

Interactive comment on “Supercooled interfacial water in fine grained soils probed by dielectric spectroscopy” by A. Lorek and N. Wagner

Anonymous Referee #2

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Recommendation

This is an interesting study of the dielectric properties of two types of fine-grained soils (Ca-Bentonit and JSC Mars 1) at martian like temperatures, in frequencies ranging from 10 Hz to 1.1 MHz. The real part of soil complex permittivity at 350 kHz is used to determine the soil ice and liquid water contents. The results of this study indicate that Ca-Bentonite contains at least 1.17 monolayers of interfacial water and JSC Mars 1 contains at least 1.96 monolayers at temperatures as low as -70° C. The analysis and discussions are insightful and the results here presented are novel. In the reviewer's opinion only a few revisions are necessary before the article is ready for publication by *The Cryosphere*. The writing needs to be improved before publication.

Specific Points

C1219

1. **Abstract.** The reviewer suggests writing “Water substance affects nearly all physical, chemical and biological processes on earth. ...” More detailed suggestions are provided in the pdf file sent to the editor.
2. **Abstract, Lines 7-9.** What is the justification for the focus on soil dielectric properties in frequencies ranging from 10 Hz to 1.1 MHz? This is briefly discussed in page 1444, but not clearly justified. A justification should be provided in the revised article.
3. **Page 1446.** What is the justification for the selection of 350 kHz to determine the ice and liquid water content of Mars soil simulant?
4. **Pages 1451-1452.** Why is the diameter of the lower plate different from that of the upper plate? What is the reason for the air-gap between the soil and the upper plate?
5. **Page 1451, Eqn (12).** The various terms of the equation are not defined clearly. For example, why is the subscript G used for the solid phase?
6. **Page 1453.** What is an isothermal decrease of temperature? This appears to be a contradictory statement. Do the authors mean stepwise decrease in temperature? The text needs to be clarified. The reviewer suggests avoiding the term “isothermally decrease of temperature.”
7. **Page 1453.** What is the motivation for choosing the three water content used in the experiments with clay and JSC Mars 1 soil simulants?
8. **Page 1454.** Is the drying of the sample for 24 hours at 105° C enough to reduce the soil water content to negligible values? How was this tested?
9. **Page 1456.** How is Eqn (14) transformed in the linear equation shown in line 12? This should be explained more carefully. What are the variables corresponding to beta and gamma?

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10. **Page 1457.** Which one is equation (GDR)? What does GDR mean?

11. **Page 1457.** Does the variable gamma in Eqn (19) corresponds to the same physical process as the variable gamma mentioned in line 16 of page 1456 (counter ion relaxation)? This is not clear in the text.

Interactive comment on The Cryosphere Discuss., 7, 1441, 2013.