Preliminary models of the resonant transneptunian populations from the Outer Solar System Origins Survey

K. Volk[1,2], B. Gladman[1], R. Murray-Clay[3], and S. Lawler[4,5]

[1]University of British Columbia
[2]Canadian Institute for Theoretical Astrophysics
[3]Harvard-Smithsonian Center for Astrophysics
[4]University of Victoria
[5]Herzberg Institute of Astrophysics

The dynamical history of our solar system's giant planets left its signature in the orbital distribution of small bodies in the transneptunian region. The outer solar system's dynamical history is particularly important in the origin and distribution of the transneptunian objects (TNOs) in Neptune's mean-motion resonances. Understanding the current population of resonant TNOs is crucial to understanding Neptune's orbital evolution in the early solar system. However, resonant TNOs are subject to complicated detection biases due to the resonant nature of their orbits. In addition to the usual biases due to distance and ecliptic latitude, resonant objects only come to perihelion at a specific range of longitude relative to Neptune (see Gladman et al. 2012, Lawler et al. 2013). Estimating the intrinsic resonant TNO population from observations requires a well-characterized survey so these biases can be accounted for. The Outer Solar System Origins Survey (OSSOS), which began observations in February 2013, will provide a sample of well-characterized resonant TNOs which can be used to model the intrinsic resonant populations.

We present preliminary models of the resonant TNOs based on detections from the first two blocks of OSSOS observations. We show that the Canada-France Ecliptic Plane Survey models of the 3:2, 2:1, and 5:2 resonances (Gladman et al. 2012) are consistent with the OSSOS observations so far. For reference, the figure shows the 3:2 resonance model from Gladman et al. 2012 with the locations of the first two OSSOS blocks. We will discuss improvements in the 3:2 resonance model that will be possible with future OSSOS observations which are expected to increase the total number of well-characterized 3:2 objects by a factor of a few over the Canada-France Ecliptic Plane Survey.

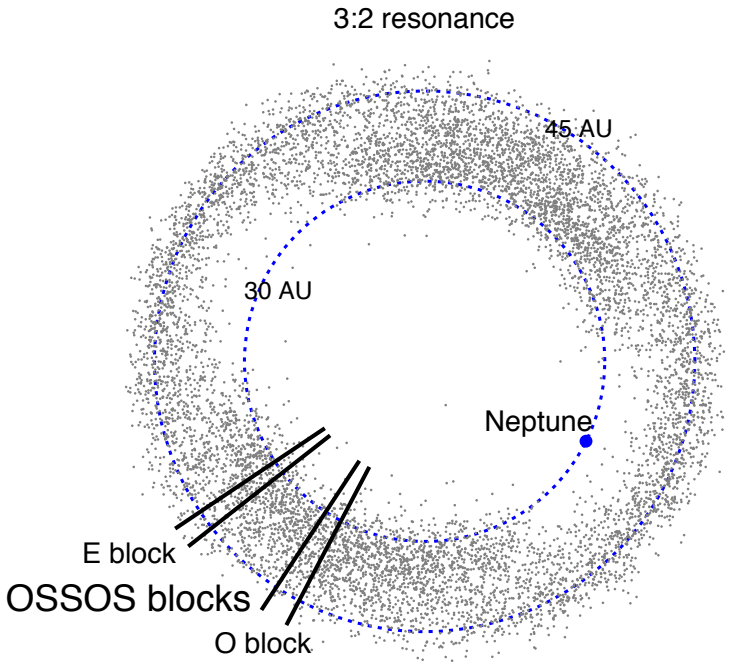

Figure: The model 3:2 population from Gladman et al. 2012 (gray dots) projected onto the ecliptic plane. The locations of the first two OSSOS blocks are also projected. The dashed lines indicate heliocentric distances of 30 and 45 au.

References: Gladman, B., Lawler, S. M., Petit, J.-M., et al. 2012, AJ, 144, 23.