Robert Guthrie Fleagle was born in 1918 in Colonial Park near Baltimore, Maryland. He received his undergraduate training at Johns Hopkins, graduating in 1940 with a B.S. degree in physics. Although registered as a conscientious objector, he enlisted in the Army Air Corps soon after the attack on Pearl Harbor; his first assignment was to teach high school math to recruits. In December 1942, he married his high school sweetheart, Marianne Diggs, and that same month he entered the graduate program at New York University (NYU).

In reflecting upon his graduate meteorology courses at NYU, Bob, as he was called, offered an insightful personal perspective on the state of the science at that time:

We got a heavy dose of airmass and frontal analysis and of Pettersen’s forecasting methods. We were indoctrinated with the belief that a good analyst should be able to find a front to account for any area of nonconvective cloud or precipitation. We accepted the view that storms are manifestations of the instability of fronts, though we realized that this had not been proven. A glimpse of better things appeared briefly when a member of the class gave a special report on Lewis F. Richardson’s attempt at numerical forecasting. This was stimulating to me and closer to what I had hoped to encounter when I applied for the program, but it was unconnected to our courses and therefore mystifying. We heard nothing of possible future development of electronic computers that could be used to integrate the hydrodynamic equations. We learned of Sir Gilbert Walker’s fascinating correlations linking changes of sea level pressure in the Equatorial Western Pacific to weather in the southeast United States and other distant sites; this stimulated thought and imagination but no one seemed to know what to do with the information.

Bob’s impatience with the immature state of meteorology as a science was suffused with an optimism that the equations that govern the evolution of weather systems were amenable to solution, and he aspired to contribute to achieving that goal.

In June 1944, Bob was part of a three-man team assigned to visit airfield weather stations to instruct forecasters in new concepts and techniques in weather analysis and forecasting. After a week or two at the University of Chicago brushing up on the latest forecasting techniques, he was stationed at Wright-Patterson Airfield in Dayton, Ohio, from which he traveled by military aircraft from station to station giving lectures and conducting workshops. He later recalled, “Sometimes I felt that it was a case of the blind leading the blind.” When one compares the “state of the art” at that time with the predictive skill that Bob lived to witness, his analogy was apt.

In 1946, Bob enrolled in the newly instituted Ph.D. program at NYU. His Ph.D. thesis, submitted in May 1948, resulted in two publications in the *Journal of Meteorology*—the first in which he described the three-dimensional field of motion in a vertical cross-section through a cyclone–anticyclone system derived as a composite from three selected cases, and the second in which he evaluated and described the processes that gave rise to the observed pressure changes. Hans Panofsky chaired Bob’s Ph.D. supervisory committee, and Bernhard Haurwitz also served on it.

During the spring of 1948, Phil Church from the University of Washington (UW) in Seattle made a recruiting trip and stopped at NYU to meet Bob. Of their meeting, Bob wrote, “We had a chance to talk about my interest in an academic career and [Church’s] plans for the Department of Meteorology and Climatology.” The program was to be developed gradually and to be modeled on programs of the five departments that trained meteorologists during the war. A week or so later Church sent Bob a telegram with a formal job offer and Bob accepted. In recalling his decision, Bob wrote:

[My] positive feeling about the UW position was based in part on having heard Phil Church give a paper at the winter meeting of the AMS in New York the previous January. His paper discusses meanders of the Gulf Stream and used data and concepts that were challenging and new to me. I was also impressed by the fact the Church had reached New York by bus during the railroad strike that had prevented nearly everyone outside the New York area from attending the meeting.
When Bob arrived in the department, he and Church were the only Ph.D.-level academic faculty in what was then called the Department of Meteorology and Climatology. Of his teaching experiences at that time, he recalled, “Most students were poorly prepared in physics and mathematics, and academic standards of the university as a whole seemed low. I concentrated on preparation for my two daily classes and directed special efforts at strengthening the students’ backgrounds in physics and their capabilities in writing accurately and clearly.” Bob’s challenging examinations and his adherence to high academic standards in assigning grades came as a shock to some of his students, but the fear that he instilled in them was mitigated by his reassurance that they were capable of understanding the intricacies of atmospheric physics and dynamics and by his willingness to help them along the way.

In 1951, three years after Bob joined the UW academic faculty, he and Church were joined by Bob’s former NYU classmate, Franklin Badgley; they were joined in 1953 by Konrad Buettner, in 1954 by Richard Reed, and in 1958 by Joost Businger. Bob played a key role in these and the many subsequent faculty recruitments, most of which were at the junior level. In 1961, the UW higher administration made a commitment of three more positions in response to a competitive offer that Bob had received from the University of Chicago; Bob agreed to stay if the department was allowed to continue to grow. The administration also agreed on a name change to the Department of Atmospheric Sciences. Bob served as department chair from the time of Church’s retirement in 1967 until 1977. By the end of his term the department had come to be recognized as one of the strongest in the nation. Bob was also instrumental in the establishment of the Geophysics Program, which is now an integral part of UW’s Department of Earth and Space Science, and he (together with D. James Baker) wrote the memorandum of understanding for the UW-NOAA Joint Institute for the Study of the Atmosphere and Ocean (JISAO).

