Klenot near-Earth-object follow-up program — next generation generation

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NEO research is a great challenge just now — for science, for exploration, and for planetary defence. Therefore NEO discoveries, astrometric follow-up, orbit computations as well as physical studies are of high interest both to science community and humankind.

The KLENOT Project of the Klet Observatory, South Bohemia, Czech Republic, has pursued the confirmation, early follow-up, long-arc follow-up and recovery of Near Earth Objects since 2002. Tens of thousands astrometric measurements has helped to improve the inventory of NEOs as well as to understand the NEO population. It was ranked among the world most prolific professional NEO follow-up programmes during its first phase from 2002 to 2008.

A fundamental improvement of the 1.06-m KLENOT Telescope was started in autumn 2008. A new computer controlled paralactic mount was built to substantially increase telescope-time efficiency, the number of observations, their accuracy and limiting magnitude. The testing observations of the KLENOT Telescope Next Generation were started in October 2011. The new more efficient CCD camera FLI ProLine 230 was installed in summer 2013.

The original Klet Software Package has been continually upgraded over the past two decades of operation. Along with huge hardware changes we have decided for essential changes in software and the whole KLENOT work-flow. Using the current higher computing power available, enhancing and updating our databases and astrometry program, the core of our software package, will prove highly beneficial. Moreover, the UCAC4 as the more precise astrometric star catalog was implemented.

Both the system and strategy for the NEO follow-up observation used in the framework of the KLENOT Project are described here, including methods for selecting useful and important targets for NEO follow-up astrometry. Methods and techniques used for the KLENOT Project are also discussed. Sources of particular inaccuracies of astrometric measurements as input data for orbit computations were identified. Then we have searched for ways to eliminate them and this effort still continues.

The modernized KLENOT System was put into full operation in September 2013. This step opens new possibilities for the KLENOT Project, the long-term European Contribution to Monitoring and Cataloging Near Earth Objects. More than 3000 minor planet and comet astrometric positions including NEA measurements were published from September 2013 to March 2014.

The 1.06-m KLENOT telescope is still the largest telescope in continental Europe used exclusively for observations of asteroids and comets. Full observing time is dedicated to the KLENOT team. Considering our results and long-time experience obtained at the Klet Observatory, we have a large potential to contribute to recent NEO efforts.

We also plan to discuss an international dimension of NEO astrometric follow-up, crucial for reasonable results. A meaningful connection and collaboration with the next generation ground-based and space surveys will be important. The cooperation with and through the Minor Planet Center, the worldwide clearinghouse for small solar system bodies astrometric observations and orbits, is an essential feature of NEO efforts. We also plan to cooperate and directly take part with the ESA's SSA-NEO Programme as a part of European network of cooperating sensors.