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The European Space Situational Awareness programme

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Abstract

This poster summarizes the European Space Situational Awareness programme and gives the current status.

1. Introduction

Out of the vast asteroid population in the solar system, more than 6000 objects are known to come close to the Earth. They are called near-Earth objects (NEOs). They are stony objects in the size range of kilometers to hundreds of meters, orbiting the sun. From Earth's history we know that such objects can impact our planet – it is assumed that a large mass extinction about 65 Mio years ago was caused by an asteroid of kilometer to ten kilometer size. A much smaller object could already cause significant damage – the Tunguska explosion in 1908, which would have caused extensive damage with hundreds of thousands of people killed had it happened over a populated area, was estimated to be only 40 m in size. A recent example of a small object crossing the path of the Earth was 2008 TC3. It was discovered only 20 hours before it entered the atmosphere over Sudan in Oct 2008. It was small enough (3-4 m) to break up in about 40 km altitude, however, meteorites from the object were recovered afterwards.

A number of search programs are ongoing to detect these objects. Two main computing centers determine the risk probability of NEOs, the Sentry system at JPL in the US, and the NeoDys system in Europe. Once an impact threat has been identified, a political process has to start to alert the endangered countries. This is an international process – a NEO could impact anywhere. It is currently discussed in the frame of the so-called Action Team #14 of the Committee on the Peaceful Uses of Outer Space of the United Nations.

2. Near-Earth Objects and the SSA programme

Historically, most of the activities related to the detection, data dissemination, and computations related to NEOs have been done by the US. In 2008, the advisory board of the European Space Agency (ESA) has approved a programme called 'Space Situational Awareness (SSA) preparatory programme' which also addresses this issue. Its goal is to increase the awareness of the situation in space concerning

(a) Space Debris
(b) Space Weather
(c) Near-Earth Objects

As part of the programme, a network of sensors for measurements will be set up. Ground systems will be set up to process the data, and a service to inform users about the situation and give warnings, e.g. about the probability of an NEO coming close to the Earth, will be installed.

This poster will give an overview of the SSA programme and more detailed information on the NEO segment.