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Hydrology and Earth System Sciences Discussions

Interactive comment on "Extension of the Hapke bidirectional reflectance model to retrieve soil water content" *by* G.-J. Yang et al.

G. d'Urso (Referee)

DURSO@UNINA.IT

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This paper, based on a accurate implementation (and modification) of the Hapke model, just confirms that the soil reflectance in the solar domain is influenced by water content. This behavior is well known and it has been demonstrated by several studies based on different approaches (from empirical methods to artificial neural networks and BRDF model inversion). However, it is very difficult to establish a general method for estimating surface soil water content from reflectance in the VIS-NIR-SWIR regions, whilst other wavelengths (mainly active and passive microwaves) have proven to give much more promising and effective methods, especially for bare soil conditions. On the other hand, it is of some relevance to evaluate (and possibly separate) the effect

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of soil background in the estimation of surface parameters i.e. LAI, surface albedo, from the inversion of BRDF models. To this respect, it should be taken into account which relationship exists between the surface soil water content, as detected from reflectance observations, and the vertical distribution of soil water content, as determined by all in-situ methods, i.e. TDR, FDR, gravimetric methods. This relationship is strictly dependent on soil type, surface conditions, drainage patterns, etc. The present study does not give any advancement on this aspect, i.e. how significant can be the surface soil water content estimated from surface reflectance in the evaluation of "average" soil water content of a soil layer of given thickness. In their validation analysis, the authors do not go beyond a simple regression analysis between an empirical parameter of the model, which has no general validity, and the soil water content measured along a 20 cm long TDR line. It would have been very useful, for advancement of the research in this field, to deepen this aspect and elaborate more carefully the validation exercise, by taking into account the actual conditions of the soil surface and deeper layers.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 3667, 2011.