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Optical Wide-field patrol Network (OWL-Net): Characterization of Earth Close Approaching PHAs

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ABSTRACT

OWL-Net (Optical Wide-field patrol Network) is the first space situational awareness facility of its kind in South Korea which consists of five identical 0.5 m wide-field telescopes with 4K by 4K CCDs. The five stations are located in Mongolia, Morocco, Israel, United States, and South Korea. They are being operated in fully autonomous mode with the minimum human intervention. The rotating image chopper with a time tagger placed in front of the focal plane enables the extraction of coordinates with time tags from tracklets of asteroids and artificial bodies in each image. The primary objective of OWL-Net is to track Korean domestic low Earth orbit satellites. However, it can be possible to conduct time-series photometry of bright NEAs zipping past the Earth such as 2012 DA14, 2015 TB145 and 2016 FY3. During its close passage in February 2013, 367943 Duende (2012 DA14) passed closer than satellites in geosynchronous orbit with a maximum reflex motion of 50 arcsec/sec; it is hard to acquire the astrometric and photometric data using the classical observation system.

Owing to the OWL-Net chopper system with a maximum speed of 50 Hz, we were able to obtain its observational data from one of the OWL stations using dozens of tracklets. In this paper, we introduce the system design and report the preliminary observation results on NEAs.
