ABSTRACT FOR IUGG2003 - SESSION GAIII.10

THE SEVEM PROJECT: TOWARDS STATISTICAL AND EMPIRICAL MODELS OF THE DISTRIBUTIONS OF VLF WAVES

F. Darrouzet (1), W. N. Spjeldvik (2), J. F. Lemaire (1), G. Gustafsson (3), P.M.E. Décréau (4)

(1) Belgian Institute for Space Aeronomy (IASB-BIRA), B-1180 Brussels, Belgium
(2) Department of Physics, Weber State University, Ogden, Utah 84408, USA
(3) Swedish Institute of Space Physics (IRFU), SE-751 21 Uppsala, Sweden
(4) Laboratoire de Physique et Chimie de l'Environnement (LPCE/CNRS), Université d'Orléans, F-45071 Orléans Cédex02, France

Fabien.Darrouzet@oma.be
Tel: +32-2-373.03.81
Fax: +32-2-374.84.23

The long-term objective of the SEVEM project (Statistical ELF and VLF Environment Models) is, by examining and analyzing satellite electromagnetic magnetospheric data, to build statistical maps of the VLF, ELF and plasma wave distribution in the magnetosphere, and to develop empirical and statistical models of the 3-dimensional distribution of wave parameters such as amplitude, polarization and frequency. We present here the SEVEM Web site (http://www.magnet.oma.be/sevem/), which contains a comprehensive catalogue/table of all the missions/satellites in the terrestrial magnetosphere which are, or have been, equipped with radio antennae and/or fluxgate magnetometers. The site contains a comprehensive description of each satellite, presenting, for example, country of origin, contact numbers, orbital parameters, description of experiments, bibliographical references concerning the experiments and preliminary results, location where the databases are archived, format of the data, hyperlinks to relevant web sites, etc… The statistical maps and models of ELF and VLF wave distribution are useful to evaluate the average, maximum and minimum electromagnetic noise levels at different frequency ranges (useful when designing antenna for future space missions). We report here the development of a data-based model of the electromagnetic power spectral densities in the VLF band (8-50 kHz) as surveyed onboard the Swedish Viking spacecraft in the high-latitude region in the northern hemisphere. The data have been sorted into bins in spatial location and wave frequency for different geomagnetic conditions defined by the Kp index. A preliminary statistical model is presented showing the mean electric power spectral density versus magnetic local time and versus invariant latitude at fixed height intervals and for fixed frequency bands within the VLF range. An empirical model fitting these averages with simple analytical functions is also proposed. Wave measurements onboard the four Cluster spacecraft will also be used to complete the frequency and spatial coverage of this statistical study. Progress along these lines is reported.