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Observational Activities At ESA's NEO Coordination Centre

Marco Micheli[1,2], Detlef Koschny[1,3,4], Rüdiger Jehn[1,5], Juan L. Cano[1,6], Laura Faggioli[1,2], Marta Ceccaroni[1,2], and Javier Martín[1,6]
[1]*ESA NEO Coordination Centre, Largo Galileo Galilei, 1, 00044 Frascati (RM), Italy, neocc@ssa.esa.int*
[2]*Rhea S.p.A., Via di Grotte Portella, 6/8, 00044 Frascati (RM), Italy*
[3]*ESA ESTEC, Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands*
[4] *LRT / TU Munich, Boltzmannstraße 15, Garching bei München 85748, Germany*
[5]*ESA ESOC, Robert-Bosch-Straße 5, 64293 Darmstadt, Germany*
[6] *Elecnor Deimos at ESRIN, Largo Galileo Galilei, 1, 00044 Frascati (RM), Italy*

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ABSTRACT

ESA's NEO Coordination Centre (NEOCC), located in Frascati, Italy, is one of the key components of ESA's Planetary Defence activities. Among its goals, the Centre has a mandate to coordinate, collect and analyse telescopic observations of NEOs. To reach this objective, we have access to a wide range of observational resources, both directly managed by ESA and obtained via proposals, direct agreements with observatories and international scientific collaborations. We present some examples of results obtained thanks to this unique network.

A first example of our contribution to the worldwide observational efforts in the field of NEOs is the recovery of 2012 TC4 in July 2017, obtained as a part of our long-term agreement with ESO for high-priority access to the Very Large Telescope (VLT). This object was the focus of an international campaign to test available

detection and characterization assets on a small target having a close fly-by to Earth. The capabilities of VLT allowed our ESA-ESO team to secure the recovery when the asteroid had magnitude V~27, probably the faintest NEO recovery achieved so far.

In October 2017 we used ESA's own Optical Ground Station (OGS), a 1 m telescope in Tenerife, Canary Islands, to obtain one of the earliest confirmation observation of the NEO candidate that then turned out to be 1I/'Oumuamua, the first discovered interstellar object. Our astrometry, when combined with the original observations from Pan-STARRS, provided us with the first evidence that the object was indeed of interstellar origin.

More recently, in June 2018, we attempted an immediate follow-up observation of the newly discovered impactor 2018 LA with a 0.6 m telescope in South Korea, in the context of an established collaboration with the Korea Astronomy and Space Science Institute. The observation was unsuccessful due to the large ephemeris uncertainty of the target, but it highlighted that quick access to telescopes in East Asia is essential to cover an existing longitudinal gap in the worldwide follow-up capabilities.

In a similar context, in March 2016, we successfully assembled a network of observers in the Southern Hemisphere to observe the outgoing trajectory of the ExoMars spacecraft in the hours just after launch, using it as a test of the worldwide observational capabilities on a challenging fast-moving target. The campaign was successful, and resulted in a large number of observations from multiple countries. Of particular note were observations of the launcher upper stage and associated fragments of hardware, obtained by our collaborators at Observatório Nacional in Rio de Janeiro using the 1 m OASI telescope.

In addition to these more challenging campaigns, our Centre also routinely uses our observational assets to follow-up, recover and precover high-priority NEOs, with a particular focus on those having non-zero impact probability with Earth. Approximately 300 of them were observed in the past five years, leading to the removal of all impact solutions in almost 100 cases. Among those observations, we will discuss an interesting chain of observations that led to the recovery of 2017 RH16, the highest-rated impactor for the next century at the time of the observations.

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