

METEOROLOGY AND GEOPHYSICS AND ITS AMBASSADORS AT THE UNIVERSITY OF GRAZ: A HISTORICAL SURVEY ^{1 2}

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Abstract

Meteorology as a science on its own came into being in the beginning of the 19th century and the same holds for geophysics (e.g., Kertz, 1999). For an extensive treatise on the development of meteorology in Austria we refer to an extensive review (Hammerl et al., 2001). In this paper we review the historical developments at the University of Graz based on biographical sketches of its most pronounced advocates, and complement thereby works on the history of the University (e.g., Höflechner, 1982) and its Institute of Physics (Rumpf, 2003)

1 Nineteenth Century

1.1 Julius Wilhelm Gintl

The professor of physics (Julius) Wilhelm Gintl pioneered meteorological and geophysical investigations at the University of Graz.

Julius Wilhelm Gintl (* 1804: Prague; † 1883: Prague)

He studied mathematics, astronomy and botany at the German University of Prague and worked as adjunct at the institutes of physics and mathematics at the University of Vienna from 1833 to 1836. In May 1836 he was promoted to professor of physics at the University of Graz, which he held till 1847, when he was named provisional inspector of the governmental telegraph office in Vienna, where he was promoted in 1849 first to provisional and in 1850 to director of the office at the Ministry of Commerce, Trade und Public Buidlings. In this occupation Gintl was responsible to lead studies and organise the implementation of telegraphy in Austria. In addition he developed the first portable telegraph for railway cars, the portable telegraph ("Feldtelegraph") and invented (in 1853) the electronic two-way communication on a single telegraph line (the so-called duplex telegraph with two batteries, using the compensation method).

He was elected corresponding member of the Imperial Academy of Sciences, Vienna, in 1848, honored in 1855 with the golden medal at the "Exposition Universelle des

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Produits de l'Agriculture, de l'Industrie et des Beaux-Arts de Paris", and retired in 1863 (Poggendorff, I, 1858; Wurzbach, 1859; Poggendorff, III, 1898; ÖBL, 1957).

His interest in meteorology started already during his time at the institutes of physics and mathematics in Vienna where he published a booklet on "the determination of heights with a thermometer" in 1835 (Gintl, 1835). Starting with January 1, 1837 he collected meteorological parameters at his flat in "Neuthor", Graz, with several instruments: thermometer, barometer, thermohygrometer, and an air electroscope. In addition the wind direction was inferred by a vane mounted at the clock tower of the "Schloßberg" (Gintl, 1837).

He performed his measurements of air temperature, atmospheric pressure, air humidity, air electricity, wind direction, aspect of sky, fog, cloud, rain, snow and other atmospheric events twelve times a day (to be more specific, at 8:00, 8:30, 9:00, 10:30, 12:00, 13:00, 14:00, 15:00, 16:00, 17:00, 21:00, 22:00). He published his results regularly - two times a year - in the "Steiermärkische Zeitschrift" but also stated that the collection of measurements at dedicated hours two to four times a day would be sufficient to record local weather.

In 1843/44 he could raise money from the local Styrian government ("Gubernium") in 1843/44 to buy modest equipment for a geomagnetic observatory (Krones, 1886, p. 158) installed at the University. Only limited information on the instruments he bought is available, but it seems very likely that the extraordinary professor at the physics institute Albert von Ettingshausen (1850-1932) in 1877 used parts of the equipment, namely two magnetic theodolites, for his measurements of geomagnetic quantities in Graz (Ettingshausen, 1877).

1.2 Carl Hummel

When Gintl left the University in 1847 his former assistant Franz Steiner acted as teaching substitute till 1850, when Carl Hummel was appointed professor of physics.

Carl Hummel (* 1801: Schultau, Moravia; † 1879: Graz)

He studied from 1821 to 1824 at the University of Vienna and finished 1825 with a doctorate in mathematics and natural sciences. After supplementary studies in various natural sciences subjects at Vienna University he was appointed professor of mathematics at the Lyzeum in Laibach (now Ljubljana, Slovenia) in 1836. In 1850 he was appointed professor of physics at the University of Graz and worked there until his retirement in 1867 (Poggendorff, III, 1898; Rumpf, 2003).

