



Pioneering evapotranspiration mapping from space

By CAROL RYAN DUMAS
Capital Press

Farmers and ranchers are hearing a lot about NASA's OpenET and its ability to make critical water data free and available for water managers in 17 western states.

But they might not know the new online platform that uses satellites to estimate the water consumption of crops and other plants builds on the pioneering work of Rick Allen, a University of Idaho water resources engineer, and the Idaho Department of Water Resources.

Evapotranspiration

Allen and his research team at the Kimberly Research and Extension Center, working closely with IDWR, developed a physics-based model using satellite data to compute and map evapotranspiration, or ET. The model is named METRIC — Mapping Evapotranspiration at High Resolution with Internalized Calibration.

Evapotranspiration includes water evaporation from the land and water transpiration from plants.

The work was funded by a National Aeronautics and Space Administration grant, and Allen's team began working on the project in 2000. IDWR was an "eager user" because it knew there would be challenges among groundwater and surface water users, Allen said.

"Idaho was really the first state to use satellite-based ET data," he said.

For its work, the team received the Innovations in American Government Award from Harvard University's Kennedy School of Government in 2009. That early work led to NASA's OpenET.

That platform offers six different ET mapping models,



Rick Allen views evapotranspiration maps of southern Idaho.

Courtesy of Rick Allen

including METRIC, and it is free to anyone who needs that information, he said.

"It allows people to easily compare or average all six models together to get a consistent estimate of ET," he said.

Allen is a member of the OpenET Consortium and was a member of the NASA Landsat Science Team from 2007 to 2017. That team helped guide the development of future satellites and applications of satellite data, he said.

"I've really enjoyed being able to work with NASA, benefiting from all the satellite technology they've designed and launched over the years," he said. "I've also enjoyed working with the state of Idaho and seeing our developments put into action for effective water

resources management."

Farming roots

Allen grew up on a corn and soybean farm in north-west Iowa. The family also fed cattle and hogs, and he was in charge of the hogs.

"I wanted to stay tied to agriculture but also wanted to do something technical," he said.

After getting a master's degree in agricultural engineering at the University of Idaho in 1977, he went to work at the university's Kimberly Research and Extension Center in south-central Idaho as a research associate. His time there was divided between ET estimation and irrigation management and evaluation and irrigation system design.

In 1984, he went to

Iowa State University as a researcher and teacher. In 1986, he moved on to Utah State University where he also did research and teaching.

He likes teaching, but it also entailed more stress than research.

"I think I was fairly good at it, but I didn't want to continue it for my entire career," he said.

In 1998, he returned to full-time research at the University of Idaho.

He's worked in general irrigation, the relationship between surface water and groundwater and irrigation design for the Irrigation Association, an international organization, and was named its Person of the Year in 2016.

He's written numerous publications and was lead author of the Food and Agri-

culture Organization's "Crop Evapotranspiration" manual, which has become a global standard on crop water requirements. He was also co-editor of the American Society of Civil Engineers' practices manual "Evapotranspiration and Irrigation Water Requirements," a source standard that is widely used in irrigation litigation in the U.S.

He's also spent quite a lot of time in many countries helping to review research programs and teaching short courses on irrigation systems design and water management.

"I've really enjoyed seeing the technology evolution in irrigation, all the electronics and sensors," he said.

This story first appeared Dec. 3, 2021.

RICK ALLEN

Age: 69

Position: Professor of water resources engineering, University of Idaho

Location: Kimberly Research and Extension Center

Education: Ph.D., civil engineering, University of Idaho, 1984; master's degree, agricultural engineering, University of Idaho, 1977; bachelor's degree, agricultural engineering, Iowa State University, 1974

Research interest: Evapotranspiration, irrigation water requirements, satellite image processing in water resources, hydrologic water balances, impacts of water conservation, center pivot design and operation, weather data quality and processing, evapotranspiration measurement

Affiliations: OpenET Consortium, member; NASA ECOSTRESS Science Team, member; NASA/USGS Landsat Science Team, past member

Publications: 212, primary author on 78

Awards: Numerous, including Innovations in American Governance Award, Harvard University's Kennedy School of Government; Arid Lands Hydraulic Engineering and Royce Tipton awards, American Society of Civil Engineers; 2016 Irrigation Association Person of the Year (international)

Family: Wife; three grown children; two grandchildren

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