Anonymous Referee #1

This manuscript provides a performance assessment of different known algorithms to solve the Richard's equation. In particular, the authors investigate the performance of the Ross method versus the Newton-Raphson with different time-stepping strategies. A nice set of guidelines are provided in the end. The article is well written and provides a nice contribution in this area.

We thank the referee for his/her review whose constructive comments helped in improving the manuscript. We are of course pleased that she/he considers that the manuscript presents a nice contribution to the challenging problem of solving Richards equation.

Based on this, I suggest the publication of the manuscript after minor revision is addressed to tackle this points:

Minor comments:

The author should clearly state the assumptions in Equation (1), rigid solid matrix (negligible dro/ro) changes in porosity) but also need to say that $\frac{1}{\rho}\nabla\rho \approx 0$. In this context, it is worth mention that the specific storage coefficient used in Equation (1) is not exactly the same as the specific storage coefficient of the flow equation. The specific storage coefficient is the sum of compressibility of water and soil. In equation (1) the changes in porosity are neglected and therefore "so" is not exactly the specific storage. Only the part corresponding to the compressibility of water.

We will change the text accordingly.

Line 36: actually there are three standard forms of the equation: pressure, saturation and mixed

We do not understand this comment. We wrote L36 'Equation (1) is also called the mixed form of RE. Two alternative formulations exist for RE' and showed the three forms of the RE (eq. 1, 2 and 3).

Equation (13) may be is worth to explain how to calculate fluxes q or simply refer to the appendix here for an example.

It is explained in the appendix, eq A32. We will refer to it.

Equation (15), maybe is worth explaining index k

It is explained two lines later (L147). The reviewer probably refers to equation 13 where we did not explain k. The text will be modified accordingly.

It is not clear whether the method suggested by Ross (2003) is mathematically equivalent to Newton-Raphson or simply performs the same way in this example. In case it is mathematically equivalent, a more detail derivation is required. In case it performs equally in

this case the manuscript should clearly state this fact. Could it be that in2D and 3D the performance of these two algorithms are different?

> The method suggests by Ross is mathematically equivalent to Newton Raphson as we explain in equation (8)-(13). We will provide more details.