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Hydrology and Earth System Sciences
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Discussions

Interactive comment on "Understanding NMR relaxometry of partially water-saturated rocks" *by* O. Mohnke et al.

Anonymous Referee #1

Received and published: 15 December 2014

General

The paper deals with the simulated NMR relaxation time distributions and signal amplitude of triangular pores in a porous medium. My overall decision is to accept the paper (after major revision) because it adds new aspects to this field of research even it is only a theoretical approach. Nevertheless, all parts of the paper (text and figures) need to be much clearer in terms of T1 and T2 relaxation times. It is often hard to identify or impossible to figure out if the authors are talking about either T1 or T2 relaxation. The same applies to the signal amplitudes (T1 or T2).

Specific

Figure 2b) With regard to the initial condition, where does the shift to slower relaxation

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times (96-89) in the beginning comes from?

Figure 8, 9 and 11.

Where does the difference in the surface relaxivity parameter 10ˆ-5 m/s to 10ˆ-10 m/s comes from?

Page 12698

Line 4 the NMR signal amplitude needs to be extrapolated to be proportional to porosity

Line 5-7 state that "[. . .] the relationship between pore size and NMR relaxation depends on pore shape [. . .]" whereas in the conclusions on page 12712 line 12 -14 "The NMR relaxation time depends on the surface-to-volume ratio (not on pore shape) [. . .]" is written. Please clarify, this seems contradictory.

Page 12705

Line 6 The whole paragraph needs to be more clear since the loss of phase coherence is a T2 issue and therefore not related to T1 as Eq. 8 states.

Technical

Figures

Figures should be larger and printed in high resolution, they are hard to read in terms of font size and color

Figure 8b and c) decay time? T1 or T2?

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Figure 10) decay time? T1 or T2?

Figure 14) decay time? T1 or T2?

Figure 8. Surface relaxivity has a wrong unit

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Figure 14. Amplitude of what? T1 or T2? Is this the extrapolated amplitude?

Page 12698

Line 25 delete “the”

Page 12699

Line 6-9 the extrapolated signal amplitudes are proportional

Page 12700

Line 22 insert blank between “and water”

Page 12701

Line 25 air is not a fluid, I suggest to use the phrase “non-wetting phase” instead of fluid

Page 12705

Line 11 I assume that you mean that the [. . .]molecules diffuse at the wall [. . .]- please clarify

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 12697, 2014.