We would like to thank the reviewer providing critical feedback to our manuscript. We provided a reply to each comment which is followed by the revisions we made to the manuscript. The text for the reviewer comments are in grey while our replies and revisions are in black.

Reviewer #2
General comments: This study examines the coupling between near-surface and sub-surface soil moisture at four sites in the Netherlands. Specifically the authors develop a methodology for determining when the two layers are decoupled, thereby providing an important analysis for surface soil moisture assimilation into models. The manuscript is very well written and the figures are well crafted. The use of a distributed lag non- linear model for quantifying decoupled soil moisture ranges is novel and, as the authors point out, does not suffer from many of the assumptions and limitations of previously implemented methods. I recommend the manuscript for publication given appropriate consideration of the following concern.

C1
Specific comments: The primary concern I have with the manuscript is the conclusion that the decoupled range is not limited to dry conditions. Evidence of this is provided at one of four sites (SM13), at which the authors confirm the presence of burrowing animals. Given the potential data quality issues at site SM13 and the fact that decoupling at the the other three sites was confined to the dry end of the soil moisture range, I believe the strong statements regarding soil moisture decoupling outside of dry conditions (i.e., section 5.1, line 9; section 5.2, lines 26-27) are not adequately supported by the results. Therefore I recommend the authors either soften this conclusion by adequately describing the uncertainty and lack of consistent supporting evidence, or assess why SM13 shows decoupling outside of dry conditions when the other three sites do not.

We acknowledge the reviewer's concern about the occurrence of decoupling at wet soil moisture conditions. Indeed, compared to the other three sites, this result is intriguing. We decided to follow the reviewer's recommendation to asses why SM13 shows decoupling outside conditions. In our view, the occurrence of decoupling during wet conditions is plausible as certain combinations of atmospheric, biological, and pedological conditions can promote this. We elaborated further on whether burrowing animals may have compromised the quality of the dataset at SM13. We argue that the creation of macropores by burrows did not result in lowered data quality as this would result in subsurface soil moisture dynamics that is opposite of what is observed from the time series datasets. We expanded the discussion in Section 5.1 in page 10 starting from line 4.

"Among the four sites, the subsurface trends observed for the 40 cm values at SM13 show consistently high values, which can be more pronounced during winter months. This resulted in decoupling during wet soil moisture conditions fig.8. This trend is different from the other three sites which only show a slight increase in the subsurface values. Further inspection of the time series data at SM13 reveals no sudden disturbance in the signal which could be attributed to errors in the sensor. Field investigation confirmed an increase in silt content at 40 cm compared to the upper layers. The increase in silt content promotes a decrease of hydraulic conductivity over depth that results in a slower vertical flow towards deeper layers. The presence of burrowing and hibernating animals was also observed at the site during winter. These create macropores which eventually alter the hydraulic properties of the soil (Kodešová et al., 2006; Beven and Germann, 2013). We infer that, at the measurement domain of the sensor, these burrows or macropores facilitated faster vertical flow to the subsurface. Alternatively, if the burrows produced voids around the measurement domain, this would result in lowered soil moisture or data gaps due to the loss of sensor to soil media contact. However, there were no gaps observed that coincided with the burrowing animals' period of hibernation. During precipitation events, soil moisture flowing from upper layers arrived more rapidly at 40 cm depths due to the presence of macropores. There it accumulated and flowed more slowly to deeper layers because of the low hydraulic conductivity promoted by the increase in silt content. The overall effect of these factors was the pronounced increase in soil moisture values at 40 cm compared to those at 5 cm during winter periods as observed from the time series dataset fig.2."