Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00176, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00176
EGU General Assembly 2008

Adaptive long-wave radio astronomy

E. L. Afraimovich, Yu.V. Yasukevich

Institute of Solar-Terrestrial Physics, Irkutsk, Russia (afra@iszf.irk.ru / Phone: +7 3952 564554)

VHF and HF radio signals are widely used to observe the Sun and pulsars. Nowadays, huge low-frequency radio astronomical arrays (LOFAR, 30-240 MHz; MIRA, 80-300 MHz) are being constructed to record pulsars radiation at the farthest distance. In order to interpret radio astronomical data, it is necessary to take into account possible distortions of these signals in the ionosphere. However, unlike modern navigation systems (GPS, GLONASS, GALILEO), in which a very accurate reconstruction of ionosphere parameters is a built-in function, a retrieve of ionosphere transfer characteristics has not been appropriately worked out yet in the present-day radio astronomy. This collides with increasing requirements to accuracy of the analysis of radio emission amplitude profile and to the angular and polarizing resolution of radio telescopes of new generation.

We have developed a method and software to calculate the ionosphere measure of rotation (RM) and dispersion (DM). We used the ionosphere model IRI-2001, magnetic field model IGRF-10, and values of the ionosphere total electron content as deduced from GPS measurements. The obtained values of DM and RM were recalculated into characteristics of a phase delay, Faraday amplitude modulation and polarization changes. Our main idea is to use a signal of navigation satellites (GPS, GLONASS, GALILEO) as a testing signal from “reference” source located at minimum angle distance from the source under study. Our project allows development of ADAPTIVE RADIO ASTRONOMY methods and systems, adaptive to non-uniform and non-stationary ionosphere by analogy to known systems of adaptive optics.