

STATISTICS OF ELF/VLF WAVE CHARACTERISTICS DERIVED FROM A LONG CONTINUOUS SET OF GROUND-BASED OBSERVATIONS AT HIGH LATITUDE

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The VELOX instrument (VLF/ELF Logger eXperiment) at Halley Research Station, Antarctica (75S, 27W, L=4.3) [1] has provided a unique set of continuous high-quality well-calibrated observations of VLF/ELF radio waves since 1992 [2]. Intensity, polarisation and other parameters have been recorded in 8 channels in the range 0.5-10 kHz, with 1 s resolution and better than 95% coverage. Fig. 1 shows the average spectrum, cf. [3] at McMurdo, and the typically 40 dB dynamic range above the receiver noise level. The steeper than 1/f slope is due to Earth-ionosphere waveguide attenuation, and the rise at high frequency to lightning.

Fig. 2 presents the dependence on local time and season at 1.0 and 3.0 kHz (whistler mode hiss and chorus) and 9.3 kHz (predominantly spheric noise from tropical lightning) consistent with [4]. At 1.0 kHz, Fig. 2(a), dawn chorus occurs at 07 MLT and hiss at 14 MLT; there are equinoctial peaks in March and October, and low intensities in the summer (high ionospheric absorption). At 3.0 kHz, Fig. 2(b), strong waveguide attenuation restricts observed whistler waves to those traversing the overhead ionosphere, confining most power within the day-night terminator (grey curve). At 9.3 kHz, Fig. 2(c), intensities are greatest in local summer and afternoon, due to South American lightning sources.

A decreasing trend of about -0.1dB/year , possibly related to climate change, is shown at 1.0 kHz in Fig. 3.

REFERENCES

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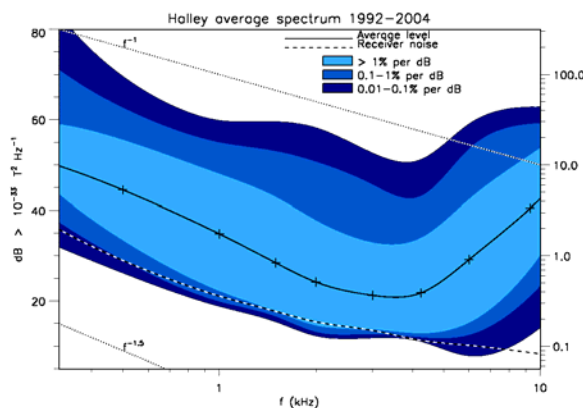


Fig. 1: Average spectrum and range of intensities.

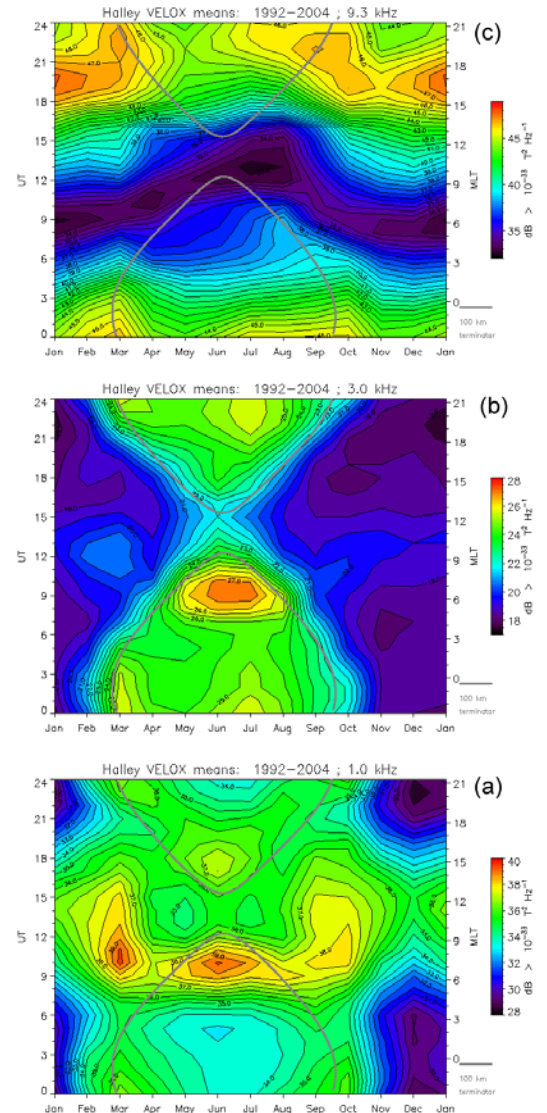


Fig. 2: Intensity vs. season and local time for 1.0, 3.0 and 9.3 kHz.

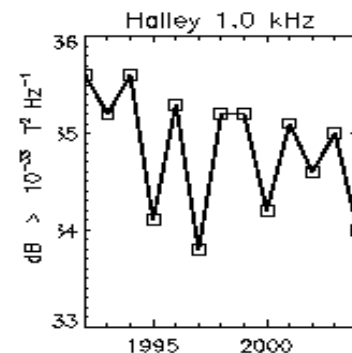


Fig. 3: Trend and variation at 1.0 kHz.