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Dr. Dr. Joachim P. Küttner

(September 21, 1909, Breslau - February 24, 2011, Longmont, Colorado/USA)

On February 24, 2011, meteorologists, atmospheric physicists, and pilots worldwide lost an indispensable and highly respected scientist, mentor, and friend. Surrounded by his family, Dr.. Joachim P. Küttner died at the age of 102 in Longmont near Boulder, Colorado, USA. This was Küttner's second home. He was born in Breslau, Germany, in 1909 and moved to the USA in 1948. For 80 years, Küttner dedicated his life to studying the earth's atmosphere, driven by his never-ending scientific curiosity and creativity, energy and imagination. Even at age 100, he still collaborated with OSTIV's Mountain Wave Project (MWP) group, evaluating their work and findings, providing valuable advice to improve the prediction of turbulence at all atmospheric levels.

Those present will never forget the day during the Soaring World Championships in Bayreuth, Germany, in 1999, when Küttner talked about his past to a group of glider pilots that included OSTIV president Dr. Manfred Reinhardt, and OSTIV vice president Christoph Kensche. Küttner described his experiences during World War II, and all his later research projects regarding the physics of the atmosphere, especially in the United States. He was full of respect and admiration for his partners, friends, and mentors such as Dr. Hugo Eckener, the head of Luftschiffbau Zeppelin in Friedrichshafen, Germany, who had protected Küttner during the difficult years of World War II. Since his family background had been considered unfavorable in the Third Reich, Dr.. Küttner repeatedly had depended on influential sponsors to protect him from retribution. The years in Friedrichshafen also marked the beginning of a lifelong friendship with Walter Stender, Zeppelin's head of development.

Other unforgettable moments include the honorary doctoral degree awarded to Küttner by Munich University in November 1999, and Küttner's lecture at the 61st German Soaring Convention 2002 in Berlin, organized by René Heise. In that lecture, Joachim talked about his scientific adventures in the atmosphere, the state of lee wave research, and his study of the still pretty unknown, extremely dangerous breaking waves at high altitudes.

Despite his enormous personal achievements, Dr.. Küttner was always extremely modest and humble when cooperating with others, for instance when integrating ideas and suggestions into his projects from collaborators and employees. His personal modesty forged a strong bond with coworkers that significantly contributed to the success of his projects. His scientific knowledge and thinking was as extensive as it was admirable, as was his lifelong focus on studying the atmosphere. The topics of his research covered a vast area of significant weather patterns, from the minor atmospheric overflow of specific mountain ranges to the formation of inter-tropic convergence zones covering thousands of

miles.

Now, Joachim Küttner is no longer among us. In the presence of close family members, he was buried in February at a cemetery in Boulder, Colorado. His wife Monika chose his final resting place for its grand view of the Rocky Mountains overlooking the city of Boulder where Küttner had lived and worked for so many years.

Küttner's family had strong scientific and cultural interests. His mother held a university degree and was an accomplished violinist, and his father was an acclaimed surgeon. As a child, Küttner had roamed the grounds of the Breslau University Meteorological Services where he grew up. The Breslau university accepted him at age 17 to study law and at 21 he earned his first Ph.D in 1931. He soon tired of law when it appeared too heavily influenced by politics and eventually enrolled at the Universities of Darmstadt, Helsinki and Hamburg to study physics and specialize in meteorology.

Küttner was a gifted student pilot who obtained his glider license in 1931 under the tutelage of the famous pilot Wolf Hirth at the renowned Grunau gliding school in the Riesengebirge Mountains near the German-Czech border. Here, he was fascinated by the "Long Wave," nicknamed "Moazagotl" by local glider pilots. This stationary meteorological phenomenon appeared about 12-20,000 feet above the peaks of the Riesengebirge Mountains.

