Proposal for a European Space Surveillance System – Results of an ESA Study

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Space Surveillance denotes the task of systematically surveying and tracking all objects above a certain size and maintaining a catalogue with updated orbital and physical characteristics for these objects. Space Surveillance is gaining increased importance as the operational safety of spacecraft is depending on it. Currently, Europe has no capability for routine Space Surveillance covering all space regions of interest and is strongly depending on external information from the United States and Russia.

A first design study for a European Space Surveillance System was initiated by ESA in 2002 and led by ONERA as prime contractor. This study proposed a preliminary system covering the LEO and GEO orbit regions including the required survey strategies allowing for the autonomous maintenance of a catalogue of orbital parameters (including cold start capability). For the surveillance of LEO objects with sizes larger than 10 cm, a bistatic UHF radar with a large field of view (20° in elevation and 180° in azimuth) and a long range (1500 km for a 10 cm sphere) was proposed, based on experience gained by the French GRAVES system. For the surveillance of GEO objects larger than 1 m, four sites equipped with survey and tasking telescopes were proposed. It was estimated that such a system would be capable to maintain the orbits of 98 % of the LEO objects and 95 % of the GEO objects contained in the USSTRATCOM catalogue. A subsequent study analyzed the feasibility of a UHF radar and proposed solutions for the surveillance of the MEO region by optical sensors. In fact, this region in space will soon gain major importance for Europe due to the deployment of the GALILEO navigation satellite system.