Investigation of the relationship between aurora activity and infrasound in polar region

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I performed comparative analysis of aurora activity and infrasound from data obtained from the infrasound sensors installed at and around Syowa Station in Antarctica and the all-sky camera installed at Syowa Station.

When a sound is generated from the aurora in the upper atmosphere, it is highly considered that very low frequency sound (infrasound) that is difficult to attenuate with respect to the sound in various frequency ranges can be propagated on to the ground. Therefore, by using the infrasound sensor installed at Syowa Station (69 ˚0 '22 "S, 39 ˚35' 24" E) and its surroundings located beneath the aurora belt, there is possibility to observe the infrasound generated from the aurora. In this research, in order to identify the infrasound that is generated from aurora. we conduct a case study on the relationship between infrasound observed at Syowa Station and auroral activities in the sky. In order to perform the comparative analysis, a program for calculating the rate of change of the image of the whole sky camera was created and used. To verify infrasound data at a specific frequency, I converted win data to csv format and applied 0.03Hz ~ 0.01 Hz bandpass filters. bandpass filters.

Large-scale aurora activity was observed, and data that met the condition that the wind speed was 5 m / s or less was extracted. In June 2016, data obtained from Skallen infrasound sensor corresponded to changes in the shape of the aurora borealis The characteristic infrasound waveform was confirmed. However, in the analysis of data obtained from the infrasound sensor installed at Syowa Station, which started observation in February 2019, which was started as a master's research, it was buried in wind noise all the time, and at this time significant data Has not been found.

From these observation data, the infrasound data obtained by Skallen rarely has an amplitude exceeding 1 Pa when the wind speed is 3 m/s or less, whereas the infrasound data obtained by observation at Syowa Station It was clarified that there was always an amplitude of about 1 Pa even when the wind speed was less than 3 m/s.
This is considered to be the characteristic depending on the installation location, and it is thought that it is due to the difference between indoor sensors and outdoor sensors.
In this presentation, we will discuss future analysis methods and sensor selection based on the data obtained so far.

Keywords: Aurora, Infrasound, Polar Region

