



## **Effect of solar and geomagnetic activities on the reception of sub-ionospheric VLF transmitter signals by DEMETER micro-satellite**

Mohammed Y. Boudjada (1), Konrad Schwingenschuh (1), Emad Al-Haddad (2), Michel Parrot (3), Patrick Galopeau (4), Bruno Besser (1), Günter Stangl (5), and Wolfgang Voller (1)

(1) Institut für Weltraumforschung, Extraterrestrial Physics, Graz, Austria (mohammed.boudjada@oeaw.ac.at, 0043-316-4120-690), (2) University of Applied Sciences, Graz, Austria, (3) Laboratoire de Physique et Chimie de l'Environnement, Orléans, France, (4) Laboratoire Atmosphères, Milieux, Observations Spatiales, CNRS, IPSL, Guyancourt, France, (5) Federal Office of Metrology and Surveying, Vienna, Austria

In the frame of the precursor electromagnetic investigations, we analyze the VLF amplitude signal recorded by ICE electric field experiment on board DEMETER micro-satellite. The sun-synchronous orbits of the micro-satellite lead us to cover an invariant latitude range between  $-65^{\circ}$  and  $+65^{\circ}$  in a time interval of about 40 minutes. We consider four transmitter signals emitted by stations in Europe (France, FTU, 18.3 kHz; Germany, DFY, 16.58 kHz), in Asia (Japan, JP, 17.8 kHz) and in Australia (Australia, NWC, 19.8 kHz). We study the variation of these VLF signals taking into consideration: the signal to noise ratio, the sunspots and the geomagnetic activities. We show that the sub-ionospheric signals are first subject to the seasonal effect depending on the transmitter locations in the Northern or Southern hemisphere. Also the correlation coefficient is about the same order, despite different time lags, when combining the VLF amplitude signal and the solar or geomagnetic activity. We discuss our results by estimating the possibility, or not, to split between inherent VLF amplitude variations due to seismic precursor or solar/geomagnetic activities.