Ground-based characterization of (98943) 2001 CC_{21}, the target of Hayabusa2# space mission

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The near-Earth asteroid (98943) 2001 CC21 is the target of the Hayabusa2 extended mission (Hayabusa2#). Ground-based telescope observations play an important role in providing key scientific data for this mission. A detailed study of the asteroid was conducted between 2022 and 2024. During this time frame it reached an apparent magnitude as bright as 16.5. We determined its rotation period to be P = 5.021516 ± 0.000106 hours and its absolute magnitude H = 18.693 ± 0.10. Based on these values, we estimated its diameter to be D = 0.523 ± 0.20 km. The asteroid was classified as an Sq-type in the Bus-DeMeo taxonomy using a high signal-to-noise ratio spectrum, covering both the visible and near-infrared regions. Its mineral composition is likely similar to LL/L ordinary chondrites, with an olivine-to-pyroxene ratio (ol/(ol+px)) of 0.60, a fayalite (Fa) content of 28.5 mol%, and a ferrosilite (Fs) content of 23.4 mol%. Simultaneous observations in the g, r, i, and zs broadband filters revealed no significant large-scale heterogeneity on the surface of 2001 CC21. The extensive lightcurve data allowed us to estimate the asteroid's convex shape and pole orientation as $\lambda = 301° \pm 35°$, $\beta = 89°$ (+1°/−6°), and an axial tilt (obliquity) of $\epsilon = 5° \pm 3°$.

References

[1] Popescu, Tatsumi et al. 2024, PSJ under review