AN EFFICIENT DEPLOYMENT STRATEGY FOR THE ESA FLYEYE NEO SURVEY TELESCOPE PROTOTYPE

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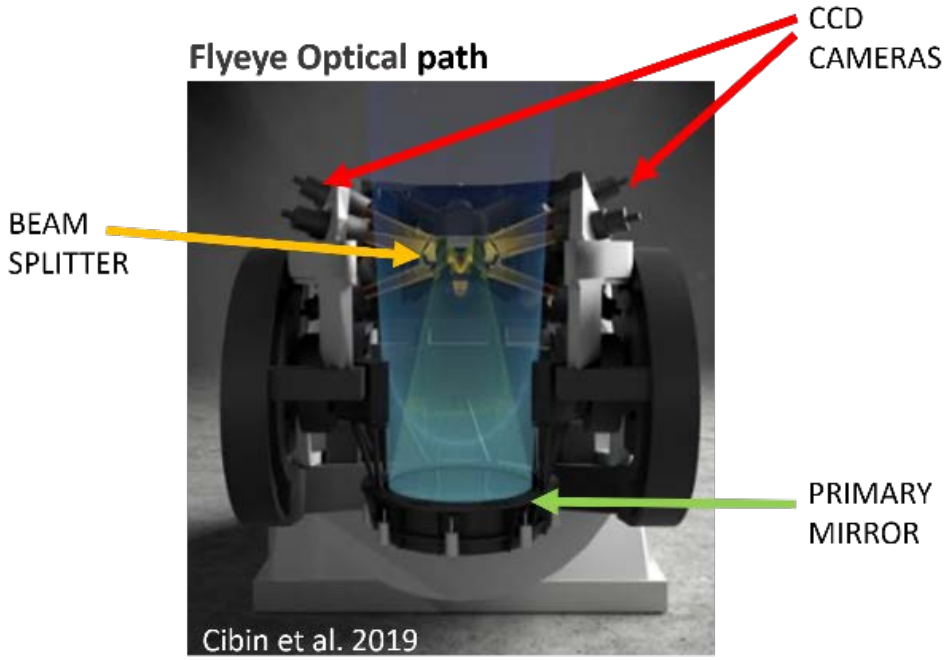
e-lightning talk

The Flyeye Telescope

The Flyeye telescope is a new-generation wide-field high-sensitivity survey telescope which relies on an innovative optical design.



The first prototype is developed within the Planetary Defense segment of the ESA Space Safety programme and it is nearing completion at the OHB-I premises.

Deployment strategy

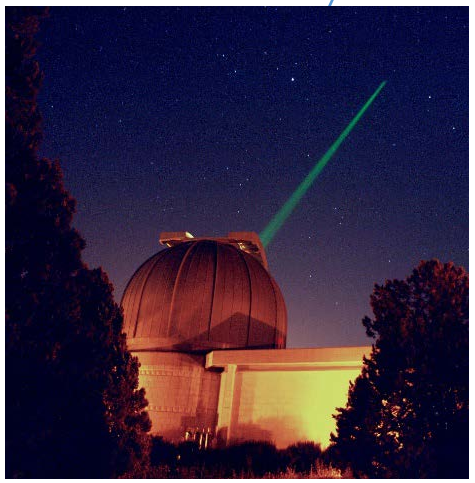
In order to address at best all the challenges involved in the Flyeye prototype deployment and operation, a two-step scenario is foreseen.

- A temporary installation at the ASI Space Geodesy Centre (CGS – near Matera, Italy) in order to carry out the commissioning and science verification phase in an ideal logistic and operational environment.

- A final installation on Monte Mufara (Sicily), which exhibits a sky quality satisfying the Flyeye technical characteristics and operational mode.

