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UNL professor to examine remote sensing technology, biodiversity

Melissa Allen Dec 10, 2013



Courtesy photo

While most of his peers are making plans for retirement, Art Zygielbaum is in the beginning stages of his third career.

After decades working in NASA's Jet Propulsion Laboratory and Aerospace Advisory Panel, interrupted by a brief stint at Nebraska Educational Telecommunications, he's now a research associate professor in the University of Nebraska-Lincoln Center for Advanced Land Management Information Technologies. He is currently working on a new \$2 million project to determine whether remote sensing technology can measure biodiversity of a region.

Remote sensing is a technique of measuring landforms by using electromagnetic waves from an aircraft or satellite.

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“Every plant characteristic has different levels of light reflected from it,” Zygielbaum said. “Different plant life cycles reflect differently, and different levels of health of the plants reflect too. All these

signals put together have spectral differences.”

It’s as simple as looking at a bouquet of flowers. If you have a bouquet of healthy daisies, then the whole bouquet will be yellow. But if you bring in a variety of flowers, the signals and colors become more complex, Zygielbaum said. Remote sensing may use these differences in plant colors to tell how much biodiversity is present in a given area.

The National Science Foundation is funding the project, which will begin in May, and will last four years. The University of Minnesota is leading the team of researchers from Appalachian State University, the University of Wisconsin and UNL. They will use remote sensing to measure the biodiversity of Cedar Creek Ecosystem Science Reserve in Minnesota. The biodiversity of the reserve has already been measured.

By comparing the information gathered from remote sensing to the information received without remote sensing, the team will be able to tell if remote sensing can be used as a biodiversity indicator for the future.

Zygielbaum’s role will be comparing and testing calibrations of the instruments and data used in the research to show how accurately remote sensing predicts the already-known biodiversity.

John Gamon, an adjunct faculty member of the School of Natural Resources, approached Zygielbaum about the project.

“It was a dark and stormy night,” Zygielbaum said. “No, I’m kidding. John came to me three weeks before the proposal was due. It was last minute, but we thought we ought to go for this. We turned it in and thought that it was a good exercise for next year to try again. We were really surprised when we learned that we actually got funding for it.”

Zygielbaum’s experience in remote sensing can be traced back to his first career. After earning a bachelor’s degree in physics from the University of California at Los Angeles in 1968 and his master in electrical engineering from the University of Southern California seven years later, Zygielbaum began working on his Ph.D. dissertation while working as an engineer for the Telecommunications Research Section at the Jet Propulsion Laboratory. Zygielbaum spent a decade developing tracking systems for spacecraft and testing Albert Einstein’s Theory of Relativity.

“I was pursuing a Ph.D., but I was also playing with a toy on Mars called the Viking,” Zygielbaum said. “I ended up preferring it (to) working on the dissertation, so I quit that. But I always felt bad about it.”



Then a chance to develop ways to use NASA technology and education through UNL came up in 1998. Until 2001, Zygielbaum was the research and development director of Nebraska Educational Telecommunications before he began working as a special government employee for NASA's Aerospace Safety Advisory Panel.

He returned to UNL to be the director of the National Center for Information Technology in Education for three years.

"I decided I would retire in 2005 and finish my Ph.D. at the ripe old age of 58," Zygielbaum said. "I finished that in 2009, stayed on and found out I could teach. So that's career number three."

Zygielbaum's past experiences and expertise make him highly skilled in his field, said John Carroll, the director of UNL's School of Natural Resources.

"You have someone who has huge technical skills that he's developed throughout his career," Carro said. "He's one of the most phenomenal people you will ever meet in your life. When most people are retiring, he's just revamping his life."

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