

PLANETARY CLOSE ENCOUNTERS

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ABSTRACT. A list of close encounters between terrestrial planets and asteroids for the next two hundred years is presented and some information about the frequency of such events during this period is obtained.

In recent years the hazard of an impact of an asteroid with our planet has been the topic of many papers and much effort has been devoted to this subject, both from the point of view of the computation and prediction of such events and the study of possible mitigation strategies. Quite understandably the task of listing close approaches between asteroids and the other major planets of the Solar System has received lesser attention, although also this topic has been addressed from a statistical point of view or in studying collisional probabilities.

The goal of the PCEL (*Planetary Close Encounters List*) is to list multi-opposition minor planets with planetary MOID values lower than 0.015 AU (Koehn and Bowell, 1996) and to compute their close encounters (within a distance of 0.02 AU) with planets Mercury, Venus and Mars in the next two centuries by means of a numerical integration of their motion. The full list is available at the URL:

<http://www.brera.mi.astro.it/sormano/pcel.html>

Special attention was devoted to the most interesting objects for which the uncertainty of the nominal distance was computed (using *Orbfit* software package) including also available radar observations. The number of objects satisfying the adopted selection criteria are 138 (Fig. 1); the results of the computations are summarized in Table 1.

Tab. 1 - Number of encounters on a timespan of 200 y for multi-opposition minor planets having planetary MOID smaller than 0.015 AU and estimate of the average frequency of such events

Planet	No. of objects	No. of encounters ($d < 0.015$ AU)	Frequency (y^{-1})	
			($d < 0.006$ AU)	($d < 0.010$ AU)
Mercury	8	24	0.025	0.055
Venus	33	32	0.040	0.075
Mars	97	11	0.010	0.025

The inclusion of some periodic comets in the list of studied object led to the discovery that 2P/Encke will have a close approach with Mercury on November 2013; this could be a good opportunity for a detailed study of the comet through the instruments of ESA BepiColombo spacecraft, which during that period will be orbiting around the planet.

References

Koehn, B., Bowell, E.: 1996, <ftp://ftp.lowell.edu/pub/elgb/moid.html>

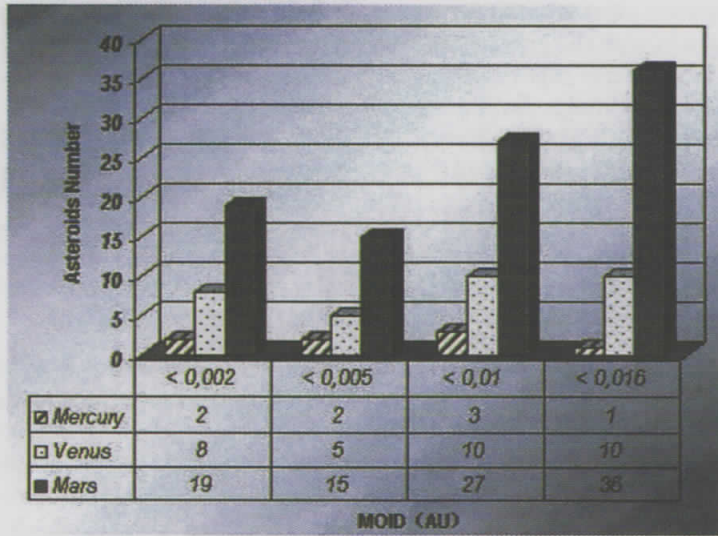


Fig. 1. Histogram of the number of asteroids as a function of their MOID value