Geoscientific Instrumentation Methods and Data Systems Discussions

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC1
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Comment on gi-2021-25

Anonymous Referee #1

Referee comment on "On the determination of ionospheric electron density profiles using multi-frequency riometry" by Derek McKay et al., Geosci. Instrum. Method. Data Syst. Discuss., https://doi.org/10.5194/gi-2021-25-RC1, 2021

The paper assesses the ability of multi-frequency riometry to determine electron density within the framework of an inverse problem. The authors have convincingly shown that the technique results in non-unique solutions and as such is an ill-posed problem. Multi frequency riometry can be useful in other ways, but with regard to defining the atmospheric density profile (or even the peak of density) the technique is fundamentally flawed.

The paper is very well written and constructed. The topic is important since it defines significant limitations on what was thought to be a promising technique for studying the energetics of the lower ionosphere. The problem is well described as is the methodology. The figures are clear and well presented.

I am happy to recommend this paper for publication.