

Funding boost for data rich remote soil water mapping

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Engineers at the University of Melbourne and collaborating institutions have been awarded \$1 million for research to develop new techniques to help farmers make use of water trapped in soil and potentially relieve pressure on Australia's key water catchments.

Melbourne principal researcher, Dr Jeffrey Walker (Civil and Environmental Engineering), says Australia's main river basins are under mounting pressure to satisfy a wide range of competing needs for water and that farmers are feeling the strain of limited access to this crucial resource.

"A better understanding of soil moisture distribution on farmland will make a huge difference to farmers because it will enable them to develop better techniques for using water in soil and to make better use of their limited allocation for irrigation," he says.

The value of the research goes beyond farming. Soil moisture and its impact on water and energy fluxes can also influence weather and climate predictions.

"It's been shown that soil moisture is more important than surface sea temperatures (the key indicator of El Nino/La Nina) in making precipitation forecasts over land at mid latitudes," Dr Walker says. "So, more accurate soil moisture estimates should lead to better weather and climate predictions."

He says there are no high-resolution soil moisture measurement products available. "In fact there is not even an operational low-resolution product available. So far, we are the only group to have developed an airborne system for making such high resolution soil moisture measurements – together with such a wide range of supplementary data, including the most detailed land surface information."

The Australian Research Council (ARC) recently awarded Dr Walker and colleagues from the University of Newcastle, Flinders University and NASA \$667,000 for a three-year project to undertake high-resolution mapping of surface and root-zone soil moisture in key areas of Australia. This will involve several large airborne campaigns utilising new ARC-funded equipment.

A \$657,000 ARC-LIEF grant was awarded last year for a thermal imager and polarimetric l-band microwave radiometer, which measures naturally emitted electromagnetic energy from the earth's surface at microwave wavelengths which can be related back to soil moisture.

The instrument is currently being installed on an aircraft from the Airborne Research Australia National Research Facility at Flinders University for test flying.

A further \$338,000 (ARC-LIEF grant) was recently awarded to enable the purchase of an airborne laser scanner (LIDAR) for creating high precision, high resolution digital models of the terrain.

"This terrain information together with the thermal and other data will enable the development of techniques for increasing the current resolution of satellite observations. Additionally, these instruments are being used for satellite validation and algorithm development," Dr Walker says.

A National Airborne Campaign is being organised to ensure that Australian scientists are able to take maximum advantage of the extensive airborne data to be collected over the next two years. The campaign was started with a workshop held at the University of Melbourne in February.

Dr Walker says the workshop initiated a huge collaborative effort across a range of disciplines.

“During the campaigns there will be some 40 people on the ground making detailed soil moisture and related measurements, including visitors from NASA, the European Space Agency, CSIRO and national and international universities.

“A lot of these people will be collecting data for a range of other related activities including bushfires, forestry mapping, carbon mapping and so on.”

The researchers are currently preparing for their first major airborne campaign which will take place over the Goulburn River in November this year. The second campaign will take place over the Murrumbidgee River a year later.