

Interactive comment on “Interpretation of Cluster WBD frequency conversion mode data” by J. S. Pickett et al.

Anonymous Referee #2

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The paper argues waveform observations using the WBD receiver onboard Cluster spacecraft in the view point of the data processing for impulsive phenomena. The WBD is the narrowband waveform receiver using the frequency down conversion technique. The authors demonstrate that the band limited receiver with the frequency down conversion causes some waveform distortion especially for impulsive waveform phenomena even if the wave energy mostly exits within the detection band width.

I completely agree the point the authors are pointing out. The band limited waveforms should be analyzed very carefully. One who analyzes such waveform data needs to keep in mind. In this meaning, the present paper is valuable for the publication in Geoscientific Instrumentation, methods and data systems.

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In order to improve this paper, the authors could consider following comments.

1. By considering the study result in this paper, we can infer some candidates of the original waveform from the down converted waveforms. However, it is very difficult to determine the unique waveform only by seeing the output waveform after the down conversion. The authors should stress this in the text. This is the limit of the waveform receiver using the down conversion.

2. The results shown in Figure 2 (a) and (b) show that a mono pulse appears after the down conversion of a wave packet consisting of several sinusoidal waves. The pulse width is almost equal to the envelope width of the wave packet. Then, the simulation in Figure 4(a) should use a wave packet as an original waveform. However, the authors setup the mono-pulse waveform before the down conversion. I don't understand the reason why the authors use the mono-pulse waveform instead of the wave packet in section 3.

3. The paper is more important for scientists who are not so familiar with plasma wave receivers or data processing of plasma waves. Then I recommend to describe the frequency down conversion method more detailed by using some illustrations to help their understanding.

Minor point: P10 line 14: Does AAR denote “Aurora acceleration region ?”

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