The ASI Space Geodesy Centre

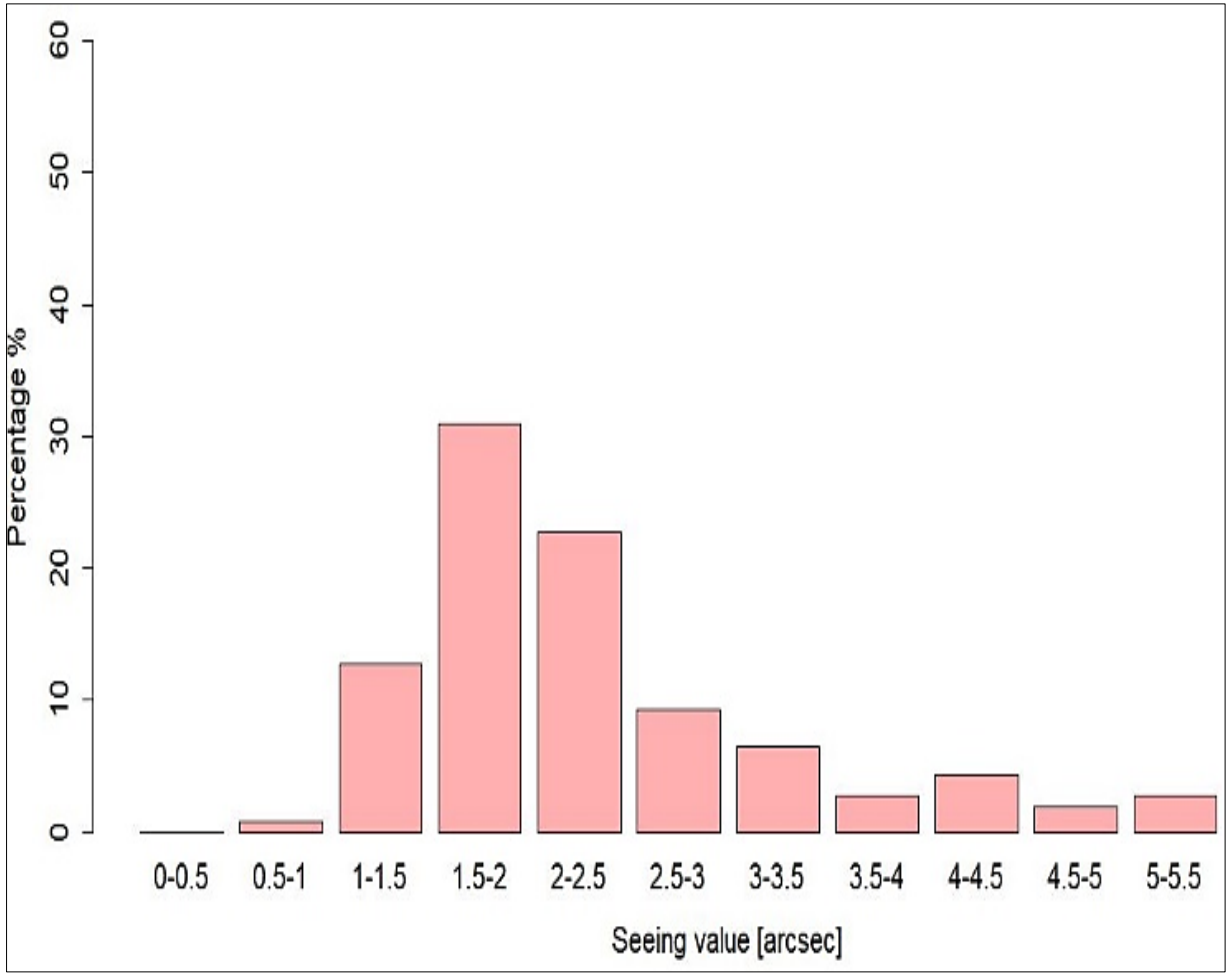
- 130 high qualified personnel (ASI + contractors)
- 20m VLBI antenna
- 1.5m telescope for satellite/lunar laser ranging
- 40cm telescope for SST observations
- Operational 24h/7d
- Routine VLBI, SLR and SST services
- GARR point (high-velocity data transfer)
- telecom antennas (e.g. Cosmo-skymed, EDRS)
- Optical, telecom and mechanical labs
- Research activities in space geodesy and quantum communication



The ASI Space Geodesy Centre

CGS is an astronomical site fully compliant with the 1.5” pixel scale characterizing the Flyeye optical design. It will allow to:

- test the telescope optical system and subsystems
- perform challenging NEO observations
- verify the telescope tasking and data reduction SW.



Commissioning and Science Verification

The commissioning and science verification activities can be summarized as follows:

- **Optical system and equatorial mount**
  transport, installation and integration of the telescope main components; verification of the basic tasking and pointing functions.

