line of International Workshops in Graz/Austria, that since then also led to three edited books (Springer) and three journal special issues, each with peer-reviewed papers from workshop presentations. (<http://wegcwww.uni-graz.at/opacirowg2016>)

5. Idea for and founding as well as leading the realization of the Wegener Center for Climate and Global Change: initial idea 1998, preps 2003-2004, operating since 2005, firm approval as Univ. Institute 2013. Funding acquired now ~1.5 M€/year, more than half by physical climate change research and monitoring projects. (www.wegcenter.at)

6. Idea of and leading the science path of the ACCURATE satellite mission concept for climate benchmark profiling of greenhouse gases, thermodynamic variables, and wind from space by combined microwave and IR-laser occultation: initial idea and first preps 2004-2005, research since 2006, funding so far ~1.3 M€. (more info under www.wegcenter.at/arsclisys)

7. Idea of and leading the realization of the WegenerNet climate station network, a long-term field experiment serving as a high-resolution monitoring and validation facility for climate and weather research and applications: initial idea and preps 2005-2006, observations since January 2007, funding invested so far ~1.8 M€. (www.wegcenter.at/wegenernet)

G. Kirchengast – selected achievements

June 2018 (for more descriptive-style information complementary to the tabular scientific CV, focus on sel. achievements)

8. Conceptualized and led, together with H. Kromp-Kolb (Vienna) and S. Schleicher (Graz), the scientific guidance and promotion process to establish the Austrian Climate Research Programme ACRP (total funding of about 33 M€ to the AT climate community since 2008). Also led the establishment of a Graz-wide/Austria-integrated Environment and Global Change research core area in 2010, one of a few major research core areas, and co-shaped similar activities at AT level, which led to the Climate Change Centre Austria CCCA (www.ccca.at), as well as at EU level (joint programming initiative).

9. Initiator and after its start in 2014 Co-Speaker of the Doctoral Programme “Climate Change Uncertainties, Thresholds & Coping Strategies” (<http://dk-climate-change.uni-graz.at>): funded after stringent reviews by the Austrian Science Fund FWF with ~5.1 M€, 12 faculty members, over 40 PhD students, the most interdisciplinary PhD school funded so far by the FWF. Co-Speaker and founding member also of the new Profile-shaping Area “Climate Change and Sustainable Transformation” of Univ. of Graz, one of its two major research clusters starting by 2018 and constituting Austria’s strongest climate science hub.

10. Considered in Austria among the top climate researchers; top in the combination of depth and breadth of scholarly insight and oversight (from indicators like scientific productivity in conceiving and intellectually leading publications and novel projects, combined with representing the field in consulting&advising to Austrian Science Fund, Academy of Sciences, IST Austria, European entities, etc., and from feedback of knowledge transfer communities). Also member of the Austrian Academy of Sciences in this field since 2008.

2. Five selected recent key publications (in last 10 years since 2009)

Liu, C.-L., G. Kirchengast, S. Syndergaard, E. R. Kursinski, Y.-Q. Sun, W.-H. Bai, and Q.-F. Du, A review of low Earth orbit occultation using microwave and infrared-laser signals for monitoring the atmosphere and climate, *Adv. Space Res.*, 60, 2776-2811, doi:10.1016/j.asr.2017.05.011, 2017.

Kirchengast, G., T. Kabas, A. Leuprecht, C. Bichler, and H. Truhetz, WegenerNet: A pioneering high-resolution network for monitoring weather and climate, *Bull. Amer. Meteorol. Soc.*, 95, 227-242, doi:10.1175/BAMS-D-11-00161.1, 2014.

Kirchengast, G., and S. Schweitzer, Climate benchmark profiling of greenhouse gases and thermodynamic structure and wind from space, *Geophys. Res. Lett.*, 38, L13701, doi:10.1029/2011GL047617, 2011.

Lackner, B. C., A. K. Steiner, G. C. Hegerl, and G. Kirchengast, Atmospheric climate change detection by radio occultation data using a fingerprinting method, *J. Climate*, 24, 5275-5291, doi:10.1175/2011JCLI3966.1, 2011.

