

カナダ、フィンランド、昭和基地の同時観測に基づく磁気圏 ELF/VLF 波動の経度スケールの研究

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Longitudinal extent of magnetospheric ELF/VLF emissions observed at Athabasca, Kannuslehto, and Syowa stations

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We report on the longitudinal spatial extent of whistler mode wave emissions in the ELF/VLF range at multiple ground-based stations. We used the wave data obtained at 3 longitudinally-separated stations at auroral and subauroral latitudes, i.e., Athabasca (ATH), Canada (54.7N, 113.3W, magnetic latitude (MLAT): 61.3N), Kannuslehto (KAN), Finland (67.7N, 26.3E MLAT: 64.4N) and Syowa Station (SYO), Antarctica (69.0S, 39.6E, MLAT: 70.5S). Simultaneous observation data at these stations are available for total 48 days during December 10-14, 2012, January 9-19 and January 29-February 5, 2013, and February 26-March 21, 2014. MLT differences are about 3 hours for SYO-KAN, 8 hours for SYO-ATH, and 11 hours for KAN-ATH.

We analyzed the probability of the ELF/VLF emissions being simultaneously observed at 2 stations when the ELF/VLF emission is observed at one station. For the KAN-SYO pair (3-h MLT difference), the probability of simultaneous wave occurrence is 36.8 % of all the intervals when the emissions are observed at KAN, and, 38.5 % of all the intervals when the emission are observed at SYO. These results indicate that the spatial extent of the emissions is about 37 % with the 3-h MLT differences. However, for SYO-ATH (8 h), they drop down up to 31.5 % (ATH) and 9.9 % (SYO) and, for ATH-KAN (11 h), they are 30.4 % (ATH) and 11.9 % (KAN). These numbers clearly indicate that the probability of simultaneous wave occurrence decreased with increasing MLT differences. We also found that the simultaneous wave occurrence rate at 2 stations is higher when 2 stations are on the dayside sector.