Hummel was the first physics professor who lectured, in addition to the physics subjects, on geophysics and meteorology at Graz University. Shortly after his appointment in the winter term (WS) of 1850/51 he gave a lecture on "physical geography", in WS 1852/53 one on "meteorology", during the summer term (SS) of 1853 one on "optical phenomena in the atmosphere", in WS 1853/54 on the "ocean and the currents within and about the tides", in SS 1856 about "the rock masses in physical-geographical aspect and about

snow, avalanches and glaciers”, and in SS 1859 he taught on ”the atmosphere and its flow (breeze, currents, calms, trade winds, monsoon, hurricanes)” (Rumpf, 2003).

In 1855 he published a book entitled ”physical geography” where he wrote about the figure, size, properties and dynamics of the Earth, about permanent forces of the Earth (gravity and magnetic force), physiognomy and climatic conditions of the Earth surface, the atmosphere and the ocean (Hummel, 1855).

1.3 Simon Šubic

The year prior to Hummel’s retirement Simon Šubic acquired his habilitation and subsequently lectured at the University on physics and meteorology.

Simon Šubic (* 1801: v’Brodeh, Carniola; † 1903: Graz)

He studied physics and mathematics at the University of Vienna from 1852 to 1856 and after his final exam for lectureship in grammar schools he worked till 1861 as a physics teacher at secondary schools in Ofen and Pest, now Budapest. In 1861 he acquired his philosophical doctorate at the University of Tübingen, and together with a few Pester colleagues he founded a secondary school at Rossau, Vienna. In 1864 he moved to Graz to work as a teacher at the School for Trade and Industry. In 1866 he qualified for university lecturing in physics at the University of Graz and in 1869 he was named associate professor (Wurzbach, 1880; Južnič, 1998).

In 1867 the second edition of Šubic’s comprehensive textbook on physics for advanced secondary schools was published, containing an extensive chapter on basics of meteorology (Šubic, 1867). Beginning of 1873, Šubic, additional to physics lectures, regularly read on meteorology at the university till the summer term 1902. He also published a german article on the pressure gauge-hygrometer (Šubic, 1876) and subsequently several meteorologically related articles in slovenian language (see bibliography in Južnič, 1998).

1.4 Paul Czermak

Paul Czermak (* 1857: Brünn; † 1912: Innsbruck)

He studied physics from 1879 to 1885 in Graz and got his philosophical doctorate in 1885. He then started his career in Vienna and Strassburg and returned as second assistant to the physical institute at the University of Graz in 1888. He qualified as university lecturer of experimental physics in 1889 and subsequently was named ”first assistant” under direction of Ludwig Boltzmann and later Leopold Pfaundler. In 1896 he was promoted to extraordinary professor of physics and shortly thereafter appointed ordinary professor of cosmic physics at the University of Innsbruck. In 1901 he was appointed professor of experimental physics at the same university and he retired in 1910 (Poggendorff, IV, 1904).

Soon after his habilitation Czermak was appointed head of the meteorological station at the physical institute in 1890. During his fruitful time in Graz he published several meteorological articles, like on the structure of the rainbow and on meteorological instruments (Czermak, 1895).

1.5 Julius Hann

In 1897 the first full professorship for meteorology was established at the University of Graz when Julius Hann at his own request resigned as director of the Viennese Central Institution of Meteorology and Geomagnetism and changed as full professor to Graz.

Julius Hann (* 1839: Wartberg ob der Aist, Upper Austria; † 1921: Vienna)

He studied mathematics, physics and geology as well as geography from 1860 to 1864, when he took an exam for qualification as teacher at secondary schools. He worked as a teacher in Vienna and Linz till 1867, when he received his philosophical doctorate and started to work as adjunct at the Central Institution of Meteorology and Geomagnetism in Vienna. In 1869 he qualified as lecturer for physical geography at the University of Vienna and was named associate professor for the same subject in 1874. In 1877 he was promoted to director of the now renamed Central Institution for Meteorology and Geomagnetism and to full professor of physics. In 1897 he resigned as director and was appointed full professor of meteorology at the University of Graz, but he returned to Vienna in 1900 as full professor to the newly established ("ad personam") institute for cosmic physics. He retired in 1910 and was ennobled the same year (ÖBL, II, 1959).