Steiner, A. K., G. Kirchengast, B. C. Lackner, B. Pirscher, M. Borsche, and U. Foelsche, Atmospheric temperature change detection with GPS radio occultation 1995 to 2008, *Geophys. Res. Lett.*, 36, L18702, doi:10.1029/2009GL039777, 2009.

(more information: <http://homepage.uni-graz.at/gottfried.kirchengast/>)

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Gottfried Kirchengast — Scientific Publications

1. Ten selected ones from the most significant publications (page 1)
2. Complete list of peer-reviewed publications (pages 2 to 12)
3. Notes on and link to further scientific publications (page 13)

1. Ten selected ones from the most significant publications

Liu, C.-L., G. Kirchengast, S. Syndergaard, E. R. Kursinski, Y.-Q. Sun, W.-H. Bai, and Q.-F. Du, A review of low Earth orbit occultation using microwave and infrared-laser signals for monitoring the atmosphere and climate, *Adv. Space Res.*, 60, 2776-2811, doi:10.1016/j.asr.2017.05.011, 2017

Kirchengast, G., T. Kabas, A. Leuprecht, C. Bichler, and H. Truhetz, WegenerNet: A pioneering high-resolution network for monitoring weather and climate, *Bull. Amer. Meteorol. Soc.*, 95, 227-242, doi:10.1175/BAMS-D-11-00161.1, 2014

Kirchengast, G., and S. Schweitzer, Climate benchmark profiling of greenhouse gases and thermodynamic structure and wind from space, *Geophys. Res. Lett.*, 38, L13701, doi:10.1029/2011GL047617, 2011

Lackner, B. C., A. K. Steiner, G. C. Hegerl, and G. Kirchengast, Atmospheric climate change detection by radio occultation data using a fingerprinting method, *J. Climate*, 24, 5275-5291, doi:10.1175/2011JCLI3966.1, 2011

Steiner, A. K., G. Kirchengast, B. C. Lackner, B. Pirscher, M. Borsche, and U. Foelsche, Atmospheric temperature change detection with GPS radio occultation 1995 to 2008, *Geophys. Res. Lett.*, 36, L18702, doi:10.1029/2009GL039777, 2009

Ho, S.-P., G. Kirchengast, S. Leroy, J. Wickert, T. Mannucci, A.K. Steiner, D. Hunt, W. Schreiner, S.V. Sokolovskiy, C.O. Ao, M. Borsche, A. von Engeln, U. Foelsche, S. Heise, B. Iijima, Y.-H. Kuo, E.R. Kursinski, B. Pirscher, M. Ringer, C. Rocken, and T. Schmidt, Estimating the uncertainty of using GPS radio occultation data for climate monitoring: Inter-comparison of CHAMP refractivity climate records 2002-2006 from different data centers, *J. Geophys. Res.*, 114, D23107, doi: 10.1029/2009JD011969, 2009

Gobiet, A., G. Kirchengast, G. L. Manney, M. Borsche, C. Retscher, and G. Stiller, Retrieval of temperature profiles from CHAMP for climate monitoring: intercomparison with Envisat MIPAS and GOMOS and different atm. analyses, *Atmos. Chem. Phys.*, 7, 3519-3536, 2007

Kirchengast, G., U. Foelsche, A. K. Steiner (Eds.), *Occultations for Probing Atmosphere and Climate*, 408 p., Springer Berlin-Heidelberg, www.springer.com/978-3-540-22350-4, 2004 including (together with 6 further papers as co-author):

Kirchengast, G., Occultations for probing atmosphere and climate: setting the scene, p. 1-8

Kirchengast, G., and P. Hoeg, The ACE+ mission: An atmosphere and climate explorer based on GPS, GALILEO, and LEO-LEO radio occultation, p. 201-220

Steiner, A. K., G. Kirchengast, and H.-P. Ladreiter, Inversion, error analysis, and validation of GPS/MET occultation data, *Ann. Geophys.*, 17, 122-138, 1999

Kirchengast, G., Elucidation of the physics of the gravity wave – TID relationship with the aid of theoretical simulations, *J. Geophys. Res.*, 101, 13,353-13,368, 1996

