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Gravitational large bolides influence on the Earth's surface

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The authors consider the zones of elongate negative gravity anomalies that accompany some astroblemes and conclude that the formation of such "tails" associated with the energy influence of the asteroids. After analyzing the morphological elements of Popigai crater and concluding that the ballistic trajectory of Popigai cosmic body (CB) had orientation from SE to NW [1], the authors found that this direction corresponds to the position of the linear zone of negative gravity anomalies [2]. Earlier, in the analysis of this zone with using a gravity model EGM08, Czech researchers concluded that it was formed by the fall of three satellites of Popigai CB. However, traces of large impact events here are unknown and unlikely to be detected.

Earlier analysis of the Russian Gravity maps 2010, scale 1:2500,000 [2], showed the presence of gravity tails for all large craters (D $\geq$ 15 km) produced by bodies for which we can assume a trajectory with a relatively low angle to the Earth's surface. However, the proven structures of large diameter are quite few in Russia. That is why it is important to check this pattern on a global scale. Indeed, the gravity imprints of CB trajectories show up in the new shaded model of "Global marine gravity" [3] for hundreds of astroblemes not specified in [2]. The data obtained can be an additional basis for definition of the CB trajectory direction along with other morphological elements of astroblemes considered by the authors earlier [4]. Furthermore, gravity can be useful to prove the impact origin of many less certain structures, such as submerged structures.

Visual observation of submerged craters is difficult, and analysis of geophysical evidence in this case is simpler than the analysis of morphology. The surface gravity anomalies mimic round shape of craters and it can be assigned to the impact category in the presence of tails, even if in the absence of data, which can reveal rootless anomalies.

Question "what are the linear tail zones of negative gravity anomalies and how were they formed" is waiting for his answer. Taking into account the often-observed bends of tail-shaped depressions, a more likely explanation would be in terms of gradual destruction of the body on its way through the atmosphere. As a result, there forms a chain of smaller fragments and particles after the body (the tail), which impacts a longer area of land.

References

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