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The OSSOS++ comprehensive model of the Kuiper belt

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The OSSOS++ transneptunian orbit sample contains over 1000 high-precision orbits whose discovery and tracking circumstances are well characterized. Using this sample we debias the observed orbit distribution to construct an absolutely calibrated model of the intrinsic orbital distribution of the Kuiper belt. Our model includes the main, inner and outer/detached classical belts, the major resonances interior, within and exterior to the classical belt and the scattering population. Our model is derived in barycentric free-inclination space (inclination from the invariable plane for distant objects, and from the local Laplace plane as determined by Huang et al. (2022), *ApJS*, 259:54, for closer objects). We model the main classical belt as being composed of multiple (more than two) inclination distributions. We find that for orbits with $i_{\text{free}} < 4.5$ deg between $42.5 \text{ au} < a < 44.5 \text{ au}$ the free inclination distribution is very narrow (width less than 2 degrees). The $i > 4.5$ degree (hot) population is well represented by a broad inclination distribution of finite extent up-to roughly 50° . See Gladman et al. (this meeting) for discussion of the orbit structure inside the main classical Kuiper belt (between the 3:2 and the 2:1 MMR with Neptune). The OSSOS++ model is consistent with the hot population's a -distribution being a continuous function across the 3:2 and the 2:1 MMRs, once accounting for the reduction of stable phase space due to the ν_8 secular resonance. The detached population beyond the 2:1 displays two unexpected features: in its q distribution, and an inclination distribution that is broader than the hot main-belt population. [a] Conversely, published scattering population models that satisfy the (a, q) distributions have inclination distributions colder than the real one. We will present our best model to-date, including population estimates for the main resonances, and compare their relative importance with those from Kuiper belt formation models. This debiased model, replacing the widely-used CFEPS model, will be open-source and available for anyone to use for testing the outcomes of giant planet migration and emplacement simulations.