Towards the assimilation of AMSR2 soil moisture and vegetation data for natural hazard monitoring and prediction

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This project aims to improve the estimation of landscape moisture through the assimilation of AMSR2 derived near surface soil moisture and vegetation moisture content. Prior to assimilation, the AMSR2 observations must be quality controlled and bias corrected. The first step of this project is validating the AMSR2 observations against ground based measurements.

Fig 1: AMSR2 radiometer onboard G-COMW satellite

AMSR2 Characteristics

- AMSR2 is the Advanced Microwave Scanning Radiometer2 onboard the GCOM-W satellite which was launched by JAXA in May 2012.
- It's the successor of AMSR-E which was operating from May 2002 to Oct 2011.
- Vegetation moisture content is not a standard product of AMSR2 available by JAXA, while soil moisture is.
- Vegetation and soil moisture content could be derived from AMSR2 data using another algorithm(s), such as Land Parameter Retrieval Model (LPRM).

Altitude	700 km
Equator Crossing Time (Local time zone)	1:30 PM Ascending 1:30 AM Descending
Antenna Size	2 m
Swath width	1450 km

Study Site Selection

It depends on the availability of ground measurements for validation purpose;

- Yanco (NSW)
- Spyglass beef research station (QLD)

AMSR-E Observation and Site Location

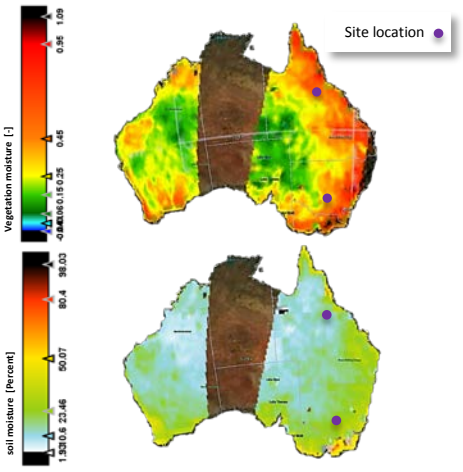

Fig 2: AMSR-E coverage on 21st July 2002 (upper: vegetation moisture content; lower: soil moisture)

Key Questions To Be Explored

- How to retrieve vegetation moisture and soil moisture content from AMSR2 data? What is the best algorithm?
- How to characterize the errors associated with AMSR2 derived vegetation and soil moisture?
- How does the vegetation moisture content relate to fuel moisture content, which is a primary variable affecting ignition and spread of bushfire?
- How to use assimilation techniques to improve the simulation of vegetation and soil moisture content by JULES land surface model ?
- How to use AMSR2 derived vegetation and soil moisture content to improve fire danger forecasting?

First Step; Validation

- Derive vegetation moisture content from AMSR2 data across Yanco (NSW) and Spyglass beef research station (QLD) (Fig 2)
- Validate optical derived vegetation moisture content from MODIS with high spatial resolution (500 m) against ground measurements and use them to assess microwave derived vegetation moisture content with low spatial resolution (25 km)
- Validate AMSR2 derived vegetation moisture content in forested area
- Compare simulated vegetation moisture content from JULES land surface model with validated AMSR2 products

References

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