

Development of automatic classification program for low frequency waves observed by Arase satellite

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Various types of low frequency waves are observed by Electric Field Detector (EFD) onboard Arase satellite. In this study, we are going to detect these low frequency waves from EFD data, and classify these waves into several types by using Machine learning method. At first, we applied R-CNN method to EFD spectrum data from 2017 to 2019, and detected 373 low frequency waves. Next, we try to classify these low frequency waves into several types by clustering method. We apply K-means method and hierarchical clustering method to the EFD spectrum data and the numerical data, which are the frequency range and the center frequency, of low frequency waves, respectively. We found 6 types of low frequency waves with different characteristics as shown in Figure 1. However, many artificial noises are included in the waves with narrow-band spectrum, therefore, we are going to distinguish natural waves from artificial noises. In addition, we are going to detect the characteristic low frequency waves, which were confirmed visually, by using machine learning method.

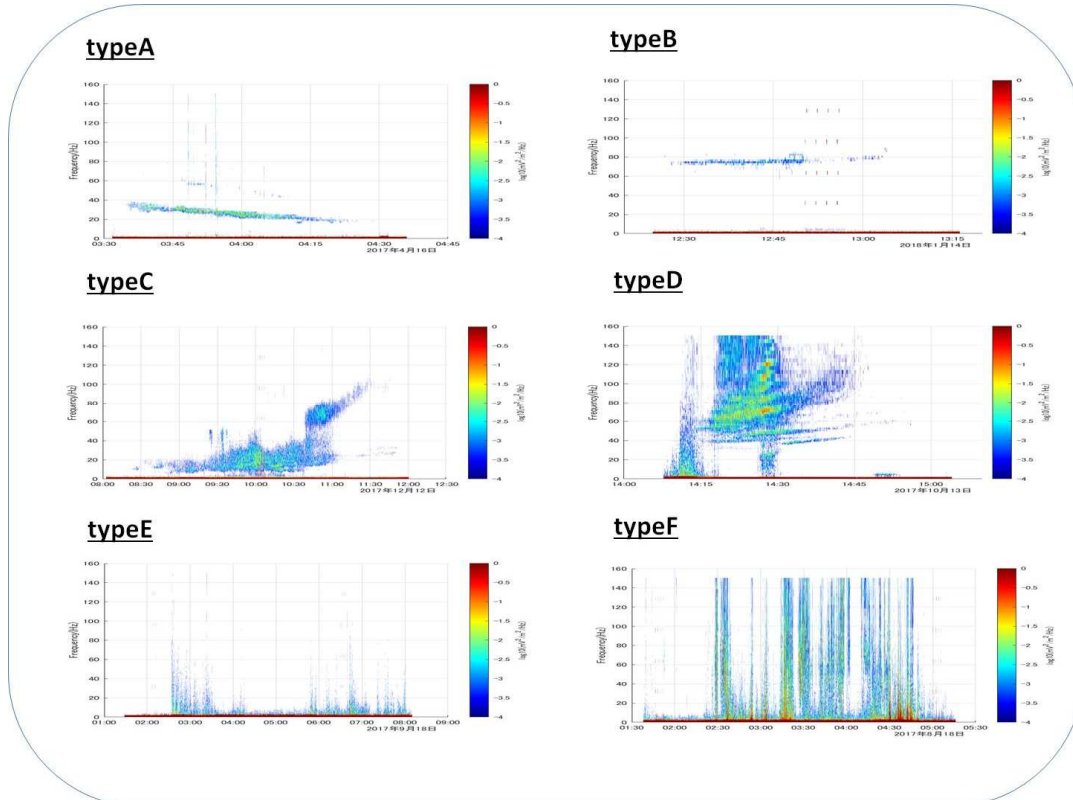


Figure 1. 6 types of low frequency waves observed by EFD onboard Arase satellite.