

A New Toolset for Passive Monitoring of Air Traffic and Sky Conditions at Metsähovi Station, Finland. J. Näränen¹, J. Lankinen¹, and A. Raja-Halli¹, ¹Finnish Geodetic Institute (jyri.naranen@fgi.fi)

Metsähovi Geodetic Research Station in Southern Finland is located near the Helsinki International Airport. Some of the flight patterns to the airport enter directly to Metsähovi airspace and thus robust solutions for airplane laser safety are called for. The new Metsähovi SLR system (first light due 2015) is located a few hundred meters from Metsähovi VLBI antenna and therefore active radio frequency based methods for aircraft detection (i.e., radar) are not allowed.

As a first step to address the airplane laser safety in Metsähovi we purchased in 2013 an Airnav Radarbox 3D ADS-B receiver which we use to track commercial air traffic over Southern Finland in real time. As a tool for the operator, we have developed a Python-based program which plots the airplane positions and directions to an all-sky image obtained with an Alcor Systems OMEA camera. In addition to the airplane positions, also the tracks and positions of satellites over the Metsähovi horizon and the telescope pointing direction are plotted to the all-sky image. An alarm is rung if an aircraft is within a user-defined distance from the pointing direction of the telescope.

The all-sky camera can provide correctly exposed color images both day and night, i.e., it has an adjustable aperture. These images can, especially during the day, be used to identify satellites that are not in clouded regions of the sky nor (with the aid of overlaid Airnav Radarbox data) close to airplanes. In addition, we have also acquired a Boltwood Cloud Sensor II for monitoring the sky conditions in Metsähovi. The unit measures several meteorological parameters (wind speed, rain, humidity, etc.) as well as sky temperature vs. ambient temperature for cloudiness index determination. These measurements provide to the operator a clear view of the current sky condition. Cloudiness index is especially useful for night time operations, where the cloud situation is not readily seen from the all-sky image. When weather conditions are adverse to SLR operations, the operator can concentrate on other tasks, while being immediately alerted when the weather improves. The cloud sensor is also used to provide weekly and monthly weather statistics in Metsähovi.

We will present the new Python-based toolset developed in Metsähovi. We will show select results from airplane monitoring and the weather statistics with Boltwood Cloud Sensor II. We will also discuss known issues in the aircraft monitoring and present ideas for future development.