During his time in Graz, Hann worked on his textbook of meteorology but the cramped localities at the Institut of Physics was not very satisfactory, as can be guessed from the following sentence of the preamble: "...For the critical judgement of the contents of the book it seems appropriate to mention, that it came into being during autumn 1898 and August 1900 in the one and only room designated to the meteorology at the physics institute in Graz..." (quoted from preface, Hann, 1901). Although there can be read some sadness about the circumstances during its making, Hann's book soon became the "indispensible work of reference for all meteorologists" (quote from Shaw, 1921) and saw several editions.

2 First Half of Twentieth Century

2.1 Hans Benndorf

When Julius Hann left Graz for Vienna in 1900 the ministry decided not to fill the vacancy of the full professorship for meteorology in Graz. It was only in 1904 and after the death of the last lecturer on meteorology Simon Šubic that the Viennese administration installed an associate professorship of meteorology.

Hans Benndorf (* 1870: Zurich, Switzerland; † 1953: Graz)

He studied physics from 1890 in Vienna (including short sojourns at the Universities of Heidelberg and Berlin) and got his philosophical doctorate in 1895. Already two years earlier he started to work as scientific assistant to Franz Exner (1849-1926) at the Physical-Chemical Institute of the University of Vienna. In 1899 he qualified for university lecturing and in 1904 he was appointed associate professor for meteorology at the physics institute at Graz University. After Leopold Pfaundler's retirement in 1910 he was promoted to full professor of physics. He was forced to retire early in 1936, but in May 1945 he resumed the direction of the physics institute, and substituted the institutes of theoretical physics and astronomy for two years (Mache, 1954).

Benndorf's habilitation thesis was in the field of atmospheric electricity, where he disproved a theory of his teacher (and superior), with data of measurements he collected during Winter 1897/98 in Tomsk, Siberia. But his broad interests were not confined to meteorology and related subjects, but he was particularly interested in seismology. Just prior to his Graz engagement he installed two seismometers in a mine shaft in Příbram (near Prague) to distinguish long-distance quakes from local microseismic activity. Using one of the Wiechert-seismometers he established in 1907 a seismological observatory at the physical institute which operated till its destruction by a bomb attack in 1945 (Benndorf, 1908). Benndorf's achievements in theoretical seismology culminated in the solution of the problem of refraction of seismic rays in spherical layers. By analysis of the travel times of seismic waves it was henceforth possible to infer properties of the Earth's interior. "Benndorf's relationship" describes the constancy of the ray parameter across the layers.

Additionally he established in 1910 an observing station for atmospheric electricity (Benndorf, 1910), actively pursued research in the field for several decades, and constructed several recording electrometers which served as standard devices in many European observatories. Together with his colleague Victor F. Hess he published in 1928 an in-depth review on atmospheric electricity (Benndorf und Hess, 1928).

2.2 Heinrich Ficker

Heinrich Ficker (* 1881: Munich, Bavaria; † 1957: Vienna) He studied meteorology from 1902 to 1906 in Vienna and Innsbruck, where he got his doctorate in 1906. After a short contract as assistant at the Central Institution of Meteorology and Geomagnetism he worked from 1907 onwards as scientific assistant at the meteorological institute of the University of Innsbruck. In 1909 he qualified for university teaching and two years later, in 1911, he was appointed associate professor for meteorology and geophysics at the University of Graz. In 1919 he was promoted to full professor and in 1923 he accepted an appointment as full professor for meteorology at the University of Berlin and director of the Prussian Meteorological Institute. In 1937 he was appointed full professor of physics of the Earth at the University of Vienna and director of the Central Institution of Meteorology and Geodynamics. He retired in 1953 (Poggendorff, V, 1925; Steinhauser, 1958).

In 1914, at the beginning of World War I, he served in a meteorological unit, where he was captured by the Russians. Due to his abilities he was allowed to work during his war capture at the meteorological institute in Kazan, where he worked on the theory of meteorological problems of northern Russia, a topic he had worked already before 1910.

When he returned after the war to Graz he got promoted in 1919 to full professor of meteorology and geophysics, and the Institute of Meteorology and Geophysics was established as a separate unit at Graz University. His assistant was **Ferdinand Travníček** (1900-1943), who worked in this capacity from 1920 to 1933, when he had to retire early due to multiple sclerosis.