As an inspiring soaring instrutor, Küttner taught soaring in Northern Europe from 1935 to 1937 and demonstrated soaring flight at air shows in Norway, Finland, and Sweden. He completed many flights for the German Research Institute for Gliding (*Deutsche Forschungsanstalt für Segelflug*) to study local gliding conditions, flying as far north as Lapland. He discovered many new phenomena, including up-drafts in shear lines above the water, and he wrote impeccable reports to document his findings.

Early in his career, Küttner began to study the physics of the atmosphere. He deployed a flotilla of instrumented gliders, manned by friends and assistants, and explored carefully and systematically the wave lift around the city of Hirschberg where the Grunau gliding school was located. In 1939, he received his second doctoral degree in meteorology from the University of Hamburg. His dissertation on the emergence and formation of foehn waves represented the first scientific study that described the structure of lee waves, newly discovered wind formations developing downwind of mountains. Küttner's observations and conclusions on this subject remain valid today.

During the war, Küttner became a test pilot who flew 45 different airplanes including aircraft prototypes for the Messerschmitt, Dornier, and Zeppelin companies. In 1944, while testing the Messerschmitt Me 321 "Gigant" cargo glider (the world's largest glider), he narrowly survived a crash when the plane broke apart in flight due to flutter.

After World War II, he led the work to rebuild the meteorological observatory atop the Zugspitze Mountain in the Alps. He worked with friend and weather observer Ernst Model, under supervision of (and with support from) American occupational forces. At 2,962 m (9,718 feet) above

sea level, the Zugspitze is the highest elevation in Germany. Küttner served as lead meteorologist at the Zugspitze observatory until 1948. During these years, he carefully observed atmospheric phenomena such as the flight of mountain-jackdaw birds and the smoke trails from the observatory chimneys to determine airflow patterns approximately 3,000 m (10,000 feet) above sea level. His research led to a habilitation paper published in 1948 at Munich University on the dynamics of thunderclouds. Shortly thereafter, he went to work in the USA.

Although the Allied occupational powers prohibited soaring in Germany until 1951, Küttner never lost interest in motorless flight. In 1948, he became a scientific field director for the Sierra Wave Project at the Geophysical Research Directorate in Cambridge, Massachusetts, USA. This position utilized his extensive knowledge and experience as a scientist, meteorologist, and pilot with invaluable experience in high altitude soaring. The Sierra Wave Project was one of several studies undertaken to increase the safety of the growing air traffic in the USA. By investigating air currents and strong turbulence in high altitudes and mapping the jet stream winds found in the troposphere layer of the atmosphere, it aimed to determine the reasons for the increasing number of flying accidents. The project was based at the Bishop Airfield outside Owens Valley, California, adjacent to the Sierra Nevada Mountains. During lee-wave weather conditions, Bishop Airfield was an ideal starting point for the many research flights which were predominantly done in sailplanes. Küttner participated in or carried out a number of notable flights:

- On March 5, 1951, Bob Symons and co-pilot Joachim Küttner, while flying a Pratt-Read LNE-1 two-seat sailplane designed for military training use, established a world record altitude of 11,780 m (38,648 ft).
- On March 19, 1952, Küttner flew 600 km (373 miles) from Bishop to Williams, Arizona in four hours. He used a tail wind and wave lift to soar over mountain ranges at an average altitude of about 6,000 m (19,685 feet). Küttner was enthusiastic about this kind of flying and predicted that long-distance flights of more than 1,000 km would soon be possible using wave lift.
- On April 14, 1955, during a successor to the Sierra Wave Project called the Jet Stream Project, Küttner set an altitude record for a German pilot that remains valid today. Flying solo in a Schweizer SGS 2-25 glider, he ascended to 13,015 m (42,700 ft) above sea level with an altitude gain of 9,031 m (29,570 ft).

