SIGNS OF CHANGES IN THE ELECTROSTATIC SEDIMENTATIONT ON EROS. I. Tepliczky[1], A. Kereszturi[2] ([1]Hungarian Astronomical Association, H-1461 Budapest, Pf. 219. Hungary. E-mail: tepi@mcse.hu, [2]Department of Physical Geography, Eötvös Loránd University, H-1117 Budapest, Pázmány sétány 1/C., Hungary. E-mail: krub@freemail.hu)

Introduction: We analysed some anomalous terrace-like regolith structures on Eros and their possible origin. We suggest that these strange surface structures can formed by changes in the electrostatic levitation.

Elestrostatic levitation: There are several evidences for the presence pf electrostatic levitation and mictometer sized grain transportation on the Moon [1,2]. Theoretically there are two basic kinds of levitation: 1. induced by charged particle bombardment from the solar wind and the magnetospheric sheat of the Earth, and 2. induced by electromagnetic radiation where the solar radiation cause the charging. Because of the electron absorption on the grains or the X-ray induced photoelectrons reimpact distribution is inhomogene it may cause differences in charge on and between the grains. If it is greater than the adhesion of the grains the electrostatic field cause dust levitation. The mechanism is probably the most effective near the terminator [3,4]. The grains can move horizontally too and take part in the regolith redistribution. The cause of inhomogene redistribution are possible the follows: horizontal inhomogenities in the charged state of the electrostatic dust sheet [5], inhomogenities in the grain size distribution, topographic inhomogenities, inhomogenities in the dynamic surface gravity of asteroids.

Working method: We analysed interesting terrains on Eros by their morphological appearance and photometric based relative topography analysis. Length measurements were made only as a row approach without projection transformations. These structures are not easy to analyse because they are relative small and visible only on the high resolution images.

The case of Eros: On Eros are several smooth terrains with anomalous structures which indicate the presence of differences in the proposed electrostatic dust redistribution. Fig 1/A,C show examples of craters where the central smooth infill surrounded my a small, steep rim (marked with R) where the rim has greater slope than the outside surrounding part of the bottom of the craters. On Fig 1/A,B,D,E there are two kind of smooth infill in the craters: The previous mentioned smooth central infill and a surrounding less smooth and somewhat lighter terrain. The later we call in this work "terrace" and marked with T. Based on the surface of "terrace's" comparised with the surrounding surface of Eros, they are some kind of dust sedimentary structures too but not as smooth as the centrals.

Discusson: Because no more effective dust transportation is known on asteroids than the upper mentioned electrostatic, these structures are formed probably by changes in the transportation process and/or there are at least two dust type/diameter groups with different mobility. Changes in the bombardment of the solar wind is possible according to the magnetic sectors, flares and solar cycle. The changes in the electromagnetic radiation can arose from annual processes (seasonal changes because the nearly fixed rotation axis orientation during the revolution around the Sun, and precession/nutation which is not observed at Eros yet but are frequent among asteroids [6,7]) and orbital migration can cause changes in the terminator and shadow tracks. In the future the smooth terrains age estimation and correlation of photometric topography with laser altitude measurements can help in this work.

References: [1] Rennison J.J., Criswell D.R. (1973) The Moon 10/121-142.. [2] McCoy J.E., Criswell D.R. (1974) Proc. Of the 5th Lunar Conf. 2991-3005. [3] Singer S.F., Walker E.H. (1962) Icarus 1/112. [4] Rhee J.W. et al. (1976) Space Research XVII. Proc. Of the Open Meetings of Working Groups on Physical Sciences, Pergamon Press. [5] Colwell J.El. et al. (2001) LPSC XXXII. #1320. [6] Ostro S. et al. (1993) Bull Am. Astron. Soc. 25/1126. [7] Harris A.W. (1973) Mon. Not. R. Astr. Soc. 165/403-411.

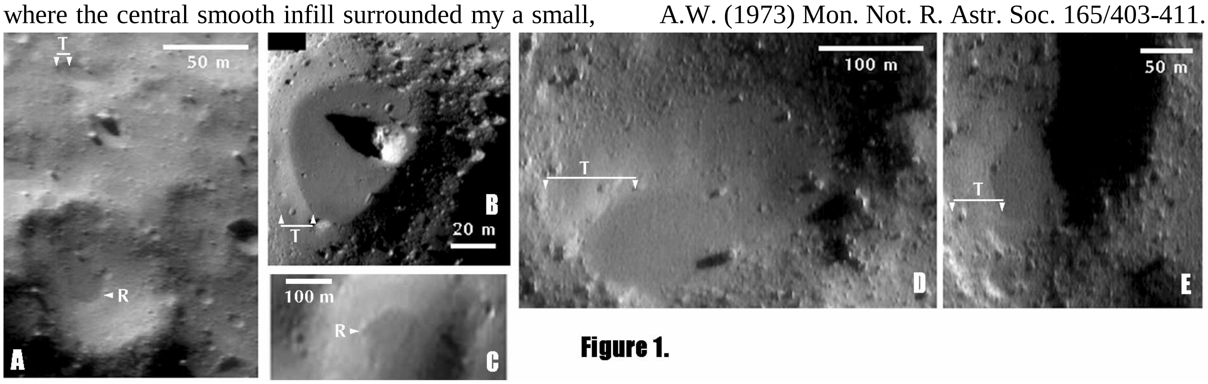

Figure 1.