Ficker's work on "cold and warm waves" over Russia's north, prior to his Graz appointment, was not well appreciated as a forerunner of Vilhelm Bjerknes' polar front theory and caused a long lasting debate on the respective priorities (Ficker, 1921; Bjerknes, 1925).

2.3 Victor F. Hess

Victor F. Hess (* 1883: Deutschfeistritz, Styria; † 1964: Mount Vernon, New York)

He studied physics from 1901 to 1905 and got his doctorate with highest honors at the University of Graz. From 1906 to 1910 he worked as scientific assistant at the physics institute of the University of Vienna and afterwards for 10 years at the Viennese Institute of Radium Research of the Imperial Academy of Sciences, Vienna (after the World War I renamed: Austrian Academy of Sciences). In 1920 he was appointed as associate professor of physics at the University of Graz, where he worked till 1931, except for a sabbatical during 1921 and 1922, which he spent in the United States organising a research institute for the US Radium Corporation. In 1925 he was promoted to full professor and in 1931 he was appointed as full professor of cosmic physics at the University of Innsbruck. Four years later, in 1936 he was awarded the Nobel Prize of Physics for his discovery of cosmic radiation, which he postulated by interpreting radiation measurements taken during scientific balloon campaigns in the period 1911 to 1913. In 1937 again he was appointed as full professor of physics at the University of Graz, but in 1938 he was forced to emigrate to the US, where he was appointed physics professor at the Fordham University, New York. He did not resume, after Second World War, his professorship in Graz and retired in 1956 from Fordham University (Bauer, 1985).

During his time at Graz University he worked on topics of atmospheric electricity and especially intensified work on cosmic radiation (Hess, 1926), in response to the work of the group around Robert Millikan, who picked a quarrel on priority rights (Bergwitz, Hess, Kolhörster und Schweidler, 1928). Hess organised measurement campaigns on Sonnblick (3100 m), Salzburg, Austria, and in Helgoland, Germany, to investigate the daily variations of cosmic rays. In 1931 he established a "Laboratory for Cosmic Ray Research" on the more easily accessible Hafelekar mountain (2300 m) near Innsbruck, Tyrol, and his group recorded cosmic ray radiation on a continuous basis. This unveiled the influence of atmospheric pressure, air temperature and solar activity on cosmic rays. During summer 1948 he returned to the University of Innsbruck as visiting professor.

2.4 Alfred Wegener

Alfred Wegener (* 1880: Berlin, Germany; † 1930: Greenland) He studied astronomy in Heidelberg, Innsbruck and Berlin where he received his doctorate in 1904. From 1906 to 1908 he took part in the Danish Greenland Expedition and in 1909 he qualified for university teaching in meteorology, astronomy and cosmic physics at the University of Marburg/Lahn, where he was scientific assistant till 1919. From 1912 to 1913 he took part in the Second Danish Greenland Expedition and after 1919 till 1924 he worked as meteorologist at the German Naval Observatory in Hamburg. In 1924 he was appointed as full professor of meteorology and geophysics at the University of Graz. Starting 1929, while on leave from the University, he was head of the German Greenland Expedition (Benndorf, 1931).

Wegener arrived in Graz during easter time in 1924, his wife and his parents in law, the famous meteorologist Wladimir Köppen and his wife, followed half a year later in autumn. He already worked on the fourth edition of his book "Entstehung der Kontinente und Ozeane" (Wegener, 1924) and planned his third and fourth expedition to Greenland. In spring 1929 he lead a preparatory expedition to Greenland and returned end of October to spend the winter in Graz. In April 1930 the main expedition started, the one he would not return from.

2.5 Kurt Wegener

Kurt Wegener (* 1878: Berlin, Germany; † 1964: Munich) The brother of Alfred Wegener studied meteorology in Innsbruck, Kiel and Berlin and got his doctorate in 1905. From 1904 to 1907 he worked at the Prussian Aeronautical Observatory Reinickendorf, Berlin, and from 1908 to 1912 he worked at the German Samoa-Observatory. In 1912/13 he took part in the German Spitzbergen Expedition and worked from 1913 to 1919 at the Central Meteorological Observatory in Straßburg. In 1919 he was promoted to department head at the German Naval Observatory in Hamburg where he worked till 1932, when he was appointed associate professor for meteorology and geophysics at the University of Graz (as successor to his brother Alfred) and served till his (first) retirement in 1941. From 1945 to 1947 he resumed his professorship in Graz and retired thereafter (Neuwirth, 1964).