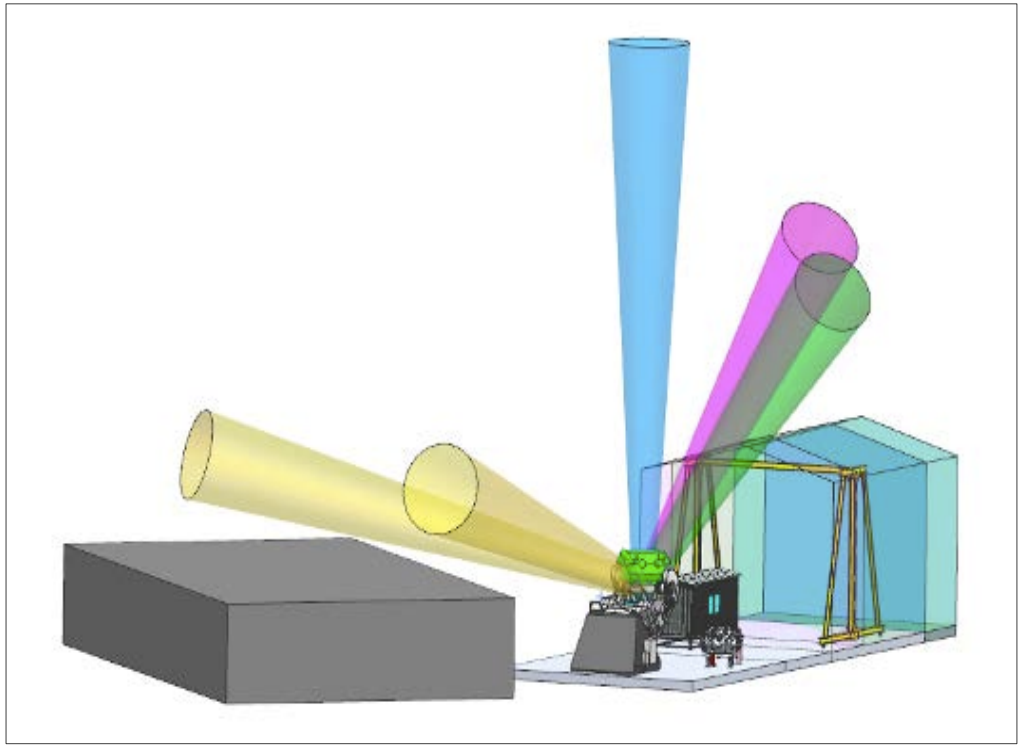
- **Telescope subsystems**
  pointing accuracy, thermal control system, mechanical/rotational speed, field stabilization in windy condition, camera alignment and focussing.

- **Data quality and analysis**
  CCDs mosaic recomposition, FWHM characterisation, nominal S/N and magnitude limit verification, scientific results validation, software debugging, nominal astrometric accuracy, data products verification, etc.

Commissioning and Science Verification

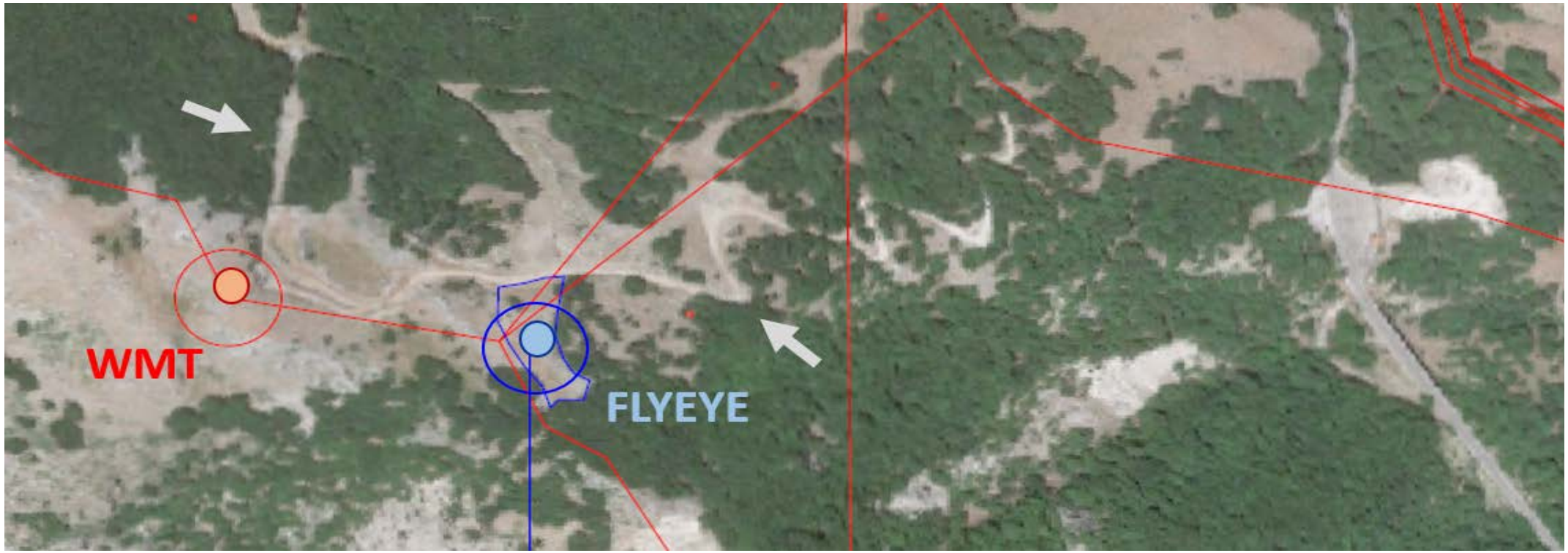
The possibility of performing observations of the same object in coordination with the telescopes operated at CGS represents a good opportunity to:

