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ITALIAN CONTRIBUTE TO EUROPEAN SPACE SURVEILLANCE: FEASIBILITY STUDY OF  
ESTABLISHING AUTOMATIC OBSERVATORIES AT THE MALINDI ASI BASE IN KENYA AND IN  
ARGENTINEAN ANDES MOUNTAINS

**Abstract**

The SpaDe observatory, built in Italy in 2007, was the first step of Italian Space Agency (ASI) to establish an Italian space debris monitoring program. The European SSA program, the recent break-up events in LEO and the increasing of Italian operative spacecrafts number (Cosmo-SkyMed constellation, SICRAL-2), pushed ASI to further improve Italian capability in space debris environment surveying.

To this aim the opportunity to establish a network of Italian observatories outside of Italian territory has been investigated. In the present paper two possible locations were analyzed: the Italian base in Kenya and the Argentinean Mountains. An observatory for space debris at the Malindi base in Kenya could greatly improve the Italian and European capability to provide support to operative spacecrafts both in LEO impact risk management and in GEO orbital manoeuvres measurement. It could permit to monitor space objects in any orbital regime and inclination. Moreover this observatory could support the Kourou's European base launch operations, cooperating with the radio antennas present at Malindi base, providing optical images of rockets, monitoring trajectory in real time and surveying the space debris release.

An observatory located on Argentinean Mountains could provide the Italian Space Agency with the possibility to monitor a larger part of the geosynchronous region improving at the same time the capability to maintain the geosynchronous object catalogue such as to individuate new space debris.

The Malindi Italian Observatory as well as the Italian-Argentinean Observatory are complementary to the SpaDe observatory in order to realize an integrated system.

More in detail:

- Malindi Observatory would permit to perform simultaneous observations by two sites to improve the Orbit Determination capability of HEO objects;
- Malindi Observatory would permit to track LEO or re-entering high inclination objects over longer orbit arcs since the same object could be tracked consecutively by Malindi and Collepardo observatories, thus increasing the precision in evaluating the impact probability related to close approaches and in evaluating the impact points of reentering objects;
- Both observatories would permit to increase the Italian space surveillance capability achieving data by sites with different meteorological conditions;

- Italian Argentinean observatory would permit to track, together with SpaDe observatory, LEO objects during different arcs of orbit increasing the number of measurements.

The paper analyses different scenarios, evaluating the system effectiveness, in terms of quality and quantity of expected measurements discussing the complementarities of these observatories with the ESA SSA facilities.