Summary:
Although the author has worked to address the comments, the fundamental scientific relevance of the paper remains unclear. In many respects, this is a sophisticated analysis of the spectral characteristics of the riometer time series. The scientific value of this paper remains insufficiently justified.

The following topics in the author's response are addressed adequately in the revision: 2., 3., 5.

More detailed comments:
On Line 120 it is stated that "the object of this study is to investigate the spectrum of the signal itself including intermittency introduced by solar activity." Investigating the signal itself will convolve several physical factors, including those due to the Sun and those in the ionosphere, thus obscuring physical interpretation of the results. The manuscript still does not sufficiently address this issue.

On line 175, the author discusses the different signatures from the cosmic noise background and the ionospheric disturbances, ultimately traceable back to solar variability. We can therefore assume that for local times when the instrument is not sunlit (many hours at a time), these space weather variations are absent. That is not demonstrated or investigated in this work.

On line 220, it is clarified that subranges are identified to associate with known physics. However, that identification is never made convincingly. References to ionospheric physics are made (line 333) but there is no discussion of how the physics affects the riometer data. Variations at the hourly timescale, for example, are assumed due to auroral effects, but no information on the aurora is gained from these data. Identifying the subranges does not clarify the physics of auroral processes, and no path forward is given for how such identification will lead to improved scientific understanding. Rather, the reverse is true: known physics is used to provide plausibility to the existence of the subranges. What is gained in this latter approach is not clear.

New text on Line 250 is meant to address the connection to physics. However, this connection is highly qualitative and the connection to details in the riometer data are not made. What sort of solar fluctuations are referred to? Are these the sort of fluctuations that effect the D-region ionosphere and therefore the riometer data? Justifying the comparison between riometer data to specific distributions is not the point. Even if an exact match is found to a specific distribution, what is learned about which physical process? Line 385 admits this point.

Paragraph (b) near line 410: although the paper makes these links, the value of these links is not clear, and there is no method presented for learning about the physical processes from these links.

Line 290, uncertainties: uncertainities are based on assumptions. One needs goodness of fit also for these uncertainties to be meaningful. Uncertainties can be driven down to very

low levels by large volumes of data while fitting to very few parameters. However, it is not meaningful if goodness-of-fit criteria are not also consulted. This should be added to the analysis.