In 1954, Dr. Küttner earned the Gold C with Three Diamonds. This is the most prestigious award a pilot can earn for accomplishments in soaring in that era. In 1955, the International Gliding Commission CIVV, member of FAI, awarded him the Lilienthal Medal for his contributions to soaring, and three years later, Küttner became the first person to receive the OSTIV Plaque, newly created by OSTIV, the International Scientific-Technological Organization for Gliding. The plaque is the

organization's highest award and nowadays coupled with the Klemperer Award. It is presented every two or three years to someone who is considered to have most significantly contributed to the scientific or technological advancement of soaring. Küttner earned the plaque for his many scientific achievements, his flights during the Sierra Wave Project, and his work as founding chairperson of the Scientific Section and the Meteorological Panel of OSTIV, a position he held from 1952 until 1981. In 1981, the Soaring Society of America inducted Küttner into the National Soaring Hall of Fame at the National Soaring Museum in Elmira, New York.

Despite his work in the USA, Küttner closely followed events and developments surrounding the revival of civilian aviation in Germany after World War II. In 1958, with Prof. Bernhard H. Goethert from the German Research Institute for Aviation (*Deutsche Versuchsanstalt für Luftfahrt*), he wrote a memorandum to the German federal government to urgently recommend the nation develop an independent capability to participate in space projects and exploration by developing and building satellites.

Around 1960, shortly before the USA's first manned space flights, Küttner accepted an offer to work with Wernher von Braun's team in Huntsville, Alabama. He managed systems integration of carrier rockets with the space capsules used in the Mercury and Apollo programs. Throughout his professional career, Küttner's ability to carefully analyze and efficiently synthesize scientific data impressed everyone he worked with. He equally impressed with his ability to manage his usually large teams of employees effectively and fairly. This ability was an integral part of his success, and won him a reputation that lasted until his death.

In 1968, after serving three years as Chief Scientist of the National Weather Satellite Center in Washington, DC, he took charge of the department for advanced research projects at NOAA, the National Oceanic and Atmospheric Administration. Four years later, the World Meteorological Organization offered him the position of International Director in charge of the Global Atmospheric Research Program (GARP). Küttner also co-supervised GATE, the Global Atlantic Tropical Experiment – at that time the most extensive international research campaign to study atmospheric physics with participants from 70 countries, using 30 research vessels and 13 airplanes. In 1982, Küttner headed ALPEX (Alpine Experiment), a project within the GARP program organized to stimulate the study of airflow phenomena in the Alpine mountain range generated and modified by orography, and characterized by both fundamental and prediction-related objectives.

In 1985, Küttner joined the First Himalayan Soaring Expedition in Nepal, organized by Spanish glider pilot Alvaro de Orleans-Bourbon. Together with Bruno Neininger from the Swiss Federal Institute of Technology (*Eidgenössische Technische Hochschule*) in Zürich, and Manfred E. Reinhardt from the Institute for Physics of the Atmosphere at the German Aerospace Center (*Deutsches Zentrum für Luft und Raumfahrt*), they studied the peak and valley circulation in Kali Gandaki valley using a Valentin Taifun 17 E motor-glider. Kali Gandaki is the deepest gorge on the planet. Running north to south

across the Himalayas, the valley forms a wind tunnel between Dhaulagiri (8,167 m, 26,795 ft, the 7th highest mountain in the world) and Annapurna (8,091 m, 26,545 ft), and the Tibetan Plateau (12,000 ft above sea level). The group took measurements from the ground up to well above the mountain tops to understand the daily cycle of air mass exchange from the plateau beneath Kali Gandaki valley (average altitude of 2,500 ft above sea level) to the mountain range (average altitude of 12-24,000 ft) behind and above the valley. Küttner, then 76 years old, participated in two measuring flights with Alvaro de Orleans-Bourbon as pilot. Especially successful were the flights undertaken on February 3, 1985 along the axis of the valley at four different altitudes between 7,500 and 12,000 ft above sea level. Analysis showed significant changes in the airstream entering the valley, confirming the thermal effects of the mountain massifs. The expedition proved that it was possible to conduct useful research flights even in very rugged terrain.

