



The National Airborne Field Experiment (NAFE): Scaling properties of passive microwave soil moisture signatures

R. Panciera (1), J. P. Walker (1), J. D. Kalma (2), E.J. Kim (3)

(1) Department of Civil and Environmental Engineering, University of Melbourne, Australia, (2) School of Engineering, University of Newcastle, Australia, (3) NASA Goddard Space Flight Center, Greenbelt, USA (rocco@civenv.unimelb.edu.au, / Phone: +61-03-8344-4955)

Passive microwave remote sensing has demonstrated great potential for monitoring soil moisture at a range of spatial scales relevant to environmental applications. However, this technology still faces some major challenges related to the correct interpretation of the spatially averaged measurements provided by such sensors. Currently, retrieval algorithms based on tower data at 10's m resolution are applied to aircraft data with resolutions of up to 1 km and satellite data with resolutions of up to 50 km. Such an approach does not reflect the spatial variation in soil moisture at these larger scales and the nonlinearity between soil moisture and radiobrightness. Due to the imminent launch of dedicated passive microwave soil moisture missions such as SMOS and HYDROS, it is imperative that these questions be addressed. The National Airborne Field Experiment (NAFE) held in the Goulburn catchment, south-eastern Australia, in November 2005, was designed with this primary objective. The NAFE dataset is unique worldwide due to the wide range of spatial scales at which passive microwave observations were made, ranging from 1 km to 62.5 m resolution. Supporting ground measurements were also made at a range of scales from 1 km to 6.25 m resolution, making this a very suitable dataset to investigate such scaling issues. Results from an analysis on the scaling properties of the passive microwave observations are presented here. The spatial properties of passive microwave signatures were compared across multiple observation scales, and the correlation with land surface attributes was investigated. The high resolution airborne observations were then spatially aggregated and compared with the microwave signature as observed at subsequently lower resolutions. Results give useful indications on applicability of passive microwave soil

moisture retrieval algorithms across scales.