2. Complete list of peer-reviewed publications

(126 ISI publications, and three edited books; ISI-indexed Springer book articles which passed two-reviewer peer review process included)

Bai, W.-H., C.-L. Liu, X.-G. Meng, Y.-Q. Sun, G. Kirchengast, Q.-F. Du, X.-Y. Wang, G.-L. Yang, M. Liao, Z.-D. Yang, D.-Y. Zhao, J.-M. Xia, Y.-R. Cai, L.-J. Liu, L., and D.-W. Wang, Evaluation of atmospheric profiles derived from single- and zero-difference excess phase processing of BeiDou radio occultation data from the FY-3C GNOS mission, *Atmos. Meas. Tech.*, 11, 819-833, doi:10.5194/amt-11-819-2018, 2018

Gorbunov, M. E., and G. Kirchengast, Wave-optics uncertainty propagation and regression-based bias model in GNSS radio occultation bending angle retrievals, *Atmos. Meas. Tech.*, 11, 111-125, doi:10.5194/amt-11-111-2018, 2018

Hohmann, C., G. Kirchengast, and S. Birk, Alpine foreland running drier? Sensitivity of a drought vulnerable catchment to changes in climate, land use, and water management, *Climat. Change*, 147, 179-193, doi:10.1007/s10584-017-2121-y, 2018

Liu, C.-L., G. Kirchengast, Y.-Q. Sun, K. Zhang, R. Norman, M. Schwaerz, W.-H. Bai, Q.-F. Du, and Y. Li, Analysis of ionospheric structure influences on residual ionospheric errors in GNSS radio occultation bending angles based on ray tracing simulations, *Atmos. Meas. Tech.*, 11, 2427-2440, doi:10.5194/amt-11-2427-2018, 2018

O, S., U. Foelsche, G. Kirchengast, and J. Fuchsberger, Validation and correction of rainfall data from the WegenerNet high density network in southeast Austria, *J. Hydrol.*, 556, 1110-1122, doi:10.1016/j.jhydrol.2016.11.049, 2018

Schroerer, K., and G. Kirchengast, Sensitivity of extreme precipitation to temperature: the variability of scaling factors from a regional to local perspective, *Clim. Dyn.*, 50, 3981-3994, doi:10.1007/s00382-017-3857-9, 2018

Schwarz, J., G. Kirchengast, and M. Schwaerz, Integrating uncertainty propagation in GNSS radio occultation retrieval: from excess phase to atmospheric bending angle profiles, *Atmos. Meas. Tech.*, 11, 2601-2631, doi:10.5194/amt-11-2601-2018, 2018

Tan, J., W. A. Petersen, G. Kirchengast, D. C. Goodrich, and D. B. Wolff, Evaluation of Global Precipitation Measurement rainfall estimates against three dense gauge networks, *J. Hydrometeorol.*, 19, 517-532, doi:10.1175/JHM-D-17-0174.1, 2018

Angerer, B., F. Ladstädter, B. Scherllin-Pirscher, M. Schwärz, A. K. Steiner, U. Foelsche, and G. Kirchengast, Quality aspects of the Wegener Center multi-satellite GPS radio occultation record OPSv5.6, *Atmos. Meas. Tech.*, 10, 4845-4863, doi:10.5194/amt-10-4845-2017, 2017

Biondi, R., A. K. Steiner, G. Kirchengast, H. Brenot, and T. Rieckh, Supporting the detection and monitoring of volcanic clouds: A promising new application of Global Navigation Satellite System radio occultation, *Adv. Space Res.*, 60, 2707-2722, doi:10.1016/j.asr.2017.06.039, 2017

G. Kirchengast – scientific publications

June 2018 (for publication information complementary to the CV, focus peer-reviewed/written publications)

Liu, C.-L., G. Kirchengast, S. Syndergaard, E. R. Kursinski, Y.-Q. Sun, W.-H. Bai, and Q.-F. Du, A review of low Earth orbit occultation using microwave and infrared-laser signals for monitoring the atmosphere and climate, *Adv. Space Res.*, 60, 2776-2811, doi:10.1016/j.asr.2017.05.011, 2017

