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**Memorial Resolution of the Faculty of the University of Wisconsin-Madison  
On the Death of Professor Emeritus Charles R. Bentley**

Charlie Bentley, A.P. Crary Professor of Geophysics Emeritus, who revolutionized our understanding of the Antarctic continent and its ice, passed away peacefully on August 19, 2017. Bentley is survived by son Alex and his spouse Emma Bentley, daughter Molly and her spouse Gordy Slack, grandson Archer Bentley and step-grandsons Jonah Taranta-Slack and Leo Taranta-Slack.

Born in 1929 in Rochester New York, Bentley was graduated in physics from Yale and then found his way into “Doc” W.M. Ewing’s program at Columbia University. After participating in ship-board seismic explorations in the Atlantic, Bentley undertook PhD research developing seismic techniques in Greenland, preparing to plumb the depths of the Antarctic ice sheet as part of the International Geophysical Year (IGY).

The day after he defended his thesis, Bentley headed for Panama, where he caught a ship south, then traversed out to Byrd Station in interior West Antarctica by February 1957. He returned to New York two years later, after two austral winters at Byrd and three summers exploring, to find that Columbia had not yet granted his PhD because his \$50 dissertation fee had not been paid.

During those first 25 months in Antarctica, Bentley led geophysical traverses that fundamentally changed our view of the ice sheet—far from being a thin layer draped over high mountains, the ice in places was well over two miles thick, with a surface high above sea level but a bed that plunged far below, including into the Bentley Trench, the deepest point on the Earth’s surface not presently under the ocean. Bentley reasoned that, when the ice sheet first grew, a wall of ice could not have advanced across such great depths, and instead that a bridging ice shelf must have run aground and then thickened to fill the abyss. The possibility that this sequence could run backward in a warming future, greatly and perhaps rapidly raising sea level, became the focus of much of Bentley’s research over the subsequent decades, as he and his students and collaborators repeatedly made major contributions to the knowledge needed to quantify the risk.

After joining the Wisconsin faculty in 1961, Bentley focused first and foremost on training generations of glaciologists and geophysicists. He did that by taking them to the most important places to learn what was there, accurately and reliably. Working with the cutting-edge technical staff at Wisconsin, and recruiting students with complementary skills, the Bentley group adapted geophysical techniques to the harsh polar environment and developed other new techniques, including pioneering work in digital data acquisition. Experiments in reflection and refraction seismics, passive seismic monitoring of subglacial earthquakes, radar, gravity, magnetics, resistivity, borehole logging, and more rolled out of Madison, headed for Antarctica or Greenland, and returned with the essential data. The subsequent analyses were complemented by a healthy dose of modeling and remote sensing, but always tied to the ground truth.

The list of major discoveries and contributions from Bentley and his group is long, including demonstration that the fast-moving ice streams are lubricated by soft till at their bases, and that ice shelves do buttress the ice sheet but may be weakened by widespread basal crevasses. He learned what was really there: the three-dimensional structure of the ice, its seismic and electrical character, the distribution of ice streams and crevasses and other features, the nature of the rocks beneath, and so much more. Nobody does research in Antarctica without relying on that fundamental knowledge.

Bentley served the community, nation and world in many ways. He provided the geophysical “G” in RIGGS, the Ross Ice Shelf Geophysical and Glaciological Survey (1973-78), and was one of the founders of the subsequent Siple Coast Project, which evolved into the still-running West Antarctic Ice Sheet (WAIS) project. His service was especially directed to the Polar Research Board of the National Academy of Sciences, which he chaired, and the international Scientific Committee on Antarctic Research, which

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he served as Vice-President and Convenor of their Group of Specialists on Global Change and the Antarctic, as well as serving as Vice-President of the International Commission on Snow and Ice. His contributions were recognized by the Seligman Crystal of the International Glaciological Society, the Bellingshausen-Lazarev Medal from the Soviet Academy of Sciences and the Hilldale Award at the University of Wisconsin, as well as by Fellowship in the American Geophysical Union, the American Association for the Advancement of Science and the Arctic Institute of North America.

And, when Charlie had reached the age that most people retire to well-earned rest, he stepped in to run the Ice Core Drilling Services (now Ice Drilling Design and Operations, IDDO) program at Wisconsin. This highly successful effort uses science and engineering to design, build and deploy drills to collect ice cores and basal samples or rapidly access desired depths in the ice, and has led to improved reconstructions of past climate, better knowledge of ice-sheet processes, and even fundamental physics observations harkening back to Bentley's undergraduate degree. He continued to travel to Antarctica to conduct this work through 2010, and completed a total of 16 Antarctic expeditions spanning seven decades.

The reliability of Bentley's science is legendary. As reported by Bentley's long-time, distinguished Antarctic colleague and three-time Wisconsin grad John Behrendt, after the first seismic profile was completed at Byrd, Charlie radioed to the IGY coordinating office that the ice was 3 km thick near there. The IGY office was unsure whether to release this startling and unprecedented result based on the word of a 20-something grad student until A.P. "Bert" Crary (deputy science lead of IGY) weighed in: "If Charlie says the ice is 3 km thick, the ice is 3 km thick." The ice was in fact 3 km thick.

Bentley's students are spread widely across industry and academe, carrying on the work they started in Wisconsin. IDDO continues to plumb the depths of the ice sheets. Mount Bentley still rises above the ice sheet in Antarctica. And, if society makes wise use of the knowledge that owes so much to Bentley's leadership and efforts, then the ice sheet will continue to occupy the depths of the Bentley Trench far into the future, as coastal dwellers thank him for timely warnings of possible dangers.

Memorial Resolution Committee  
Richard Alley  
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