



HAL
open science

Estimates of surface soil moisture under wet grass using L-band radiometry

Kauzar Saleh Contell, Jean-Pierre Wigneron, Patricia de Rosnay,
Jean-Christophe Calvet, Yann H. Kerr, Maria-José Escorihuela, Philippe
Waldteufel

► **To cite this version:**

Kauzar Saleh Contell, Jean-Pierre Wigneron, Patricia de Rosnay, Jean-Christophe Calvet, Yann H. Kerr, et al.. Estimates of surface soil moisture under wet grass using L-band radiometry. 6. SMOS Workshop, May 2006, Copenhagen, Denmark. 2 p. hal-02819103

HAL Id: hal-02819103

<https://hal.inrae.fr/hal-02819103>

Submitted on 6 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Estimates of surface soil moisture under wet grass using L-band radiometry

Saleh, K. ^(1*), Wigneron J.-P. ⁽¹⁾, de Rosnay P. ⁽²⁾, Calvet J.-C. ⁽³⁾, Kerr Y. ⁽²⁾, Escorihuela M.-J. ⁽²⁾, Waldteufel P. ⁽⁴⁾.

⁽¹⁾INRA, EPHYSE, Bordeaux, France (* Visiting scholar at The University of Cambridge, Geography Department, Downing Place, Cambridge CB2 3EN, Tel :+44 1223 766561, e-mail : ksalemco@bordeaux.inra.fr)

⁽²⁾ CESBIO, Toulouse, France, ⁽³⁾ Météo-France, Toulouse, France, ⁽⁴⁾ Service d'Aéronomie, Paris, France

The SMOS level 2-product retrieval algorithm is currently under development. In order to retrieve surface parameters from L-band data the algorithm requires specific information on the vegetation parameters of the direct emission model to be inverted (the L-band emission of the Biosphere model, [Wigneron et al, 2003]). Vegetation parameters specific to approximately 200 vegetation ecosystems are needed accordingly to the ECOCLIMAP [Masson et al, 2003] land surface global database selected for the retrievals from SMOS data. For that purpose, experiments making use of ground-based L-band radiometers are greatly important in order to define appropriate model parameters for each ecosystem.

This communication focuses on vegetation parameters for natural grass (see [Lopez-Baeza et al.] in this workshop for a case study over shrubs from the MELBEX experiment in Valencia, Spain). Multi-angular and dual-polarisation brightness temperatures over grass were obtained during the Soil Moisture of the Reservoir Experiment (SMOSREX, Toulouse), ongoing since the beginning of 2003.

The emission of natural grass is complex as it compounds the radiation emitted by the soil, by the vegetation material between the soil and the main canopy, and by the grass itself. The vegetation material between the soil and the main canopy includes vegetation litter, as well as green vegetation, which is very dense in that part of the plant. As a result, such layer close to the surface (here called *mixed layer*) wettens after rain and dries out slowly, absorbing a great part of the radiation emitted by the soil. Systems including a similar layer (e.g. forests, prairies, etc) need special consideration, as that additional contribution to the surface emission can invalidate the soil moisture retrievals if neglected.

In the first part of this communication we describe the calibration of vegetation parameters carried out for grass at the SMOSREX site, with particular emphasis on the emission of the *mixed layer* and the role of rain interception. Both wetness in the *mixed layer* and in the standing vegetation increase the emission of the whole system, and reduce the sensitivity of the surface emission to soil moisture changes. We show how the emission of the *mixed layer* can be parameterised to correctly estimate surface soil moisture. The second part of this communication shows the validation of the developed parameterisations. Surface soil moisture is retrieved in wet and dry conditions from L-band measurements acquired on the following year to that used for the calibration study.

Finally, two grass data sets with a different soil interface are compared: the SMOSREX data set with litter, and the ETH data set over clover grass but without litter [Schwank et al., 2005].

J. -P. Wigneron, J. -C. Calvet, T. Pellarin, A. A. Van de Griend, M. Berger and P. Ferrazzoli, Retrieving near-surface soil moisture from microwave radiometric observations: current status and future plans, *Remote Sensing of Environment*, vol. 85, Issue 4, pp. 489-506, 2003.

Masson, V., Champeaux, J.-L., Chauvin, F., Meriguet, C. Lacaze, R., A global database of land surface parameters at 1-km resolution in meteorological and climate models. *J. Climate* 16(9): 1261–1282, 2003.

Schwank, M.; Matzler, C.; Guglielmetti, M.; Fluhler, H., L-band radiometer measurements of soil water under growing clover grass, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 43, Issue 10, pp. 2225 – 2237, 2005