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Developing Chorus Wave Model Using Van Allen Probe and Arase Data

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Chorus waves play an important role in the dynamic evolution of energetic electrons in the Earth's radiation belts and ring current. Due to the orbit limitation of Van Allen Probes, our previous chorus wave model [1] developed using Van Allen Probe data is limited to low latitude. In this study, we extend the chorus wave model to higher latitudes by combining measurements from the Van Allen Probes and Arase satellite. As a first step, we intercalibrate chorus wave measurements by comparing statistical features of chorus wave observations from Van Allen Probes and Arase missions. **We first investigate the measurements in the same latitude range during the two years of overlap between the Van Allen Probe data and the Arase data**. Our preliminary results imply that the statistical intensity of chorus waves (root mean square of B_w) from Van Allen Probes is stronger than those from Arase observations in most of the MLT/L bins during the overlapped spatial and time interval. An example is shown in Figure 1. After the intercalibration, we combine the chorus wave measurements from the two satellite missions and develop an analytical chorus wave model which covers all magnetic local time and extends to higher latitudes. This chorus wave model will be further used in radiation belt and ring current simulations.

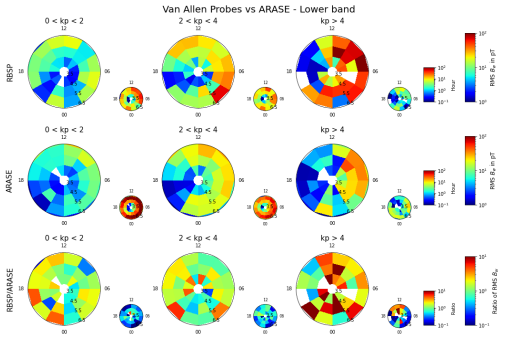

Figure 1. Different columns show statistical characteristics (RMS Bw and sampling time) of chorus waves in different geomagnetic conditions. Panels in first (second) row show results from Van Allen Probes (Arase). Panels in the third row show the ratio of RMS Bw and sampling time between RBSP and Arase.

References

[1] D. Wang, Y. Y. Shprits, I. S. Zhelavskaya, O. V. Agapitov, A. Y. Drozdov, and N. A. Aseev, "Analytical choruswave model derived from Van Allen Probe observations," *Journal of Geophysical Research: Space Physics,* **124**, pp. 1063–1084, 2019, doi:10.1029/2018JA026183.