New Martian Trojans and an update on the Eureka cluster

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The number of known Trojan asteroids of Mars has recently increased twofold [1,2]. This has led to claims of a cluster [2] associated with the first Mars Trojan discovered, 5261 Eureka.

The existence of an asteroid family so close to the Sun has implications for our understanding of asteroid evolution in general. Depending on the formation mechanism, studying these NEO-sized objects will provide insight on their collisional history and their long-term physical/dynamical evolution under the Yarkovsky and YORP effects [3]. Martian Trojans may also be an important control population for the study of the resetting of asteroid surfaces by planetary close encounters [4].

The clustering claim is based on an overall sample of 6 Trojans. To confirm it, we are presently carrying out an observational programme to (a) recover single-opposition Martian Trojan candidates and increase the sample size, and (b) improve the orbits of known Trojans.

At the time of abstract submission, we have confirmed two additional asteroids as Martian Trojans. One was observed previously on multiple apparitions but not considered in [2]; the other is a recovery of a single-opposition object using the 2.5 m lsaac Newton Telescope (Isaac Newton Group, La Palma, Canary Islands). In addition, we have recovered 2011 UN63 using the 2 m Faulkes Telescope South in Siding Spring, Australia. This is a confirmed cluster member that had nevertheless been observed previously on only two apparitions.

During the conference, we will present results for the two additional objects, in particular whether they are cluster members or not. Using the improved statistics and orbits, we will re-assess the significance of the clustering and discuss its origin.

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