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Interactive comment on "The influence of the signal-to-noise ratio upon radio occultation inversion quality" *by* Michael Gorbunov et al.

Anonymous Referee #3

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This paper is potentially important, with significance for decision makers who are planning future operational radio occultation (RO) constellations. The major conclusion is that RO missions that produce signal-to-noise ratios (SNR) of approximately 10 V/V will yield RO observations that will be sufficiently accurate for numerical weather prediction (NWP) applications. This threshold SNR value is more than an order of magnitude below the average SNR of COSMIC and other RO missions such as MetOp and KOMP-SAT, and according to the paper may be achieved with "smaller satellite platforms such as CubeSats and without high-gain antennas" (line 107 in the Conclusions). This result is surprising, and therefore must be carefully explained and justified. It is also misleading that the author, without clear explanation, uses the SNR in the 50 Hz band, which is about 7 times smaller compared to the commonly used SNR in the 1 Hz band.

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Discussion paper

Furthermore, the main conclusion of the paper, that there is a threshold SNR for which increases above this threshold do not matter, is contradicted by the results shown in Fig. 7, in which the RMS errors decrease as SNR increases!

Therefore it is imperative that the additional details of the calculations and discussion and interpretation of the results be provided before publication. The paper should be as free of errors as possible and clearly written, with all the figures explained carefully.

As written, the paper is not acceptable for publication.

Detailed comments are provided in the Supplement

Please also note the supplement to this comment:
https://amt.copernicus.org/preprints/amt-2020-114/amt-2020-114-RC3-supplement.pdf

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