After Alfred Wegeners fateful expedition to Greenland it was his brother Kurt, who stepped in, brought this expedition to end, and published its results in a series of books. In 1932 Kurt was appointed associate professor of meteorology and geophysics at Graz University and was thereby Alfred's successor. During his Graz time he shifted his interests from meteorology to geophysical subjects and published in 1934 his book on physics of the Earth (Wegener, 1934). In 1941 he resigned from teaching and moved to Konstanz, Germany. But in 1945 he returned to Graz and resumed his professorship to retire definitely in 1947. Till 1952 he spent most of his time at different places in South America, measuring solar radiation, when he returned to Graz and lived here till 1964 and afterwards resided with Alfred's widow in Munich.

2.6 Wartime: Second World War

Robert Schwinner (* 1878: Ottenschlag, Lower Austria; † 1953: Graz) He studied at the Universities of Vienna, Jena, Munich and Zurich, where he worked on a geological dissertation and got his doctorate in 1911. Soon afterwards he moved to Graz and in 1919 he started as assistant at the geological institute of the University of Graz. In 1923 he was named associate professor and in 1928 he was promoted to "Extraordinarius". From 1941 to 1942 he administrated the Institute of Meteorology and Geophysics (Wegener, 1953; Hubmann, 2003).

After Kurt Wegeners resignation during war time in 1941 Schwinner substituted him as head of the institute till 1942 when the Berlin authorities appointed Johannes Letzmann as associate professor.

Johannes Letzmann (* 1885: Wenden, Livonia, Latvia; † 1971: Langeoog, Germany) He studied meteorology from 1906 to 1913 at the University of Dorpat (now Tartu), Estonia, and since 1913 he was assistant at the meteorological institute. In 1924 he got a doctorate from the University of Helsingfors (now Helsinki), Finland. In 1929 he qualified for university teaching in geophysics at the same university, where he stayed till 1939. From 1939 to 1940 he was provisional head of the physics institute at the University of Posen (now Poznań, Poland). In 1940 he was named remunerated lecturer of meteorology and in 1941 associated professor at the Institute of Meteorology and Geophysics of the University of Graz, where he worked till 1945, when he retired. In 1941 he was additionally named managing director of the research center for atmospheric eddies at the University of Graz (Poggendorff, VI, 1936; Poggendorff, VII, A, 1956; Peterson, 1992).

Already in 1918 Letzmann met Alfred Wegener, who lectured one semester at the University of Dorpat. In 1928 Letzmann spent one year in Graz and worked with Wegener on tornados, whirlwinds and related phenomena (Letzmann und Wegener, 1930). He continued to work on this subject and when appointed to the University of Graz in 1941 he also led a newly established research center for atmospheric eddies. One of the only preserved records of the time is a revised version of a report from 1938 (Letzmann, 1944). After his retirement in 1945 he continued his work on a private basis and stayed in Graz till the end of the 1960s.

Heinz Lettau (* 1909: Königsberg/Prussia)

He studied geophysics and meteorology from 1928 to 1931 at the Universities of Königsberg, Frankfurt/Main and Leipzig, where he got his doctorate in 1931. In 1936 he qualified for university teaching at the University of Leipzig and in 1938 he moved to the University of Königsberg as observer at the geophysical observatory. In 1943 he was appointed to associate professor of meteorology and geophysics at the University of Graz. Due to war time commitments (he served in a meteorological unit) he never assumed office during World War II, and afterwards the Austrian

State abandoned all appointments made at state owned institutions after the "Anschluß" (March 1938). He worked till 1947 for the German Meteorological Service and later emigrated to the United States, where he lectured at the Massachusetts Institute of Technology and was later appointed full professor of meteorology at the University of Wisconsin, Madison (Poggendorf, VIIa, 1956).

One of the major reasons for the appointment of Heinz Lettau seems his expertise in atmospheric turbulence (Lettau, 1939), which would have fitted very well with the establishment of the research center for atmospheric eddies, but army duties prevented Lettau to take up his office and work in Graz.

