

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)

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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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