

This paper investigates the feasibility of CRNS-based SM monitoring in irrigated environments. The paper is informative with lots of simulations in different scenarios. Simulation of neutron count in different scenario was performed with Monte Carlo simulations and Ultra Rapid Adaptable Neutron-Only Simulation. However, obtained results were not validated using real case scenario of irrigated areas.

The author chose a square, not a circle, irrigated area. While the CRNS is tube-shaped and the footprint of the CRNS is circular, is there a reason for that specific shape? Also, do we expect an improved detection rate or minimal if he changed it to circular?

Belo few questions that could make the paper clearer for the reader:

Line 14: the unit needs typo correction

Introduction: Recent work on soil moisture mapping from SAR images is worth reporting in the introduction, primarily those that provide operational soil moisture mapping through the synergistic use of Sentinel-1 and Sentinel-2.

In line 143-144, you mentioned that variations in humidity, vegetation, and other environmental variables can affect the footprint but with less degree than the SM effect. However, in the simulation, these factors were fixed (line 167-170). Can you explain what the impact would be on the simulation results if you include the diurnal weather conditions?

Line 187: why did you choose 9m radius specifically for all the simulations? Is there a method for choosing the right radius size for the tube?

Looking at Table2 + Figure 3 and then Figure 6, Figure 7 and Fig 9. They are very well connected, I wonder why they did not come directly after each other so that it is easier for the reader to stay on track!

Lines 374 – 376: *“As shown in Figure 8, an irrigation event that leads to a  $0.05 \text{ cm}^3\text{cm}^{-3}$  increase in SM can be detected with CRNS (relative change in detected neutrons higher than  $3\sigma + \alpha$ ) when the initial SM of the simulation domain is  $0.05 \text{ cm}^3\text{cm}^{-3}$ .”* It looks like there is an overlap in this figure: the green bars represents the  $0.05 \text{ cm}^3\text{cm}^{-3}$  initial SM and the blue bar for the  $0.10 \text{ cm}^3\text{cm}^{-3}$ . Indeed, the relative change is lower when the increase of soil moisture is higher. Is that correct?