Nehrir, A. R., C. Kiemle, M. D. Lebsock, G. Kirchengast, S. A. Buehler, U. Loehnert, C.-L. Liu, P. C. Hargrave, M. Barrera-Verdejo, and D. M. Winker, Emerging technologies and synergies for airborne and space-based measurements of water vapor profiles, *Surv. Geophys.*, 38, 1445-1482, doi:10.1007/s10712-017-9448-9, 2017

O, S., U. Foelsche, G. Kirchengast, J. Fuchsberger, J. Tan, and W. A. Petersen, Evaluation of GPM IMERG Early, Late, and Final rainfall estimates using WegenerNet gauge data in southeastern Austria, *Hydrol. Earth Syst. Sci.*, 21, 6559-6572, doi:10.5194/hess-21-6559-2017, 2017

Pincus, R., A. Beljaars, S. A. Buehler, G. Kirchengast, F. Ladstaedter, and J. S. Whitaker, The representation of tropospheric water vapor over low-latitude oceans in (re-)analysis: errors, impacts, and the ability to exploit current and prospective observations, *Surv. Geophys.*, 38, 1399-1423, doi:10.1007/s10712-017-9437-z, 2017

Scherllin-Pirscher, B., A. K. Steiner, G. Kirchengast, M. Schwärz, and S. S. Leroy, The power of vertical geolocation of atmospheric profiles from GNSS radio occultation, *J. Geophys. Res. Atmos.*, 122, 1595-1616, doi:10.1002/2016JD025902, 2017

Schlager, C., G. Kirchengast, and J. Fuchsberger, Generation of high-resolution wind fields from the WegenerNet dense meteorological station network in Southeastern Austria, *Wea. Forecasting*, 32, 1301-1319, doi:10.1175/WAF-D-16-0169.1, 2017

Schwarz, J., G. Kirchengast, and M. Schwaerz, Integrating uncertainty propagation in GNSS radio occultation retrieval: From bending angle to dry-air atmospheric profiles, *Earth Space Sci.*, 4, 200-228, doi:10.1002/2016EA000234, 2017

Syndergaard, S., and G. Kirchengast, An Abel transform for deriving line-of-sight wind profiles from LEO-LEO infrared laser occultation measurements, *J. Geophys. Res. Atmos.*, 121, 2525-2541, doi:10.1002/2015JD023535, 2016

Biondi, R., A. K. Steiner, G. Kirchengast, and T. Rieckh, Characterization of thermal structure and conditions for overshooting of tropical and extratropical cyclones with GPS radio occultation, *Atmos. Chem. Phys.*, 15, 5181-5193, doi:10.5194/acp-15-5181-2015, 2015

Gorbunov, M. E., and G. Kirchengast, Uncertainty propagation through wave optics retrieval of bending angles from GPS radio occultation: Theory and simulation results, *Radio Sci.*, 50, 1086-1096, doi:10.1002/2015RS005730, 2015

Kann, A., I. Meirold-Mautner, F. Schmid, G. Kirchengast, J. Fuchsberger, V. Meyer, L. Tüchler, and B. Bica, Evaluation of high-resolution precipitation analyses using a dense station network, *Hydrol. Earth Syst. Sci.*, 19, 1547-1559, doi:10.5194/hess-19-1547-2015, 2015

Ladstädter, F., A. K. Steiner, M. Schwärz, and G. Kirchengast, Climate intercomparison of GPS radio occultation, RS90/92 radiosondes and GRUAN from 2002 to 2013, *Atmos. Meas. Tech.*, 8, 1819-1834, doi:10.5194/amt-8-1819-2015, 2015

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Li, Y., G. Kirchengast, B. Scherllin-Pirscher, R. Norman, Y. Yuan, J. Fritzer, M. Schwaerz, and K. Zhang, Dynamic statistical optimization of GNSS radio occultation bending angles: advanced algorithm and performance analysis, *Atmos. Meas. Tech.*, 8, 3447-3465, doi:10.5194/amt-8-3447-2015, 2015