- compare the Flyeye performances wrt other optical systems under the same observing conditions.
- execute co-located NEO follow-up observations in order to test rapid response operational procedures.



The Monte Mufara site

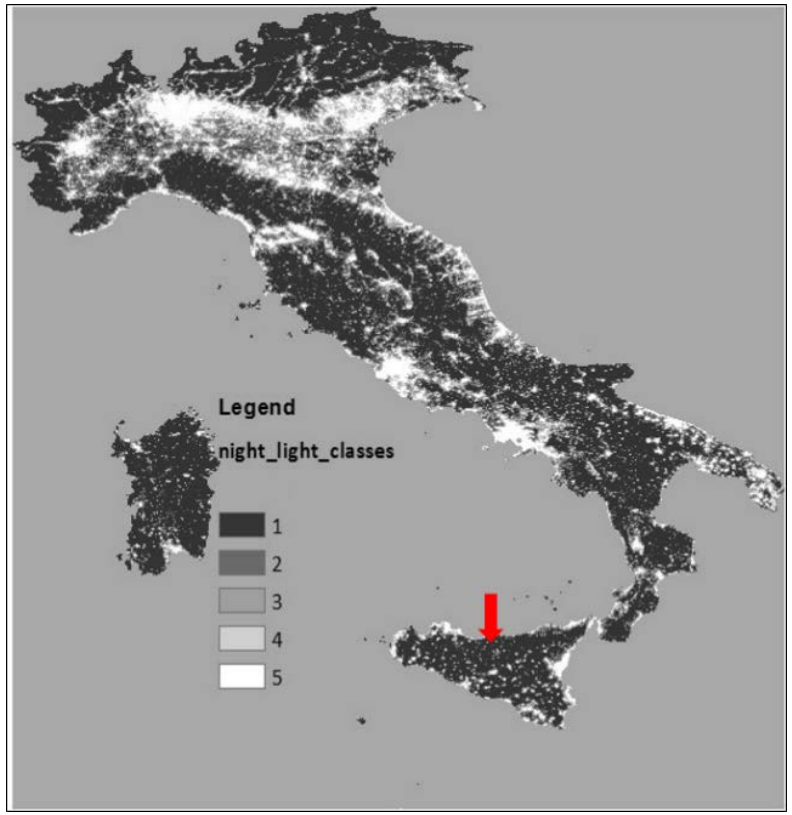
Monte Mufara is located in northern Sicily at Long=14.0166 °E and Lat=37.9375 °N, reaching up 1865 m altitude and it is characterized by two distinct hill-shaped mountain tops .



