STATISTICS OF EXCITATION OF DUCTED WHISTLER-MODE WAVES VIA MODULATED HEATING WITH HAARP

Gołkowski, M., Inan, U.S., Carpenter, D.L.
STAR Laboratory, Stanford University, Stanford, CA, 94305 USA

Extensive ELF/VLF data collected in both the northern and southern hemispheres during recent HAARP ELF/VLF excitation campaigns are analyzed from the point of view of assessing the occurrence properties of triggered ELF/VLF emissions , both naturally occurring and excited by the HAARP HF heater. Signals in the ELF/VLF frequency range are robustly generated by the HAARP HF heating facility in Alaska. We examine the cases that lead to successful magnetospheric ducting of HAARP generated signals manifested in propagation to the magnetically conjugate hemisphere and back again after reflection from the lower ionospheric boundary. The study focuses on a statistical survey of geomagnetic and ionospheric conditions and HF parameters that show potential correlation with successful ducting and magnetospheric amplification. The survey includes geomagnetic and auroral electrojet indices, magnetic field conditions, and ionospheric profiles. Results suggest the existence of an 'active' and sometimes narrow frequency range in which ducting and magnetospheric amplification occur. Specially formatted ELF/VLF signals in the 1-6 kHz range were transmitted by HAARP and recorded locally as well as at the conjugate point in the South Pacific Ocean. Measurements at the conjugate point were made using a receiver mounted on a buoy designed specifically to detect HAARP induced whistler-mode waves. Signals from both hemispheres are analyzed with attention to the time/frequency format which has shown to be a key factor in successful hemisphere to hemisphere propagation. Relationships between HF carrier frequency, alternated between 3.3 and 5.8 MHz, and signal strength above and below the ionosphere are investigated. The occurrence of HAARP-injected whistler-mode echoes is compared with the occurrence of natural ducted signals (chorus emissions, and lightning-generated whistler echoes), as well as with occurrence rates of ducted whistler-mode signals excited in Siple Station, Antarctica wave-injection experiments.

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1. (a) Mark Golkowski
Packard Building Rm 351
350 Serra Mall
Stanford University
Stanford, CA
94305 USA
mag41@stanford.edu
   (b) 650-723-3789
   (c) 650-723-9251

2. H - Waves in Plasma

3. (a) H Radiation Belt

4. C - Contributed Paper

5. please submit to special session: H Radiation Belt (Greg Ginet and Guru Ganguli)