Geophysical Research Abstracts
Vol. 13, EGU2011-11327, 2011
EGU General Assembly 2011

The TNOs in perspective: a two-third majority among the 100 largest bodies of our Solar System

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TransNeptunian Objects have now gained a two-third majority in the list of the 100 largest bodies in the Solar System. We have compiled the available peer-reviewed published data whether on size, shape and color, and complemented the lacking data by interpolation and reasonable default values. This results into a poster putting them in perspective, with an estimate of the Solar System top 100 and a representation of those 100 bodies in a comprehensive composite picture up to scale. We zoom on all largest Solar System solid bodies in the bottom rows and provide our table of assumptions in the caption.

When elaborating this picture and this ranking, one of our goals has been to raise awareness of TNOs for both public and other science communities. TNOs include indeed full-fledged planetary objects. By daring to rank them by size, despite the large uncertainties remaining on most of them that will constantly modify such a list, we aim at enabling immediate order of magnitude comparison with the mid-sized icy moons. Size matters indeed as it increases significantly the scientific interest for a given object, whether by favoring full or partial differentiation, by enabling past or extant liquid subsurface layers [3] or, via the value of surface gravity, by allowing the potential presence of a thin atmosphere and a more complex chemistry on the surface.

This work has taken into account the available data on the TNO sizes, reporting median values from references [2][4][5][6][12]. In particular recent results following observations by ESA's Herschel space telescope [1][2][12] have been incorporated. For Orcus' moon, Vanth, we have taken the middle of the wide range expected by M. E. Brown [8]. For all other TNOs that are without much characterization obtained as of today, we have assumed by default (given the general trend [7]) a progressive increase of albedo versus diameter by allocating estimates as a function of the absolute magnitude H. Aware of the large associated uncertainties, we have nevertheless inferred an estimated ranking.

The large variability on albedos and "colors" evidenced so far points at a fascinating diversity. We have selected pictures from space missions or generated artist's views so as to represent the objects as much as possible as they should appear to the naked eye with the exception of the Sun, Venus and Titan. The latest findings on Pluto [11] have been taken into account too in our artist's view. On this poster, the colors of the TNOs vary from bluish grey to reddish brown based on V-R or B-R spectrographic data whenever available [4][5][6][9][10], with beige as a default option. We recap all these data in tabular form in the text part of the poster.

The resulting estimated ranking as of December 2010 is thus presented in this poster. It will evolve significantly in the coming years as space and ground observatories gather new data and as new objects are discovered.

References:
[1] Müller et al 2009, EM&P; [2] Lellouch et al 2010, arxiv; [3] Desch et al 2007, LPSC; [4] Fulchignoni et al 2008, Univ Arizona Press; [5] Perna et al 2009, A&A; [6] Stansberry et al 2007, Univ. Arizona Press; [7] Lykawka & Mukai 2005, P&SS; [8] Brown et al 2009, E&PA; [9] Snodgrass et al 2010, A&A; [10] Sheppard 2010, AJ; [11] Buie et al 2010, AJ; [12] Lim et al 2010, A&A.