WHAT COMETS ARE REALLY "NEW"?. J. A. Fernández, Departamento de Astronomía, Facultad de Ciencias, Iguá 4225, 11400 Montevideo, Uruguay (julio@fisica.edu.uy)

``New" comets are thought to be coming from the Oort cloud to the inner planetary region for the first time. They move on near-parabolic orbits with original orbital energies in the range $0 < x < 100$ (in units of 10^{-6} AU^{-1}). We show in this presentation that there are significant differences in the orbital properties of the sample of comets with original energies $0 < x < \sim 30$ from those with $\sim 30 < x < 100$, and that the latter sub-sample exhibits similar orbital characteristics to the ``young" long-period comets with $100 < x < 1000$ [1]. We interpret this as due to the fact that comets with $0 < x < \sim 30$ are really new, while comets with $x > \sim 30$ have already passed through the planetary region before, so they were subject to planetary perturbations that sorted them out according to their inclinations and perihelion distances.

Yet, the determination of which comets are really new and, going further, which of them fall within any of the two narrow energy ranges defined before, relies in the first place upon the accuracy of the computed original orbits, i.e. the orbits that the comets have before entering the planetary region. Besides planetary perturbations, comets are subject to nongravitational forces whose omission or erroneous modeling might introduce large errors in the computed values of the original energies [2], and thus blur the limit at $x \sim 30$. We also address the question on whether the action of nongravitational forces may introduce such large errors in the computed orbital energies (greater than about several tens units) so as to prevent us from clearly distinguishing the sample with $0 < x < 30$ from the one with $30 < x < 100$. From the analysis of the computed original orbits from different authors, we show that this may be the case for comets approaching the Sun to less than ~2.5 AU where nongravitational forces are stronger, but that the original orbits are more reliable for larger perihelion distances.

We find that there is an even more clear distinction between both sub-samples, $0 < x < 30$ and $30 < x < 100$, when we restrict ourselves to comets with $q > 2.5$ AU. Therefore, to learn about the space structure of the Oort cloud and the external forces acting on Oort cloud comets (e.g. passing stars, galactic tides) we should preferentially consider incoming comets with $q > 2.5$ AU to avoid uncertainties introduced by nongravitational forces. Some orbital properties of the Oort cloud derived from our sub-samples will be discussed.

References:[1] Fernández J. A. (2002) *Asteroids, Comets, and Meteors, ACM ESA SP-500*, pp. 303-304. [2] Królikowska M. (2006) *Acta Astronomica, 56*, 385-412.