

## Comparative study of L4 and L5 small Jovian Trojans - Size distributions -

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We examined the size distribution of small L4 and L5 Jovian Trojan asteroids detected during Subaru Main-Belt Asteroid Survey (SMBAS).

This is a first time to compare the size distributions between the L4 and L5 Jovian Trojans with the same size-range, moreover by de-biased surveys.

This comparative study is very important for getting knowledge on the origin and evolution of the L4 and L5 Jovian Trojans.

We used the 8.2 m Subaru Telescope, at a top of Mauna Kea, Hawaii, and the Suprime-Cam which is a mosaic CCD camera having a wide field of view ( $27' \times 34'$ ) being attached with the prime focus of the Subaru Telescope to observe  $3 \text{ deg}^2$  at about 30 degree ahead of L4 Lagrangian point of Jupiter and  $4 \text{ deg}^2$  at about 20 degree behind of L5 Lagrangian point of Jupiter.

A limiting magnitude was reached to 24 mag with the R-band.

Fifty-one L4 Trojans and sixty-two L5 Trojans were detected in the size range between 0.8 km and 18 km in diameter (assumed albedo of 0.04).

Usually a cumulative size distribution of asteroids is discussed with the slope (b) which corresponds to a index of power-law distribution.

We noticed that the size distributions of small L4 Trojans are different from that of small L5 ones.

Moreover, we found that the slope for L4 Trojans which are smaller than 5 km in diameter becomes shallower than that for large Trojans.

The b was  $2.3 \pm 0.2$  for larger L4 Trojans (larger than 5km in diameter) and it was  $1.2 \pm 0.1$  for smaller one.

The value of b for smaller L5 Trojans (between 2km and 5km in diameter) was  $2.1 \pm 0.1$ .

The observed sky number density of each L4 and L5 Trojans brighter than  $R=24$  mag (corresponding to 2 km in diameter) was 15 per  $\text{deg}^2$  at 30 degree ahead of L4 point and 14 per  $\text{deg}^2$  at 20 degree behind of L5 point, respectively.

According to a spatial distribution of known Trojans and previous studies, the sky density must increase at the closer region to the Lagrangian points. However, in our observation, the sky number density of our L5 Trojans is smaller than that of our L4 Trojans.

This might support an asymmetry between L4 and L5 populations that has been recognized as an interesting problem on the solar system formation for a long time.

A difference of size distribution among Jovian Trojan population in each L4 and L5 swarm may be an evidence that they have been undergone independent collisional evolution since they had been captured onto their orbits.