

# necrologies

## **Kinsell L. Coulson** **1916–1999**



Kinsell L. Coulson died in December 1999 at the age of 83 after the completion of an unusually varied career in government, military, academia, and industry.

He was best known for his publications of extensive measurements of the degree of polarization of sunlight scattered by cloud-free atmospheres and natural surfaces. His

observations were taken in desert, agricultural, urban, and polar regions, and in the pristine environment of the Mauna Loa Observatory. His strongest interest concerned the effects of aerosols on the polarization and intensity of skylight. He measured their effects in Los Angeles smog, central California haze, deserts, ice crystals in Antarctica, and volcanic clouds over Mauna Loa. An important series of measurements was the detection of El Chichon volcanic dust in the stratosphere over Mauna Loa with lidar and subsequent measurements of the degree of polarization and intensity of sunlight scattered by the cloud. He summarized all of his results and compared them with other investigators in his book *Polarization and Intensity of Light in the Atmosphere* (1988).

Coulson grew up on a farm in Missouri. He did not graduate from college until the age of 26, because during the Depression, he had to drop out from time to time in order to earn enough money to continue. After a one-year stint with the Weather Bureau and meteorological study at the University of Chicago, he entered the U.S. Navy in 1943.

He then served as a forecaster of weather conditions during navy operations in the China theater. During this time he met Vivien Vainer in Shanghai and married her in 1947. This proved to be a loving relation-

ship in which she typed many of his manuscripts, strongly supporting and encouraging him throughout his career. She survives him.

After their marriage, they returned to the United States, and for two years Coulson engaged in meteorological activities related to rocket tests by the Naval Ordnance Test Station at China Lake, California. Next he went to the University of California, Los Angeles (UCLA), where he received a Ph.D. in 1959 under the tutelage of Zdenek Sekera doing research on the theoretical and measured characteristics of skylight. His Ph.D. thesis presented theory and computations of the intensity, degree of polarization, and fluxes of sunlight in an atmosphere free of clouds and aerosols.

After leaving UCLA, Coulson studied the atmospheric radiation balance at the Stanford Research Institute. In 1960 he moved to the Space Sciences Laboratory, General Electric Company, Philadelphia, Pennsylvania, where he was manager of geophysics for six years. He had the responsibility for research activities in atmospheric physics of the earth and other planets and in the definition of experiments for the exploration of Mars and Venus. In addition, with GE's assistance, he constructed a goniometer to measure and analyze the polarization and intensity of visible light reflected from soil samples. In 1965, he transferred to the University of California, Davis, as professor in the Agricultural Engineering Department. There he was able to intensify his research by collaborating on the construction of an electronic polarimeter with control and recording of data by a computer. He used this instrument henceforth for his measurements at Davis, Los Angeles, the Antarctic, and Mauna Loa.

Coulson was active in promoting the use of solar energy and did theoretical research and measurements of upward and downward fluxes of solar radiation. He took his teaching seriously. His students understood his devotion to them, both inside and outside of the classroom. Bruce Fitch tells about being interviewed by Coulson to become a graduate student. Coulson encouraged him by telling him that he could have his own office with plenty of fresh air. One year later Fitch was stationed at the South Pole to take measurements with

the polarimeter for a year. Coulson's distinguished career at University of California, Davis, culminated by receiving the highest grade of professorship. After a review of his career the award recognized his contributions in developing an atmospheric sciences curricula, his research publications, and the well-received book *Solar and Terrestrial Radiation: Methods and Measurements* (1975).

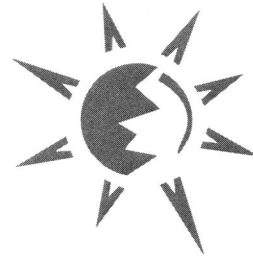
Coulson retired from the University of California, Davis, in 1979 as professor emeritus and then changed his career by becoming director of the Mauna Loa Observatory in Hawaii. From a height of 3400 m above sea level in very clean air, he made observations of the intensity and degree of polarization measurements of twilight under pristine conditions and with volcanic aerosols.

He did not completely retire when he left Hawaii in 1984 but became a consultant to the National Atmospheric and Space Administration (NASA) at Houston (1984–92) to improve satellite measurements of the earth's surface by utilizing the polarization characteristics of reflected sunlight, and also to remove part of the obscuring light scattered by the earth's atmosphere. Coulson and V. S. Whitehead of NASA developed a dual-camera system with orthogonal polarizers, which was mounted on several space shuttles. The crews operated these cameras and 400 pairs of the first polarization images of the earth were taken. In addition, Coulson and Whitehead developed a polarimeter with a rotating analyzer to be operated from low-flying aircraft and helicopters. With it oil spills on water were clearly delineated and standing water below plant canopies was detected. They received a patent for this application.

He received many awards. Among the more notable was chairman of the AMS Radiation Commission and appointment as Fellow of the AMS. His alma mater, Northwest Missouri State University, gave him an Outstanding Alumnus Award. He was the first president of the Northern California Solar Energy Association and received an Outstanding Service Award from them. The University of California, Davis, presented him with a Special Promotion for Outstanding Performance, Department of Land, Air, and Water Resources. As mentioned previously, he was awarded the highest level of professorship at the University of California, Davis. Besides the two books already mentioned, he published another book, *Tables Related to Radiation Emerging from a Planetary Atmosphere with Rayleigh Scattering* (with J. V. Dave and Z. Sekera in 1960.) He also wrote a biography of Sir

David Brewster, best known to AMS readers for inventing the kaleidoscope (1917) and discovering the neutral point of skylight polarization below the sun; but Coulson was unsuccessful in getting the book published.

Coulson was exceptionally responsible and devoted to tasks that he was assigned or that he created. He was a friendly, humorous, kind person who could be trusted.—*Robert S. Fraser, with contributions from John Carroll, Vivien Coulson, J. V. Dave, Bruce Fitch, John Miller, Lorraine Remer, and V. S. Whitehead.* ●



*In Memoriam*

*Philip E. Donatelli*  
1934–1999

*Frederick G. Finger*  
1924–2000