

**PRECURSOR SERVICES FOR A NEAR-EARTH OBJECT SEGMENT OF ESA'S SPACE SITUATIONAL AWARENESS PROGRAMME.** G. Drolshagen<sup>1</sup>, E. Bassano<sup>2</sup>, F. Bernardi<sup>3</sup>, G. Hahn<sup>4</sup>, D. Koschny<sup>5</sup>, A. Milani<sup>6</sup>, E. Perozzi<sup>7</sup>, N. Sanchez<sup>8</sup>, G. Valsecchi<sup>9</sup>, S. Weikert<sup>10</sup>, <sup>1</sup>ESA/ESTEC ([gerhard.drolshagen@esa.int](mailto:gerhard.drolshagen@esa.int))  
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**Introduction:** In November 2008 member states of the European Space Agency approved the first phase of a new programme on Space Situational Awareness (SSA). The SSA programme initially consists of 3 segments: Space Surveillance and Tracking, Space Weather and Near-Earth Objects (NEO). As of February 2012 13 ESA members have subscribed to the SSA programme.

The approved Preparatory Programme Phase of the SSA covers the period 2009-2012. This should be followed by the SSA Pre-Operational Programme Phase for which a proposal is under preparation.

**Overview of SSA-NEO segment.** The following items are seen as main services and tasks to be provided by the SSA-NEO system:

- NEO observations with main emphasis on follow-up observations, orbit determination and physical characterization
- a survey of the complete sky every night to detect objects that are only observable when close to Earth (wide survey)
- supply of orbit determination and prediction data of tracked NEOs in state or ephemeris format with known accuracy
- storage and maintenance of available orbit data and physical characteristics of all known NEOs
- identification and ranking of NEO collision risks with the Earth
- foster international cooperation
- support the study, development and application of mitigation measures

**Implementation of precursor services:** The SSA-NEO system will be implemented gradually. It will be based on existing tools, like the Near Earth Objects - Dynamic Site (NEODyS) developed by the Universities of Pisa, the Spaceguard Central Node, the European Asteroid Research Node (EARN) and others.

The kernel of the SSA-NEO segment will be the NEO data centre. It will include a database which stores the available information on asteroids, NEOs as

well as on fireballs. Stored data will include raw images and physical properties of asteroids.

The database will also hold derived data like orbital information, and calculated impact probabilities and risk assessments (e.g. Palermo Scale value). During the Preparatory Phase these precursor services will continue to be provided by existing experts and tools. They will be combined to provide some added value and be made available via a common SSA-NEO web site.

**Observations:** Initially, NEO observations are limited and will rely heavily on external sources. During the Preparatory Phase only ESA's 1 m Zeiss telescope on Tenerife, the so called Optical Ground Station (OGS), is used for asteroid surveys and follow-up observation during a few nights per months. During the next phase the development of a wide field of view telescope of the 1m class is planned and the deployment of at least one prototype telescope for automatic NEO surveys. More detailed observations needed for the determination of physical characteristics of asteroids will rely on service level agreements with existing larger telescopes.

**International cooperation:** International cooperation is seen as key aspects for all components, i.e. NEO measurements, impact risk assessments and potential mitigation measures. The Action Team 14 of the UN-COPUOS has been the focal point for international discussions on NEO mitigation issues.

This paper gives an overview of the SSA-NEO segment and presents its intention, scope and main planned features and capabilities.