Beginning in 1986, Küttner joined the staff at the National Center for Atmospheric Research (NCAR) and the University Corporation for Atmospheric Research (UCAR), both located in Boulder, Colorado. Until the early 2000s, he took part in numerous scientific research programs all over the world, for example, GALE beginning in 1986, TAMEX beginning in 1988, TOGA-COARE, which started in 1992, CEPEX from 1993, INDOEX and MAP from 1999 on, and T-REX, which started in 2004.

Parallel to T-REX (a program to research terrain-induced atmospheric rotors), Küttner dedicated the last ten years of his life again to research on lee waves. Back in March 1952, when he performed a 600-km distance flight from Bishop, CA, to Williams, AZ, Küttner had predicted that long-distance flights beyond 2,000 km would be possible using tail winds at higher altitudes. This flight and Küttner's prediction inspired glider pilots all over the world to search for the suitable routes combining orography, large-scale weather conditions, and long daylight hours that such flights required. To encourage pilots, Küttner established in 1987 the Joachim Küttner Prize and Trophy, under the aegis of OSTIV's Meteorological Section, to be presented to the pilot who made the first 2,000 km straight distance soaring flight. The Küttner Prize was also a scientific award honoring the recipient's contribution to soaring by:

- the systematic exploitation of waves and other sources of energy during long-distance flights,
- the development and employment of new soaring strategies for high-altitude flights, and
- the extension of the existing knowledge with regard to up-draft occurrences over heavily structured terrain.

It took many years and many attempts to make the first 2,000 km soaring flight. During a research expedition in 1999 to the Andes, members of OSTIV's Mountain Wave Project (MWP) used

the local wave systems along with three essential factors: orography (longest mountain range in the world), extensive weather system (stable western winds), and long daylight hours, to complete a flight of over 1,550 km (963 miles) to Rio Grande (Tierra del Fuego) – a big step toward the 2,000 km goal. On November 23, 2003, 16 years after the Küttner Trophy was established, German glider pilot Klaus Ohlmann, a member of the Mountain Wave Project, completed the first flight over 2,000 km straight distance. It happened because of a systematic exploration of the terrain as well as the optimal exploitation of the advantages offered in the atmosphere. Ohlmann's flight was the result of many years of research, gathering experiences in different altitude bands, and studying the appearance and structure of many forms of turbulence. The Mountain Wave Project had collected and processed these data to improve weather forecasts for the benefit of general aviation. Küttner's 1952 prediction and the award he established in 1987 had advanced soaring and the science of meteorology. In 2004 at the age of 95, Küttner had the great pleasure to present the Küttner Trophy to Klaus Ohlmann during the Soaring Convention in Atlanta, Georgia, U.S.A.. After the convention and fully aware that he would probably not live to see it won again, Küttner increased the flight distance necessary to win the trophy to 2,500 km.

On March 30, 2010, the life time achievements of Joachim Küttner – "Joach" to his friends all over the world – were officially acknowledged when the President of the Federal Republic of Germany, Dr. Horst Köhler, awarded him the Officer's Cross of the Order of Merit of the Federal Republic of Germany (*Verdienstkreuz 1. Klasse des Verdienstordens der Bundesrepublik Deutschland*), one of Germany's highest civilian honors. The German Minister of Foreign Affairs had recommended Küttner for the award "in recognition of his extraordinary and unceasing commitment to air and space research, and in recognition of his exemplary status as a scientist and pilot, reaching far beyond Germany." On May 4, 2010, the German Consul General awarded the Order of Merit to Küttner during an official ceremony at the National Center of Atmospheric Research in Boulder, Colorado. To conclude the ceremony, members of the Mountain Wave Project gave lectures about new record flights. That evening a heavy foehn storm appeared over the city and Lenticularis clouds glowed at dawn.

In your attitude, your demeanor, and your legacy, you live on for us all.
Thank you, dear Dr. Joachim P. Küttner, thank you, Joach!

For all his friends,
René Heise, Dr. Manfred Reinhardt and Peter F. Selinger

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