Geosci. Model Dev. Discuss., 7, C478–C479, 2014
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Geoscientific Model Development Discussions

Interactive comment on "Simulations of direct and reflected waves trajectories for in situ GNSS-R experiments" *by* N. Roussel et al.

Anonymous Referee #2

Received and published: 2 May 2014

Summary: The authors have developed a simulator to determine the locations of surface reflection points by modeling the transmissions from GNSS satellites. They investigate multiple approaches to modeling Earth's surface, including a digital elevation model (with potential obscuration) and incorporate a troposphere model. The latter is shown to have significant impact.

The work appears to be a very useful tool. However, some of the results are puzzling. Some assumptions are not fully worked out. In addition, no validations are performed against prior work. These issues must be addressed prior to publication.

Detailed comments:

Abstract: "DEM" is used before it is defined.

p.1009, Line 23 (1009-23): This assumption is not justified, particular when a DEM is used. The authors should at least justify this assumption and have some quantitative estimate as to the error made by this assumption, and understand the implications of this assumption.

p. 1015-18: There is something wrong with this sentence.

p. 1015-22: Was it not stated earlier that a 2D coordinate system does not always apply? This should be clarified if needed.

p. 1021-5: Do not use the word "important" here.

p. 1023-17: The 8 cm difference seems much too large for the 5 m receiver height, comparing the sphere versus ellipsoid. 8 cm is 0.27% of the maximum reflection point distance from the receiver of 30 m. Distances from the receiver reach up to 30 m for the 5 m altitude antenna. It is hard for me to believe that the difference between sphere and ellipsoid over a 30 m distance approaches 8 cm. 30 m is a small fraction (5x10ˆ-6) of the Earth radius. I do not see how differences of nearly 0.3% are possible over 30 m. An independent validation or cross check of this code is warranted, to establish there is not an error.

p.1026-5: integration of a DEM must consider the lack of co-planarity is possible between transmitter, receiver and Earth center.

Interactive comment on Geosci. Model Dev. Discuss., 7, 1001, 2014.