Interactive comment on “Potential soil moisture products from the Aquarius radiometer and scatterometer using an observing system simulation experiment” by Y. Luo et al.

Anonymous Referee #1

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This study investigates the potential soil moisture retrieval capacity of NASA’s Aquarius radiometer and scatterometer (both at L-band frequencies) instruments in an Observing System Simulation Experiment (OSSE) framework. The OSSE consists of Noah land surface model, Microwave Emission and Backscatter Model (MEBM), Orbit and Sensor Model (OSM) and Retrieval Model (RM). The OSSE is carried out over 1000 x 2200 km2 area in Central USA from September 2002 to September 2003 at 0.125 degree spatial resolution. The results are presented from 6 am (local time) simulations which is the overpass time of the satellite. The results indicate that the radiometer
outperforms the scatterometer over the scattered vegetation regions though both the
instruments capture the soil moisture values and temporal dynamics realistically. Vege-
tation coverage plays a major role in soil moisture retrievals and both the instruments
perform poorly over the densely vegetated regions.

This work is both novel and relevant, and I recommend it be published after addressing
one “minor comment”. In particular, the authors do a good job of communicating the
potential pros and cons of both radiometer and scatterometer aboard the Aquarius
satellite through a properly designed OSSE.

General Comments: (1) I have one comment: In Figure 4(b), I notice that the ra-
diometer (open circles) shows higher soil moisture estimates (uncertainties) during
winter months (from mid-October till April). The vegetation is typically sparse in winter
months and the vegetation cover has less impact on soil moisture retrievals in the win-
ter months than summer months over snow-free regions. So, what is the cause of high
uncertainties noticed in the radiometer retrievals in winter months? On the other hand,
if you remove the retrievals in the winter months and calculate the error statistics only
for summer months, then the radiometer will have less error values which indicate that
the vegetation cover is not the factor that affects the radiometer measurements. Is it
the case?