3 Second Half of Twentieth Century

3.1 Otto Burkard

Otto Burkard (* 1908: Graz) He studied physics at the University of Graz and received his doctorate in 1933 with a dissertation in atmospheric electricity. From 1934 to 1938 he worked as research assistant to Fritz Kohlrausch at the Technical University of Graz, and from 1938 to 1942 at a school for electrical engineering in Graz. In 1942 he qualified for teaching at university and soon afterwards he served in military service until the end of World War II at a radio station in Tromsø, Norway. After returning to Graz he resumed his job at the technical school and started to build up an ionosphere observing station at the Institute of Meteorology and Geophysics. In 1947 he was appointed associated professor and provisional head and from 1949 onwards head of the Institute. In 1962 he was promoted to full professor of meteorology and geophysics. He retired with emeritus status in 1978.

Soon after World War II Otto Burkard developed and installed an ionospheric observing station at the Institute. Starting in the second half of the 1950s the instrumental development was done by **Valentin Mostetschnig** (* 1926). The station was fully automatically operational for the International Geophysical Year in 1957/58 and had been upgraded continuously and operated till mid of the 1980s. The primary research target of the institute was the physics of the the upper atmosphere and ionosphere. In 1965 **Reinhart Leitinger** joined the Institute as research assistant and qualified for university teaching in 1971.

Together with Karl Rinner (1912-1991) and Willibald Riedler (* 1932) Otto Burkard in 1970 was one of the "founding fathers" of the Space Research Institute of the Austrian Academy of Sciences located in Graz. He acted as head of the "committee of applicants" from 1970 to 1975 and later as its first designated managing director from 1975 to 1984. As head of the department of physics of near-Earth space his group conducted research in magnetospheric physics.

3.2 Siegfried J. Bauer

Siegfried J. Bauer (* 1930: Klagenfurt, Carinthia)

He studied geophysics, meteorology and physics at the University of Graz and got his doctorate in 1953. Soon afterwards he emigrated to the US to take a job in ionospheric physics at the US Army Signal Research and Development Laboratories in Fort Monmouth, New Jersey. In 1960 he joined the Goddard Space Flight Center of NASA and acted in various leading positions, finally as associate director of space sciences, till 1981. In 1981 he was appointed full professor of meteorology and geophysics at the University of Graz till his retirement with emeritus status in 1998 (Bauer, 2003).

During Bauer's professorship the scope of the Institute broadened, especially into the fields "atmospheric trace gases", "aeronomy of other planets and moons", "planetary radio emission", "magnetospheric physics" and "physics of comets". Additionally research assistant positions were filled in by **Erich Putz** and **Gottfried Kirchengast**. He also promoted several scientists (**Helmut O. Rucker**, **Helfried Biernat**, **Peter Ladreiter**, and **Gottfried Kirchengast**) to qualify for university teaching.

In 1982 Bauer also was appointed successor of Otto Burkard as head of the department of physics of near-Earth space at the Academy of Sciences and served in this capacity till 1999, when **Helmut O. Rucker** succeeded him in this position.

4 At the Turn to the Twenty-First Century

In 1999 the Institute of Meteorology and Geophysics and the Institute of Astronomy merged and were renamed to "Institute of Geophysics, Astrophysics and Meteorology" (short form: IGAM), headed by **Reinhart Leitinger** (since 1999).

In 2003 **Gottfried Kirchengast** was appointed professor of geophysics and succeeded Siegfried J. Bauer's professorship. In April 2004 the Institute was affiliated as a department to the Institute of Physics of the University of Graz.

Information about the department and its workscopes, can be accessed via the web-address "<http://www.kfunigraz.ac.at/igamwww>".

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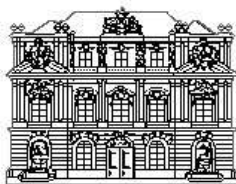
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H. O. RUCKER and R. LEITINGER (Editors)

FESTSCHRIFT

ON THE OCCASION OF THE
75TH BIRTHDAY OF
EM.O.UNIV.-PROF. DR. SIEGFRIED J. BAUER



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FOREWORD

On behalf of the Department of Extraterrestrial Physics of the Space Research Institute (IWF) of the Austrian Academy of Sciences and the Institute for Geophysics, Astrophysics, and Meteorology (IGAM) of the Karl-Franzens-Universität Graz, the editors Helmut O. Rucker and Reinhart Leitinger dedicate this publication to

em.o.Univ.-Prof. Dr. Siegfried J. Bauer

on the occasion of his 75th birthday.

