SOIL MOISTURE RETRIEVAL FROM TEMPORAL SERIES OF PALSAR SCANSAR DATA

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1. INTRODUCTION

The availability of dense temporal series of SAR acquisitions from space platforms makes possible the use of change detection techniques to monitor near-surface soil moisture content globally. The rational of this method is that temporal changes of surface roughness, canopy structure and vegetation biomass occur at longer temporal scales than soil moisture changes, excluding periods of cultivation. Therefore, variations in surface backscatter observed with a short repeat cycle are expected to reflect mainly changes in soil moisture, since other parameters affecting radar backscatter can be considered fairly constant. A soil moisture retrieval algorithm based on change detection has recently been developed and tested making use of either C- or L-band SAR data collected by the E-SAR airborne system [1]. The study demonstrated that:

- low incidence angles (e.g. 20°-35°) and HH polarization are generally better suited to m_v retrieval than VV polarization and higher incidence angles;
- at L-band, it is feasible to retrieve soil moisture content, underlying a broad range of agricultural crops, with an accuracy between 5% and 6%.

The objective of this paper is to investigate the applicability of the aforementioned approach to multi-temporal L-band PalSAR ScanSAR WB1 data.

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2. EXPERIMENTAL DATA

The algorithm is therefore tested using 32 descending PalSAR WB1 acquisitions acquired from October 2006 to December 2008 over the "Yanco" study area in Southern Australia. The Yanco area is a flat semi-arid agricultural and grazing area of approximately 60 x 60 km, located in the broad western plains of the Murrumbidgee catchment, monitored for soil moisture remote sensing purposes since 2001 (http://www.oznet.org.au/). The principal summer crops are rice, maize and soybeans, while winter crops include wheat, barley, oats and canola. The area is hydrologically monitored by the OzNet soil moisture monitoring network, consisting of 13 soil moisture monitoring sites installed in a grid-based pattern to continuously monitor precipitation, soil moisture and soil temperature at various depth.

3. ANALYSIS

This paper illustrates the methodology used and provides a preliminary assessment of the algorithm applicability to L-band SAR data, by comparison of the SAR-derived soil moisture maps over the Yanco site with the ground soil moisture measurements.

4. REFERENCES

[1] Balenzano, A., F. Mattia, G. Satalino, M.W.J. Davidson, "Interpreting dense temporal series of C- and L-band SAR data over agricultural crops", *IEEE J-STARS, in press*