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# SPACE DEBRIS AND ASTEROIDS DETECTION FROM TOPPO DI CASTELGRANDE OBSERVATORY

**Abstract**

Toppo di Castelgrande is an area in the Basilicata region (Italy) of particular interest for space objects observation, with very good air quality parameters. In particular the seeing parameter is the most favourable in Italy. In such area is located a big observatory run by INAF-Capodimonte and hosting a 1.54 meter altazimuth telescope with a Ritchey-Chretien optical configuration (TT1). This telescope is equipped with an active secondary mirror, designed specifically for optimal image quality and a spectrograph is hosted inside the TT1 cupola. In the same area a new building has been realized by the local authorities of Castelgrande to host an observatory dedicated to the space debris and asteroid detection. It is a 6x6 meters building in two levels entitled to "Giulio Cianci", and it will host three telescopes, namely:

1. VT-78a telescope of 19.2 cm aperture with field of view 7 degree
2. A telescope of 25 cm aperture with FOV of 1 degree
3. A telescope of 35 cm aperture with FOV of 40'

The first telescope will be used for extended geostationary orbit (GEO) surveys providing up to 15 thousands measurements for 500 - 700 objects per night (with duration of object tracks up to a few hours). These surveys are performed to determine more precise GEO orbit parameters for conjunction analysis, to detect maneuvers of active satellites and to help maintain the orbits of GEO objects in clusters. Another output of this activity is the detection of many highly elliptic orbits (HEO) objects as background ones.

The other two smaller telescopes will be used for follow up tracking of bright objects at GEO and HEO orbits.

This activity will be included in the International Scientific Optical Network (ISON) which represents one of largest systems specializing in observation of space debris objects.

Moreover an activity will be performed jointly with the TT1 Italian 1.5-m telescope for spectrometry and photometry of faint space debris fragments and near Earth asteroids.

The main purpose of these joint observations is to study characteristics of debris and asteroids such as rotation period, size and shape of the body, surface composition and other.

The current activities of the new space debris observatory will be reported as well as the potentialities of its insertion into the Asteroid Search and Photometry Initiative pursued by the ISON network.