Liu, C. L., G. Kirchengast, K. Zhang, R. Norman, Y. Li, S. C. Zhang, J. Fritzer, M. Schwaerz, S. Q. Wu, and Z. X. Tan, Quantifying residual ionospheric errors in GNSS radio occultation bending angles based on ensembles of profiles from end-to-end simulations, *Atmos. Meas. Tech.*, 8, 2999-3019, doi:10.5194/amt-8-2999-2015, 2015

Norman, R., J. Le Marshall, W. Rohm, B. A. Carter, G. Kirchengast, S. Alexander, C. Liu, and K. Zhang, Simulating the impact of refractive transverse gradients resulting from a severe troposphere weather event on GPS signal propagation, *IEEE J. Sel. Topics Appl. Earth Obs. Remote Sens.*, 8, 418-424, doi:10.1109/JSTARS.2014.2344091, 2015

Plach, A., V. Proschek, and G. Kirchengast, Profiling wind and greenhouse gases by infrared-laser occultation: results from end-to-end simulations in windy air, *Atmos. Meas. Tech.*, 8, 2813-2825, doi:10.5194/amt-8-2813-2015, 2015

Proschek, A., G. Kirchengast, S. Schweitzer, J. S. A. Brooke, P. F. Bernath, C. B. Thomas, J.-G. Wang, K. A. Tereszchuk, G. González Abad, R. J. Hargreaves, C. A. Beale, J. J. Harrison, P. A. Martin, V. L. Kasyutich, C. Gerbig, O. Kolle, and A. Loescher, Retrieval and validation of carbon dioxide, methane and water vapor for the Canary Islands IR-laser occultation experiment, *Atmos. Meas. Tech.*, 8, 3315-3336, doi:10.5194/amt-8-3315-2015, 2015

Gurvich, A. S., M. E. Gorbunov, O. V. Fedorova, M. I. Fortus, G. Kirchengast, V. Proschek, and K. A. Tereszchuk, Spatiotemporal structure of a laser beam at a path length of 144 km: comparative analysis of spatial and temporal spectra, *Appl. Optics*, 53, 2625-2631, doi:10.1364/AO.53.002625, 2014

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Lammer, H., S.-C. Schiefer, I. Juvan, P. Odert, N. V. Erkaev, C. Weber, K. G. Kislyakova, M. Güdel, G. Kirchengast, and A. Hanslmeier, Origin and stability of exomoon atmospheres: implications for habitability, *Orig. Life Evol. Biosph.*, 44, 239-260, doi:10.1007/s11084-014-9377-2, 2014

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Proschek, V., G. Kirchengast, C. Emde, and S. Schweitzer, Greenhouse gas profiling by infrared-laser and microwave occultation in cloudy air: Results from end-to-end simulations, *J. Geophys. Res. Atmos.*, 119, 12372-12390, doi:10.1002/2014JD021938, 2014

Scherllin-Pirscher, B., A. K. Steiner, and G. Kirchengast, Deriving dynamics from GPS radio occultation: Three-dimensional wind fields for monitoring the climate, *Geophys. Res. Lett.*, 41, 7367-7374, doi:10.1002/2014GL061524, 2014

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Li Y., G. Kirchengast, B. Scherllin-Pirscher, S. Wu, M. Schwärz, J. Fritzer, S. Zhang, B. A. Carter, and K. Zhang, A new dynamic approach for statistical optimization of GNSS radio occultation bending angles for optimal climate monitoring utility, *J. Geophys. Res. Atmos.*, 118, 13022-13040, doi:10.1002/2013JD020763, 2013

Liu, C. L., G. Kirchengast, K. F. Zhang, R. Norman, Y. Li, S. C. Zhang, B. Carter, J. Fritzer, M. Schwaerz, S. L. Choy, S. Q. Wu, and Z. X. Tan, Characterisation of residual ionospheric errors in bending angles using GNSS RO end-to-end simulations, *Adv. Space Res.*, 52, 821-836, doi:10.1016/j.asr.2013.05.021, 2013

