AN ORIGIN FOR THE SOUTH POLE-AITKEN BASIN THORIUM. V.I. Chikmachev, S.G.Pugacheva, Sternberg State Astronomical institute. Moscow University. Moscow. chik@sai.msu.ru.

Introduction: The lunar South Pole-Aitken (SPA) impact basin is one of the largest and oldest impact basins and has thus been heavily degraded by post-basin-formation primary impacts and their ejecta [1]. The general area of the SPA basin is characterized by numerous pre-Nectarian basin structures, for example the Hertzsprung, Mendel-Rydberg, Korolev, Gagarin, Keeler-Heaviside etc. [2]. However, a few basins, for example the Al-Khwarizmi/King and Lomonosov-Fleming, probably formed before the SPA and located by near outermost ring of the structure but are now completely obliterated. This entire area to the north – westward of SPA consists almost exclusively of what are commonly called the "old features of the lunar surface". In figure 1 the highest crater frequency is found, that within the limits of the possible Al-Khwarizmi/King basin [3].

The SPA basin thorium map: The using data Lunar Prospector [4] the thorium distribution map demonstrated a hemisphere of the Moon which contains the SPA basin structure and its environs was constructed. Perspective azimuthal orthographic projection was used as carthographic basis of this map (fig.2). The principal thorium source is located almost at center of the SPA basin, exactly in Mare Ingenii ($\lambda = -166^{o}$, $\beta = -41^{o}$), where maximum thorium is more 5 micrograms/gram. Its height level is $H \leq -5$ km [5]. At edge of the SPA basin (near to its outermost ring) concentration of thorium is decreased up to a minimum (below 1 micrograms/gram). It is necessary to note, that secondary emissions of thorium to north-west from SPA where buried basins Al-Khwarizmi/King and Lomonosov-Fleming settle down the concentration of thorium is kept above 1,5 micrograms/gram.

Conclusions: On the basis of our study of the generalized structure of the SPA basin we conclude that ejecta of thorium from SPA have taken place at the center of basin in the moment of formation of all structure. Secondary emissions of thorium in northwest from SPA have taken place in a direction of motion a comet body caused impact and formation SPA basin structure [5]. Thus, SPA basin almost certainly exposes lunar material with very deep origin, almost certainly the lower crust and possibly the lunar mantle [6].

References : [1] Hiesinger H., Head J.W., III (2003) Microsymposium 38, Moscow, Abstract # MS 107. [2] Chikmachev V.I., Pugacheva S.G., Shevchenko V.V. (2004) Microsymposium 40, Moscow, Abstract # MS 17. [3] Wilhelms D.E. (1987) USGS Prof Paper 1347, 300 pp. [4] Lawrence D.J. et al. (2000) JGR 105, 20307. [5] Chikmachev V.I., Pugacheva S.G., Shevchenko V.V. (2005) LPS XXXVI, 1078. [6] Luceu P.G., Gills J.J., Cahill J.T. (2005) LPS XXXVI, 1520.

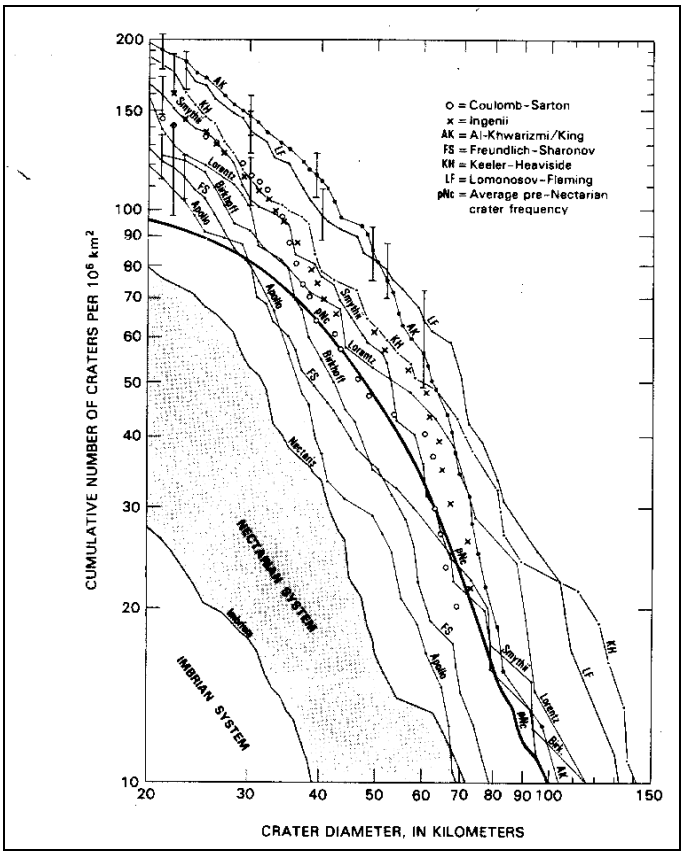

Figure 1. Cumulative size-frequency distributions of craters at least 20 km in diameter superposed on pre-Nectarian basins [3].

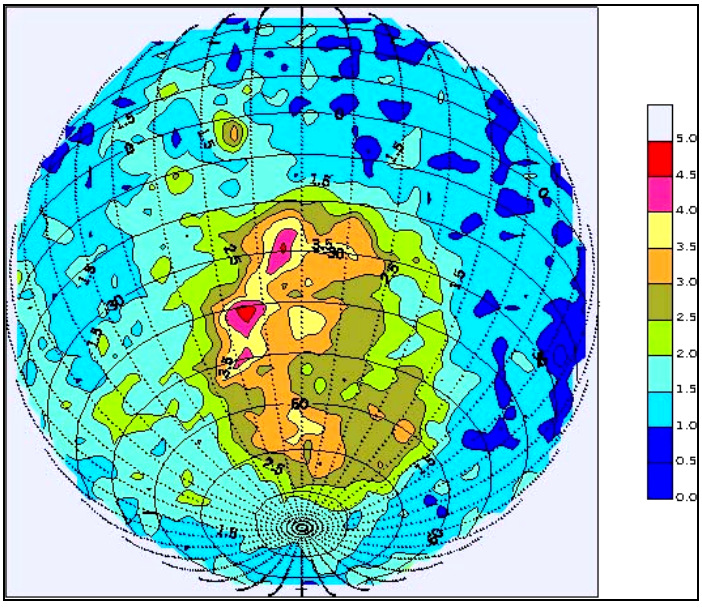

Figure 2. The distribution of thorium is shown on the map of the SPA basin. The center of the map represents in the landing position $\varphi=40^{o}$ S, $\lambda=180^{o}$.