

Revolutionary environmental engineering research

Associate Professor Jeffrey Walker has led a team of researchers in a world-first research project to validate data being collected by the European Space Agency's newest satellite.

Australia's vast tracts of uninhabited land and hot summer meant that the University team was ideally placed to be the first researchers to validate data from the recently-launched Soil Moisture and Ocean Salinity (SMOS) satellite – Data had to be collected within six months from launch, making a European validation study impossible because of their cold, wet winters.

Information collected during the project will be used to prove the satellite's measurements are accurate.

"It's very exciting, because there has never been a satellite that makes these measurements before," says Professor Walker.

SMOS measures "brightness temperatures", radiation being emitted from the Earth's surface at the microwave wavelengths, which can then be interpreted to gain soil moisture data.

30 people were involved in the study, including University post-doctoral researchers and PhD students, who were joined by researchers from across Europe.

Professor Walker and his team took measurements from an aeroplane, which made flights over a 500km x 100km area between Balranald and Canberra that SMOS had already measured, then took soil moisture readings in the same area using portable probes over areas of "farms" measuring two kilometres x five kilometres. Data from the Aircraft had a one kilometre resolution, to SMOS' resolution of around 40 kilometres.

Funded by an ARC Discovery Grant, Professor Walker and his team worked over a five-week period that started with hot and dry conditions, and fortuitously included a major rainfall event, leading to minor flooding.

"We were expecting it would be a snapshot in time with consistent dry conditions, but with the rain event in early February, the data covered soil conditions that went from very dry to very wet, and then to dry again."

Data is also being collected from a network of over 60 soil-moisture stations www.oznet.unimelb.edu.au that continuously measure soil moisture at individual points for long-term validation studies.

Professor Walker explains that validation of SMOS data is one step on the road to possibly changing the way weather is forecast worldwide, as better soil moisture data will allow for more accurate numerical weather prediction.

There are also potential benefits for improved flood forecasting, agriculture and food production because soil moisture levels determine how much rainfall goes into the soil versus how much becomes run-off.

Better information on pre-existing and future soil moisture conditions will allow farmers to make more informed decisions about what to plant, when to plant and how much to irrigate.

Extensive validation studies using the data Professor Walker's team collected will be undertaken in Australia and Europe later this year as the SMOS data becomes available.

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