Paper: Long term soil moisture mapping over theTibetan Plateau using Special Sensor Microwave/Imager

This paper discusses the retrieval of surface soil moisture from brightness temperatures measured with SSM/I sensor. After a validation of moisture products, using ground truth measurements and GLDAS-Noah soil moisture simulations, an analysis of normalized soil moisture anomalies and their trends are proposed. Using 19.4 GHz, soil moisture products are proposed for a very limited penetration depth (about some millimeters). Because of different effects (vegetation, atmosphere, roughness), and the high sensitivity of these measurements to atmospheric conditions, it seems very complicated to consider SSM/I retrieval for analysis of annual or monthly trends.

Different points have to be clarified.

1) The discussion of soil moisture anomalies using a 19.6GHz sensor seems not evident. In fact, high variation of soil moisture in the first millimeters is linked to important effect of meteorological conditions and evaporation. It is not clear how to retrieve annual or monthly trends.

2) The authors consider that penetration depth for 19.4 GHz is about 1.55 Cm. If we consider theoretical equations, penetration depth is only about some millimeters. In C band (5.3 GHz for example), we consider a depth of about 2 cm!

3) Authors consider Dobson et al. 19985 model for retrieving of soil moisture from dielectric constant, or proposed model is validated only between 1.4 GHZ and 18GHZ?

4) How authors explain higher trends for annual anomalies than for monthly anomalies in figure 10.

5) What depth is considered for ground measurements, 2.5cm, to validate satellite products?

6) Authors don't consider vegetation effect in the proposed inversion algorithm, or for 19.4 GHz, sensitivity to vegetation cover (even dispersed) could be very important.

7) Figure 5 shows comparison between ground measurements and satellite retrieval. What is the limitation of satellite products based on high frequency sensor? Even in C band, we observe some difficulties in medium soil moisture because of heterogeneity of soil moisture profile (Amri et al., IEEE TGARS, 2012).

8) Authors consider inversion at low spatial resolution (pixel: 25km). What about errors due to heterogeneities and particularly presence of lakes? What about errors due to spatial scale for validation with ground measurements?

9) Authors consider trends function of elevation (with a bin of 50m). How they consider this analysis with low resolution pixels, combining probably different elevation levels?

10) It will be important to illustrate a comparison between GLDAS simulation and satellite measurements, showing multi-annual variations like for figure 5.