Over the course of his academic career, Bob supervised 12 Ph.D. students and 12 M.S. students. The former included Dean Staley (1956), James Deardorff (1959), David Houghton (1963), David Rodenhuis (1967), Robert Brown (1969), Margaret Lemone (1972), Wendell Nuss (1986), and Nicholas Bond (1986). Reflecting on Bob’s mentoring style, Bond recalled that Bob would allow him to flail: “I would show him the results from an ill-conceived analysis of the field data for my thesis and he would smile and gently inquire about what I was trying to show. The outcome of our conversation was almost always some change in direction. At the time, I thought I was doing the steering, but afterwards I realized that was hardly the case.” As time went by, Bob’s research interests shifted from large-scale dynamics to studies of air–sea interaction and phenomena and processes in the planetary boundary layer. Much of his research in these areas was conducted in collaboration with Badgley and Businger, and their students and postdocs associated with what was referred to as the “Energy Transfer” project. During this period, Bob and Businger wrote a textbook, *An Introduction to Atmospheric Physics* (1963, second edition 1980), which was widely used in courses for undergraduate majors.

In recognition of his research contributions during the early years of his career, Bob received the AMS Meisinger Award in 1959. Upon hearing the good news in a letter from Church while he was on sabbatical in England, Bob wrote back on a postcard, “It’s something like a Ph.D., I think. It doesn’t mean that you deserve it but only that you are challenged to prove that you deserve it.”

During his early years at UW, political events cast a shadow on Bob’s enjoyment of his academic life, Looking back on this period, he wrote:

Beginning with the Cantwell hearings of 1948, restraints on academic freedom at the University of
Washington...exposed contrasting views of the university’s purpose and responsibilities, damaged its reputation, disrupted normal campus processes, and in my judgment jeopardized the future of the institution. When I arrived at the UW in 1948, the faculty Tenure Committee was investigating charges brought by the university administration against three faculty members accused of being Communists, and tensions were high. Early in 1949 President Raymond Allen recommended firing three faculty members and putting three others on probation. The Regents carried out these recommendations, effectively ending the careers of the affected faculty members and chilling freedom of expression for the campus as a whole. These actions were protested by many prominent liberals around the country. In this time of great tension, a petition protesting the actions of Allen’s decisions was circulated among the faculty and signed by 103, including me. Given the attitude of the administration, which many senior faculty members supported, including Phil Church, many of the signers had to recognize that the petition might well lead to an end to their employment at the university. I felt that if that were actually the case, I would not want to remain.

The petition that Bob signed was the first salvo in a war of nerves that lasted into the early 1970s, and culminated in Bob’s losing his security clearance (or so he believed), but fortunately not his job. He wrote letters to newspapers and, more notably, he was among the 63 faculty members who wrote letters to the UW president revoking the loyalty oaths that they had previously signed and joined together as plaintiffs in a lawsuit challenging the constitutionality of the loyalty oath. One of the points that Bob repeatedly emphasized in his letters and op-ed pieces was that “prohibition of association with Communists would exclude broad scientific communication and participation in international scientific meetings, which were part of my professional responsibilities.” Their lawsuit eventually worked its way all the way up to the highest judicial authority. Bob was “inspired,” as he put it, to be present in 1964 when the Supreme Court, by a vote of 7-2, ruled that the loyalty oath was unconstitutional.

The occasion for Bob’s being present at the Supreme Court hearing was his year of service in the Office of Science and Technology (OST). In 1963, President John F. Kennedy’s science adviser, Jerome Wiesner, called upon Bob to fill one of the 14 staff positions in his office—the one designated for a special-
helped to forge while he was at OST have yielded long-term benefits for the atmospheric sciences. The events of that year also had the effect of kindling in Bob an enduring interest in science policy that would dominate his professional life from that time onward.

In the years that followed, Bob made frequent trips to Washington, D.C., to attend meetings of the National Academy of Science (NAS)/National Research Council (NRC’s) Committee on Atmospheric Sciences (CAS). He had served as a member of CAS since 1961, chaired it from 1969 to 1973, and continued to serve on it until 1976. Much of the work of CAS involved setting program priorities and fostering interagency and international cooperation in major enterprises such as field programs and the design and deployment of observing systems. Between 1960 and 1984, Bob served on seven other NAS/NRC committees and panels for shorter time intervals.

