ISU researcher works with European Space Agency to test moisture satellite

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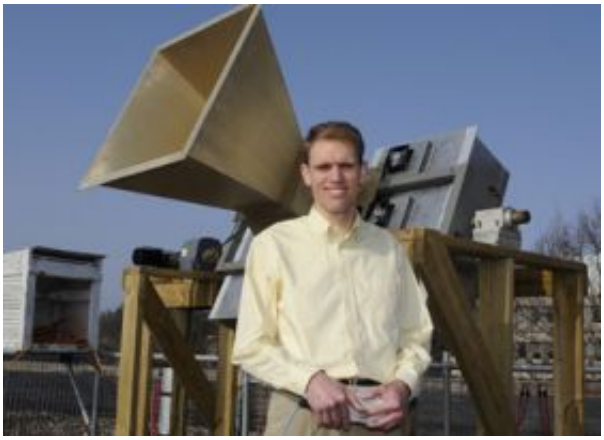

One of the instruments Brian Hornbuckle uses to measure soil moisture content is a microwave radiometer. Photo by Bob Elbert.

Europeans want to peek into our soil and see how dry we are. And an Iowa State University professor is eager to help, and even check their results.

The European Space Agency (ESA) is set to launch the Soil Moisture and Ocean Salinity (SMOS) satellite this fall as researchers try to learn more about the amount of moisture in the ground in the United States and around the world.

ISU's Brian Hornbuckle is helping them. For the past year, Hornbuckle has led a team of investigators from ISU, the University of Iowa, and the

USDA's National Soil Tilth Laboratory that measures moisture content in Central Iowa soil in using land-based technology. Now, he is working with the ESA.

The ESA will take satellite readings of soil moisture and compare them with the actual readings from Hornbuckle's land-based team. That will give the Europeans information on the accuracy of their satellite readings.

When they compare what their satellite said with Hornbuckle's actual readings, ESA researchers will then adjust the numerical models they are using to relate the satellite measurements to soil moisture.

Hornbuckle, an assistant professor in agronomy, says the arrangement is good for both ISU and ESA.

"Our deal with the European Space Agency is that they give us data that they collect from their satellite for free," said Hornbuckle. "In exchange, we'll share our data on the ground and also advise them on how their satellite is performing when it passes over Iowa."

Hornbuckle is working with Europeans because the United States does not yet have a satellite designed to monitor soil moisture.

By getting this experience with the validation and calibration team of SMOS, Hornbuckle hopes that when NASA does launch a soil moisture-measuring satellite, he may be selected to get involved with that program.

Soil moisture is important because, among other things, it directly affects weather and climate.

"Weather prediction isn't as good as it could be," said Hornbuckle. "One

of the limitations of weather prediction is that we don't completely understand how water moves through our environment. Soil moisture is one important part of the water cycle that is directly linked to precipitation because it catches the rain and releases the water back into the atmosphere, either by evaporation or when plants transpire though their leaves."

Currently, weather forecasting models do not include real-time measurements of soil moisture content as part of their programs. Once scientists can better measure soil moisture, especially over large land masses such as North America, this missing piece can be included in weather prediction models, making for more complete and more accurate predictions, says Hornbuckle. And satellites can provide global coverage at the lowest cost.

Hornbuckle's land-based soil moisture-measuring techniques involve placing monitors in the ground in various locations around a farm field. These monitors electronically send soil moisture data to computers at the University of Iowa and the National Soil Tilth Laboratory.

That data is then analyzed. It is these results that the ESA is eager to access.

Amy Kaleita, an assistant professor in agricultural and biosystems engineering, helps monitor soil moisture with Hornbuckle. She specializes in precision farming and is interested in soil moisture for another reason.

"I am looking for patterns in the soil moisture," she said. "Over time, these patterns have a significant influence on crop yield."

Kaleita says that if we can understand moisture behavior in certain areas, then we can start to understand some of the variability in crop yields.

Eventually, Kaleita thinks the information collected through moisture satellites may be useful for precision farming.

Source: Iowa State University