TARANIS

J-L. Pinçon[1], E. Blanc[2],

[1] *LPC2E, University of Orléans, CNRS, Orléans, France*
[2] *CEA, DAM, DIF, Arpajon, France*

TARANIS is a French satellite dedicated to the study of Transient Luminous Events (TLEs) and Terrestrial Gamma-ray Flashes (TGFs). By the end of 2016, TARANIS will be operating in space and will provide: combined Nadir observations of TLEs and TGFs, high resolution measurements of energetic electron beams, and high resolution wave field measurements from DC up to 35 MHz. The measured data will be distributed to the atmospheric electricity community through the TARANIS Scientific Mission Center (CMST). The TARANIS payload, the strategy adopted to maximize the scientific return of the mission, and the main functionalities of the future CMST will be presented and discussed.

1. Introduction

In Celtic mythology Taranis is the god of thunder. The mission TARANIS is funded and operated by the French space agency CNES. This is a low altitude satellite project dedicated to the study of impulsive transfers of energy between the Earth atmosphere and the space environment. Such phenomena, evidenced by the observation at ground and on satellite (FORMOSAT 2) of Transient Luminous Events (TLEs) and the detection on satellites (CGRO, RHESSI, Fermi, AGILE) of Terrestrial Gamma ray Flashes (TGFs), are observed above active thunderstorms and appear to be correlated to lightning activity. To answer the numerous remaining questions about the physics of TLEs and TGFs, the TARANIS mission will provide a set of unprecedented and complementary measurements. Specific examples include:

- Combined images of TLEs and TGFs (through fast micro-cameras and photometers, nadir-viewing and X-ray and Gamma-ray measurements) and the associated measurements of relativistic electrons and wave fields;
- High resolution measurement of energetic electrons in energy, pitch angle and time allowing to detect runaway electrons as well as Lightning-induced Electron Precipitation (LEP) and to track natural and man-made controlled variability of the radiation belts;
- Onboard wave field measurements in a frequency range running from DC to 30 MHz allowing to record radio signatures of optical and particle transient phenomena and to detect the presence of quasi-electrostatic thundercloud fields.

2. Scientific objectives

TARANIS aims at providing a sufficiently complete package of novel instrumentation to answer specific questions raised by the many ground-based campaigns to observe TLEs, and by the highly successful FORMOSAT 2 and RHESSI missions. The science objectives of the TARANIS mission are into three broad categories:

- Advance physical understanding of the links between TLEs and TGFs, in their source regions, and the environmental conditions;
- Identify the generation mechanisms for TLEs and TGFs and, in particular, the particle and wave field events which are involved in the generation processes or which are produced by the generation processes;
- Evaluate the potential effects of TLEs, TGFs, and bursts of precipitated and accelerated electrons (in particular lightning induced electron precipitation and runaway electron beams) on the atmosphere of the Earth and/or on the radiation belts.

3. Scientific Mission Center

The main goals of the TARANIS Scientific Mission Center (CMST) are: to deliver the TARANIS data, and to provide on-line tools for their interactive plotting and data processing. Depending on their login classes, users of the CMST will have the possibility to access the functionalities of the following services: data selection and downloading, QuickLook/QuickView selection and downloading, interactive plotting and data processing of TARANIS data. The CMST web site will be located at LPC2E (Orléans, France).