Steiner, A. K., D. Hunt, S.-P. Ho, G. Kirchengast, A. J. Mannucci, B. Scherllin-Pirscher, H. Gleisner, A. von Engeln, T. Schmidt, C. Ao, S. S. Leroy, E. R. Kursinski, U. Foelsche, M. Gorbunov, S. Heise, Y.-H. Kuo, K. B. Lauritsen, C. Marquardt, C. Rocken, W. Schreiner, S. Sokolovskiy, S. Syndergaard, and J. Wickert, Quantification of structural uncertainty in climate data records from GPS radio occultation, *Atmos. Chem. Phys.*, 13, 1469-1484, doi:10.5194/acp-13-1469-2013, 2013

Brooke, J. S. A., P. F. Bernath, G. Kirchengast, C. B. Thomas, J.-G. Wang, K. A. Tereszchuk, G. Gonzalez Abad, R. J. Hargreaves, C. A. Beale, J. J. Harrison, S. Schweitzer, V. Proschek, P. A. Martin, V. L. Kasyutich, C. Gerbig, C. Kolle, and A. Loescher, Greenhouse gas measurements over a 144 km open path in the Canary Islands, *Atmos. Meas. Tech.*, 5, 2309-2319, doi:10.5194/amt-5-2309-2012, 2012

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3. Notes on and link to further scientific publications

In addition to the peer-reviewed publications G. Kirchengast has authored or co-authored more than 160 further scientific articles and reports. Four selected ones are cited here, each having received more than 25-55 citations (Google Scholar) despite being “grey” literature:

Kirchengast, G., J. Fritzer, and J. Ramsauer, End-to-end GNSS Occultation Performance Simulator Version 4 (EGOPS4) Software User Manual (Overview and Reference Manual), *Tech. Rep. ESA/ESTEC 3/2002*, 472 p., Inst. for Geophys., Astrophys., and Meteorol., Univ. of Graz, Austria, 2002

Kirchengast, G., J. Hafner, and W. Poetzi, The CIRA86aQ_UoG model: An extension of the CIRA-86 monthly tables including humidity tables and a Fortran95 global moist air climatology model, *Tech. Rep. ESA/ESTEC 8/1999*, 18 p., Inst. for Meteorol. and Geophys., Univ. of Graz, Austria, 1999

Kirchengast, G., End-to-end GNSS Occultation Performance Simulator overview and exemplary applications, *IMG/UoG Wiss. Ber. 2/1998*, 138 p., Inst. for Meteorol. and Geophys., Univ. of Graz, Austria, 1998

Hoeg, P., A. Hauchecorne, G. Kirchengast, S. Syndergaard, B. Belloul, R. Leitinger, and W. Rothleitner, Derivation of atmospheric properties using a radio occultation technique, *DMI Sci. Rep. 95-4*, 208 p., Danish Met. Institute, Copenhagen, Denmark, 1995

Another four selected ones are finally noticed here as examples of substantially influential reports in the field (as per feedback from the relevant scientific communities):

Kirchengast, G., et al., ACCURATE—climate benchmark profiling of greenhouse gases and thermodynamic variables and wind from space (ESA Earth Explorer Opportunity Mission EE-8 Proposal), *Sci. Rep. 36-2010*, 93 p., Wegener Center Verlag, Graz, Austria, 2010

Hoeg, P., G. Kirchengast, et al., ACE+ — Atmosphere and Climate Explorer based on GPS, GALILEO, and LEO-LEO radio occultation (ESA Earth Explorer Opportunity Mission Proposal), *Wiss. Ber. 14-2002*, 121 p., Inst. for Geophys., Astrophys., and Meteorol., Univ. of Graz, Austria, 2002

Bengtsson, L., J. R. Eyre, G. Kirchengast, A. Hauchecorne, P. Silvestrin, and P. Ingmann, Atmospheric Profiling Mission – a candidate Earth Explorer mission (report for assessment), *ESA Spec. Publ. SP-1196(7)*, 58 p., ESA Publ. Div., Noordwijk, NL, 1996

Kirchengast, G., The Graz Ionospheric Flux Tube Simulation model, in *STEP Handbook of Ionospheric Models*, R. W. Schunk (Ed.), USU Logan, UT, and SCOSTEP Boulder, CO, 73-94, 1996

A detailed list of scientific publications (written and oral) is found via the website <http://homepage.uni-graz.at/gottfried.kirchengast/> (follow the link *Publications*).

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