

A VOEvent model for Meteors and TLEs Optical Detections

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Abstract

Atmospheric transient events are subject of observation and investigation of a growing community. Professional as well as amateur observation networks are established in Europe and abroad to collect data important not only for the scientific investigation of some physics processes but also to assess their possible impacts on Earth's environment. We propose here an implementation of the Virtual Observatory Event standard to the domain of meteors and Transient Luminous Events (TLEs). A well establish standard for real-time alert on those domains will facilitate coordination between networks and make easier the extraction of critical information, and will come along with improved collaboration between the amateur community and agencies (e.g. the ESA Fireball Database, or the CNES Taranis mission).

1. Introduction

Atmospheric transient events are observed and analyzed for space weather forecasting or for scientific research in an increasingly systematic way. In particular meteor and Transient Luminous Events (TLEs) have often been subject of paired optical observation campaigns, as both benefit from continuous sky monitoring and similar hardware installations.

Data provided by professional and amateur observers need to be compared, merged and archived. A well defined standard describing observation metadata is then necessary in order to efficiently process those data and enable real-time updates

2. VOEvents for atmospheric surveillance

VOEvent [8] is a standardized protocol developed to report observations of astronomical events. It has been officially adopted by the International Virtual Observatory Alliance (IVOA) in 2006. The VOEvent sys-

tem is already used by several large-scale projects as the Gamma-Ray Coordinate System (GCN) [1], the Large Synoptic Survey Telescope (LSST), the European Low Frequency Array (LOFAR), or the Solar Dynamic Observatory (SDO). VOEvent is used for fast transmission of transient observations. In the framework of the Planetary Space Weather Service (PSWS) of the Europlanet-H2020 Research Infrastructure (EPN2020RI) project [2], we propose to use VOEvent for atmospheric observations like meteors and TLEs.

2.1. Meteors

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2.2. TLEs

Transient Luminous Events (TLEs) are large-scale optical events occurring in the upper-atmosphere from the top of thunderclouds up to the ionosphere. TLEs may have important effects in local, regional, and global scales of the atmosphere, but many features of TLEs are not fully understood yet (e.g. [7]). They are sometimes accompanied by terrestrial gamma-ray flashes (TGFs).

The Taranis 1 microsatellite will fly over thousands of TLEs and TGFs for at least two years. Its scientific instruments will be capable of detecting these events and recording their luminous and radiative signatures at high resolution, as well as the electromagnetic perturbations they set off in Earth's upper atmosphere.

[5] the observation of TLEs over unprecedented space and time scales will strongly increase the probability of satellite-ground joint detection and hence increase the scientific return of space missions such as ASIM (ESA) and TARANIS (CNES).

3. Summary and Perspectives

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