This is the second Festschrift edited by us. It aims at demonstrating that the two departments that Siegfried Bauer had directed are still well and alive and have been able to continue to produce well founded research results very much in the tradition initiated by the jubilee. Despite of major changes in charter and organization of Karl-Franzens-Universität we could salvage IGAM (and keep its name in English, its acronym and its uniqueness) as a research unit of Institute of Physics. In unison, IWF plus IGAM are and intend to remain the solar system research and teaching unit of Austria.

We consider this publication to be a continuation of the first Festschrift of 2000 covering a five years period. Therefore it contains a small number of review type articles. The majority of the contributions report on original research and project investigations carried out and initiated between the end of 2000 and the mid of 2005.

Speaking for all members of our two departments we congratulate Siegfried Bauer to his 75th birthday and thank for his continuing interest in the fate of our institutions, for his help and encouragement. All our best wishes for a lot of active, fruitful and truly interesting years to come!

Graz, September 2005

THE EDITORS

HELMUT O. RUCKER

REINHART LEITINGER

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Siegfried J. Bauer (© Lunghammer)

Siegfried J. Bauer is Professor Emeritus of Meteorology and Geophysics at the Karl-Franzens University of Graz and was formerly Department Head and Deputy Director of the Space Research Institute (Austrian Academy of Sciences) in Graz.

He was born 1930 in Austria where he also received his education. Soon after obtaining his Ph.D. at the University of Graz, where he specialized in ionospheric physics, he emigrated in 1955 to the U.S. for a research career of 25 years. For the first five years he was at the US Army Signal R & D Labs. at Fort Monmouth, N.J. where in the late fifties he determined the extent of the terrestrial ionosphere using the Faraday rotation of radio signals reflected from the moon. In 1961 he joined the newly established Goddard Space Flight Center of NASA, at Greenbelt, MD, where he spent the following 20 years. There he was first engaged in rocket and satellite experiments of the ionosphere and soon concentrated on the aeronomical interpretations of these observations. In the mid-sixties he taught a graduate course on the physics of planetary ionospheres and atmospheres at the Catholic University of America, at Washington D.C., out of which grew his classic monograph “*Physics of Planetary Ionospheres*” that appeared in English, Russian and Japanese. During his tenure at GSFC he also served as NASA-Project Scientist for the first international satellite missions in the field of aeronomy, i.e. Ariel 3 with the UK and Aeros 1 & 2 with Germany. In the seventies he was engaged in the preparation and later in the scientific investigation of the first US Venus mission, the Pioneer Venus Orbiter, and Bus for the entry probes, where he served as Interdisciplinary Scientist and member of the ion mass spectrometer experiment team. Following his return to his alma mater in 1981 where he was appointed to the Chair of Meteorology and Geophysics he concentrated his research on the aeronomical problems of Venus and later also of Mars and Titan, the latter two because of his involvement in experiments of missions to these objects. As then Chairman of the Solar System Working Group he was instrumental in “selling” ESAs participation in the Joint American-European Cassini-Huygens mission.

Prof. Bauer has established a small “*school of planetary aeronomy*” at Graz, where together with his graduate students and post doctoral researchers, he is contributing to the European effort in the investigations of planetary atmospheres and ionospheres. In view his four decades of significant contributions to planetary aeronomy Siegfried J. Bauer, received the EGSs David Bates Medal for Planetary Aeronomy, in 2000.

His monograph “*Physics of Planetary Ionospheres*” recently got a significant improvement and update by the new volume “*Planetary Aeronomy*” (2004) together with his long-term co-worker Helmut Lammer. Siegfried J. Bauer is a Fellow of the American Association for the Advancement of Science and of the American Geophysical Union, a Member of the Austrian Academy of Sciences, the Academia Europaea (London), and the International Academy of Astronautics (Paris), as well as a recipient of NASAs Exceptional Scientific Achievement Medal and Austrias highest honor award in the sciences and arts.