



Phase curves of >40,000 small solar system bodies obtained by the Tomo-e Gozen transient survey

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The Tomo-e Gozen project conducts optical wide-field survey programs with a wide-field CMOS camera, Tomo-e Gozen, attached on the 105-cm Schmidt telescope at the Kiso Observatory, the University of Tokyo, Japan. Tomo-e Gozen is the world's first wide-field CMOS camera which covers 20 square degrees with 84 chips of 35 mm full HD CMOS image sensors. A wide-field and high-cadence survey in the optical wavelengths began in 2018 with the Tomo-e Gozen (hereafter referred to as the Tomo-e Gozen transient survey). The main purpose of this survey is to detect young supernovae. However, the survey simultaneously detects a large number of moving objects in their images. As one of the by-products of the survey, here we show our preliminary result about production of phase curves (solar phase angles versus absolute magnitude) of more than 44,000 small solar system bodies including main-belt asteroids, near-Earth asteroids, Jupiter Trojans, Centaurs, and Transneptunian objects (this number is as of April 11, 2020). Combining the moving object catalogue derived from the survey and the output ephemeris that the Horizons/JPL system provides, we are now able to obtain phase curves of these objects almost automatically. As the Kiso moving object catalogue is updated and being expanded on a daily basis, the number of the objects (small bodies) that we deal with goes up as well. Our result, when completed, will make a fair complement as well as a significant keystone to what is already published such as from the Pan-STARRS systematic survey on the knowledge of the surface characteristics of the small solar system bodies.