Interactive comment on "Estimating Sahelian and East African soil moisture using the Normalized Difference Vegetation Index" by A. McNally et al.

General:
In this paper, the authors developed a vegetation-based index, namely NSM, to estimate soil moisture over lager areas in Sahelian and east Africa, using satellite observation of the Normalized Difference Vegetation Index (NDVI) from the MODIS instrument. The authors related NDVI and the soil moisture measurements in 6 years at two sites (Wankama and Tondi Kiborn) in Niger and derived the coefficients in NSM statistically. They then tested NSM at other sites and compared NSM with a precipitation-based index, the Antecedent Precipitation Index (API). They found NSM is best related to crop yields in Niger, in comparison with API and another water-related index, namely WRSI.

Vegetation-soil moisture relationship has been a subject of interest in numerous studies for different vegetation, soil, and weather conditions. This study adds a new understanding in such relationship, which should be welcomed. The developed NSM can describe the mean status (2006-2011) of seasonal variation in soil moisture at the Niger sites and it is well correlated to crop yields in Niger.

Predicting soil moisture has been a huge challenge. A statistical approach is empirically based so that the coefficients derived from the measurement at one site may not be applicable to other sites or to a large area. This is the main problem with this paper. The developed NSM index works well on average at the Niger sites (Figure 3). However, it could not adequately describe the soil moisture in a wet or dry year at the Niger sites. It could not fully explain soil moisture in terms of magnitude and seasonality at other sites (see below). The authors may revise their paper with in-depth analysis and discussion in this perspective.

Figure 4 suggests that API estimates soil moisture better than NSM at the Niger sites, especially at the beginning and the end of the growing seasons. Both NSM and API underestimate soil moisture in a wet year (2006) and overestimate soil moisture in a dry year (2010).

Again in Figure 6 at the Mali sites, API follows the seasonality of soil moisture better than NSM, especially at the beginning and the end of the growing seasons. NSM can describe the magnitude of soil moisture better in normal years (2006 and 2007) than API. However, both indices cannot capture the magnitude of soil moisture in a dry year (2005) and a wet year (2008).

In Figure 7, although NSM describes the magnitude of soil moisture much better than API at the Kenya site, the NSM estimate is out of phase with the observed soil moisture in December 2011.

Finally, relating NDVI at 250 m resolution to soil moisture measurement at a site can be bias unless the surface is homogenous.

Specific:
Page 7972, Line 25: Figure 5 only shows a map for correlation between NSM and API. A map of NSM would help. The authors can compare NSM, NDVI, and API. Some in-depth analysis and discussion in their similarities and differences would help.

Page 7978, Line 2: Change "when" to "in".

Figure 1: Only 3 yellow starts can be seen. Fonts are too small.

Figure 6: Use format "Jun-2005" as x-axis title so the reader is clear "05" is for "2005".

Should "dekad" be "week" , and "dekadal" be "weekly"?