An alternative destination on Bob’s frequent airline flights was AMS Headquarters in Boston. He had already served as a member of the AMS Council from 1957 to 1960, which had to deal with ethics charges against one of its members for what Bob described as “extravagant claims of success” in the realm of long-range, day-by-day weather forecasting. As a member of the AMS Scientific and Technological Activities Commission (STAC) from 1965 to 1969, he worked to stimulate and strengthen it by stopping the proliferation of committees, many of which he viewed as insular or parochial, and by encouraging the turnover of committee membership, enlisting younger and more active members. He served on the AMS Executive Committee from 1980 to 1984 and as AMS President in 1981. Priorities during his presidency included strengthening the links with physical oceanography, establishing the Journal of Climate, expanding opportunities for minorities and women, and positioning the Society to serve as an advocate for environmental protection in the face of increasing pressures for resource development.

Bob was a strong supporter of NCAR from its inception in 1958 until the time of his retirement 30 years later. In 1964, he was appointed chairman of NCAR’s first Evaluation and Goals (E&G) Committee, which oversaw its annual performance reviews. To ensure fair reviews by experts in the field, he worked to stimulate and strengthen it by stopping the turnover of committee membership, enlisting younger and more active members. He served on the AMS Executive Committee from 1980 to 1984 and as AMS President in 1981. Priorities during his presidency included strengthening the links with physical oceanography, establishing the Journal of Climate, expanding opportunities for minorities and women, and positioning the Society to serve as an advocate for environmental protection in the face of increasing pressures for resource development.

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Bob’s remarkable record of service to the atmospheric sciences community was recognized in the AMS Cleveland Abbe Award in 1971 and the Charles Franklin Brooks Award in 1985. Bob was also a Fellow of AMS, the AGU, and the AAAS. He enjoyed personal friendships with other “movers and shakers” of his generation of atmospheric scientists, such as Robert White and Tom Malone.

Throughout his career, Bob remained steadfast in his commitment to pacifism, particularly with regard to publicizing the grave dangers inherent in the nuclear arms race. The Fleagle and Businger textbook ends with the exhortation, “The all-encompassing atmosphere need not be destined to serve as the medium of transmission for man’s final inhumanity to man.” He was influential in persuading the AMS Council to approve a strong statement in 1984 “calling on the nations of the world to take whatever steps are necessary . . . to prevent the use of nuclear weapons and avoid nuclear war.”

Bob retired from UW in 1989 after more than 40 years of service. Throughout most of his retirement, he remained involved in a variety of projects and activities. From 1992 to 1995, he chaired the AMS Committee on the History of the Atmospheric Sciences. He wrote a book, Global Environmental Change: Interactions of Science, Policy and Politics in the United States, published in 1994. Despite (or perhaps as a counterweight to) his pacifism, Bob showed no mercy on the tennis court, a place he frequented well into his retirement years. While serving as caregiver for Marianne during the late 1990s, he continued to write opinion pieces and take part in events in the realm of peace activism. Marianne died in 2000, and a
Complex environmental challenges confront society today, such as the protection and conservation of natural resources, prediction and mitigation of the effects of climate change, and resilient response to natural disasters. The Earth is a system composed of subsystems linked by biogeophysical and biogeochemical processes that are governed by natural laws. Consequently, the well-being of human society is intimately connected to the behavior and evolution of the Earth system. For these reasons, it is vital that precollege education in the United States and the world include the science of the Earth system.

The American Meteorological Society (AMS) recognizes the importance of Science, Technology, Engineering, and Mathematics (STEM) education in developing, maintaining, and growing an education "pipeline" for the purpose of creating a world-class twenty-first-century workforce in the United States, and stresses the benefits of integrating Earth system science as a major component of STEM. Creating a STEM education pipeline has been directly linked to the future U.S. national economy and security. To ensure that U.S. students are able to meet these future challenges, improvements in precollege STEM education are needed to 1) foster an interest in and understanding of STEM disciplines and their relationship to Earth system science; 2) encourage students to pursue a career in STEM disciplines including Earth system science; 3) promote a lifelong understanding and appreciation of STEM and its role in advancing social and economic well-being; 4) increase STEM literacy to establish an informed public; and 5) expand opportunities to broaden participation and enhance diversity.

In the United States, STEM education policy is developed through the efforts of the Office of Science and Technology Policy (OSTP) and the National Academy of Sciences (NAS), among others. Reports and publications, such as Prepare and Inspire: K–12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future (President’s Council of Advisors on Science and Technology, 2010), and A Framework for K–12 Science Education Standards (National Research Council, 2011), have led educators to develop an integrated approach to precollege STEM education that recognizes the linkages between the various STEM disciplines.

AMS embraces this interdisciplinary philosophy and encourages the application of Earth system science as a core element of this approach. AMS offers leadership to the organizations and institutions...