ESTIMATION OF PASTURE BIOMASS AND SOIL-MOISTURE USING DUAL-POLARIMETRIC X AND L BAND SAR – ACCURACY ASSESSMENT WITH FIELD DATA

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1. ABSTRACT

This paper presents the results of a study conducted to relate X and L band polarimetric SAR backscatter to pasture soil moisture and biomass as part of an environmental monitoring program. Extensive field data was collected concurrently with satellite SAR data acquisition – including dry/wet above ground biomass, soil moisture, surface roughness profiles and EM-38 electromagnetic sensor data. This data is used for both electromagnetically modeling the surface to work out the theoretical backscatter as well as empirical fitting regression models to the recorded SAR data and validation of existing inversion models[1].

Dual-polarimetric(HH/HV) ALOS-PALSAR data was collected as part of the Kyoto and Carbon initiative to measure above ground biomass. Campaigns have been conducted to characterize wooded savannahs in Northern Autralia with ALOS-PALSAR[2]. The current campaigns are aimed at pastures and grasslands. Previous data sets collected with PALSAR show significant impact of soil moisture on L-band backscatter, with corroboration from AMSR[3].

Dual-polarimeric data in similar polarizations was also collected from Terrasar-X in order to asses the impact of shorter wavelength on the backscattering properties on pastures[4]. The grass cover is expected to have a larger radar cross section (RCS) at shorter wavelengths. TerraSAR-X has shown promise in measuring yield values obtained from grasslike cereal crops[5] and shows high decorrelation

due growth of grass scale vegetation. TerraSAR-X complements PALSAR by measuring the above ground wet-biomass at a smaller scale.

This study will develop a complete SAR based remote sensing approach to monitor the extensive grasslands and pastures present in Australia. The food on offer (grass biomass) and drought status (available soil moisture) of these pastures is economically and climatically important.

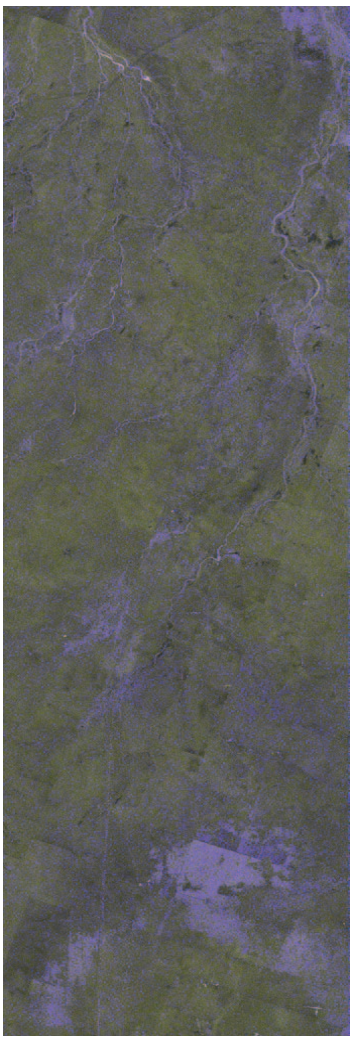

Figure 2: TerraSAR-X Dual-Polarimetric Scene over the study site

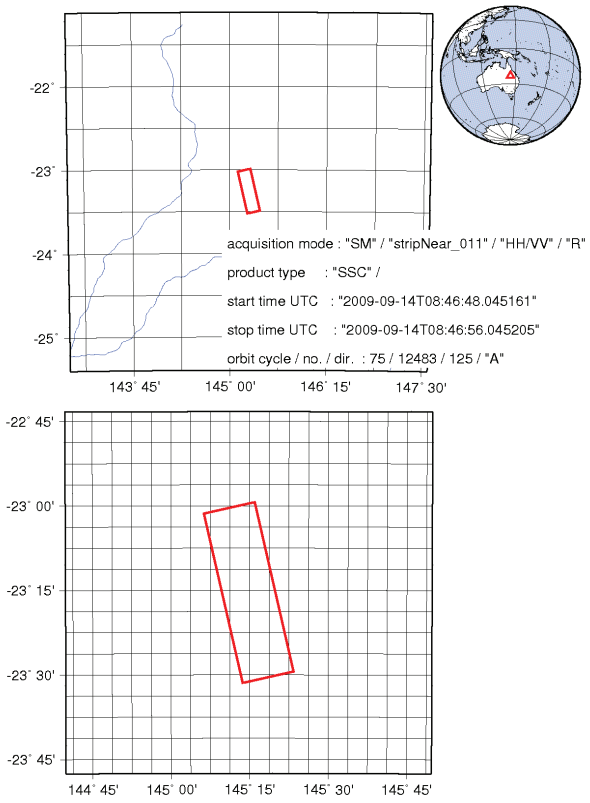

Figure 1: Location of the pastures study site

Bibliography

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