EARTH OBSERVATION SYMPOSIUM (B1)
International Cooperation in Earth Observation Missions (1)

Author: Prof. Valerii Korepanov
Lviv Centre of Institute for Space Research, Ukraine, vakor@isr.lviv.ua

Prof. Stanislav Klimov
Space Research Institute (IKI), RAS, Russian Federation, sklimov@iki.rssi.ru
Dr. Csaba Ferencz
Hungary, spacerg@sas.elte.hu
Dr. Janos Lichtenberger
Hungary, spacerg@sas.elte.hu
Mr. Serhiy Belyayev
Lviv Centre of Institute of Space Research, Ukraine, belyayev@isr.lviv.ua

EARTH OBSERVATION MICROSATELLITE CHIBIS

Abstract

One of the recent challenges of space physics is the study of processes having place during lightning discharges. A special microsatellite named CHIBIS ("lapwing" in English) is under preparation for launch in 2010, which contains two space instrumentation units: "Thunderstorm" and "Wave Package". The payload composition is discussed and it is stressed that a special efficiency of this project is expected because not only the direct observation of lightnings, but also the synchronized study of wave processes triggered by them will be carried out. This will give unprecedented opportunity to monitor the development of the lightning mechanism from its generation till the relaxation in the form of electromagnetic (EM) waves. In frames of EM experiment onboard of CHIBIS the measurements of electric and magnetic fields and electric current density will be performed.

Wave Package has also its own scientific goals discussed below. Special attention is paid at the ULF-VLF frequency range. This is because namely these variations in the ionospheric plasma are used for the study of the structure and physical processes there – a clear analogy with the application of seismic waves to study the Earth interior. Moreover, the EM waves in this range reflect the powerful processes in atmosphere and lithosphere, such as hurricanes, earthquakes, explosions, starts of heavy rockets to name a few. It is possible to say that these waves play a major role in the interactions in the system "magnetosphere-ionosphere-atmosphere-lithosphere" and their study is essential to monitor them. Other important goal of the experiment is the Space Weather monitoring with the new combined wave diagnostics method.

To realize both these goals, special requirements to the onboard measuring and processing complex parameters have to be fulfilled, as well as, taking into account very low level of the expected signals, the measures have to be assumed to provide the microsatellite electromagnetic cleanliness (EMC).

The scientific goals and the ways to provide high EMC level, as well as onboard instrumentation development results and ground support program of Wave Package operation are discussed.

The methodical questions of atmospheric lightning discharges study were developed with the support of International Space Sciences Institute (Bern) Team in frames of CARNES project (Coupling of Atmosphere Regions with Near-Earth Space). The Wave Package development is supported by NSAU contract 1-05/08.