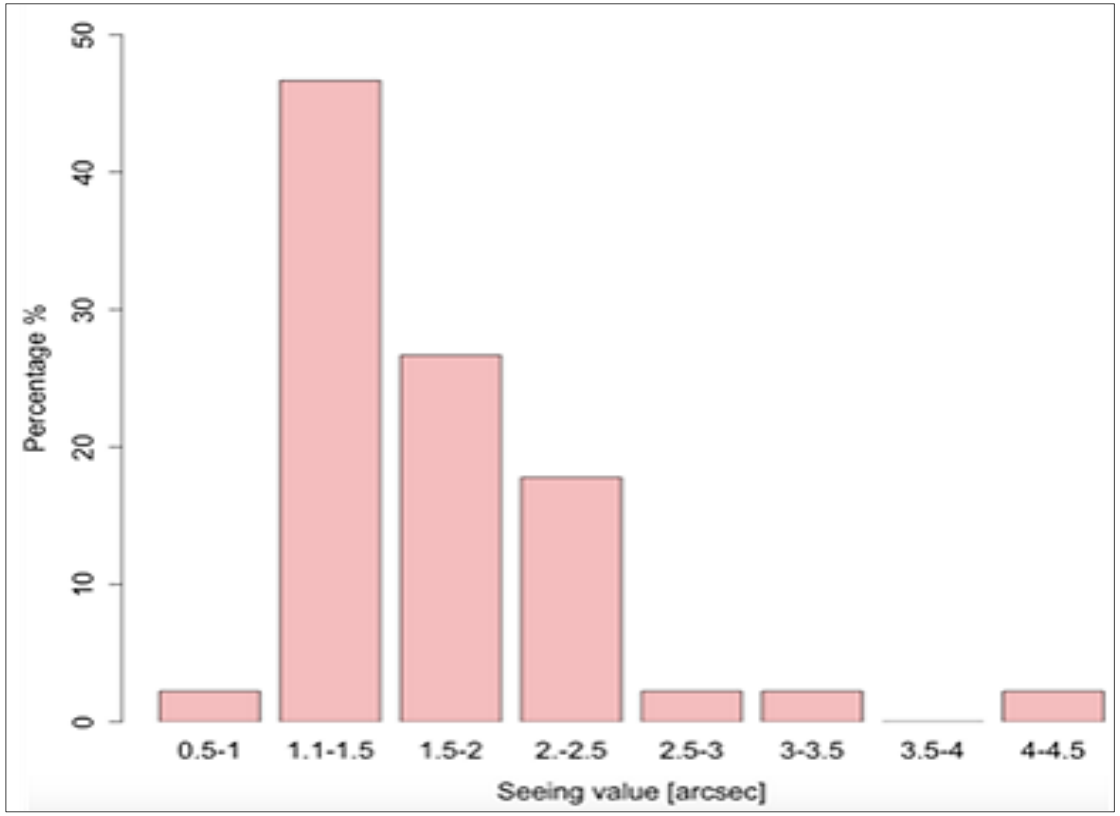
On one of them the “Wide-field Mufara Telescope” (WMT) is located, whose technical characteristics (1m aperture, 6 square deg. FoV, multicolor filters) are well suited for operating in coordination with the Flyeye telescope for NEO astrometric or physical characterization follow-up observations. Sharing support infrastructures and routine maintenance represents also cost-effective opportunities during operations.

The Monte Mufara site

The behaviour of the astronomical seeing has been monitored along the year and the background luminosity has been checked by ad-hoc processing Earth observation data



Italy cloudless map; the red arrow points the inland direction where Mt. Mufara is located



Mt. Mufara seeing statistics

The Monte Mufara Observatory

Designing the Flyeye Observatory has been a challenging exercise, carried out by EIE, an Italian company specialized in the realization of astronomical observatories.

Major drivers were the massive equatorial mount, the demanding survey strategy, and the compliancy with the constraints deriving from Parco delle Madonie being a natural reserve protected area. Eventually, a 13 meter diameter high-speed rotating dome has been designed, which integrates into a low profile building structure that nicely follows the topography of the surroundings.

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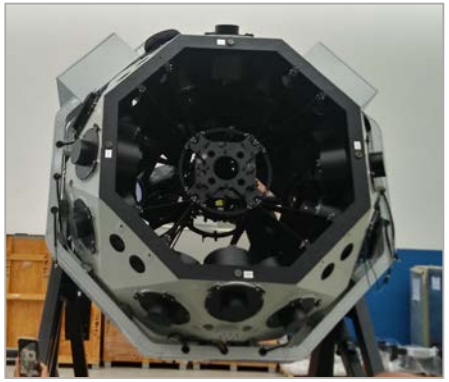
Conclusions



The Flyeye is an innovative telescope with an entirely new optical design covering an extremely wide field of view (45 square degrees) which will be devoted to perform a challenging NEO survey.

The many “firsts” involved in the realisation and installation of the first prototype deserve a demanding commissioning and science verification phase which can be best executed at the ASI Space Geodesy Centre (Matera, Italy)

This will allow to speed up assembling the telescope and starting nominal operations at the final site, on Monte Mufara (Parco delle Madonie, Sicily)