**Transient magnetic fields generated by post-impact plumes.** M. Yu. Kuzmicheva[1] and T. V. Losseva[2], [1] Institute of Geospheres Dynamics RAS (Leninsky prospect 38, bld. 1, 119334 Moscow, Russia, kuzm@idg.chph.ras.ru), [2] Institute of Geospheres Dynamics RAS (Leninsky prospect 38, bld. 1, 119334 Moscow, Russia, losseva@idg.chph.ras.ru).

**Introduction:** Magnetic anomalies are typical for impact craters on the Earth - impact craters on the Earth and Mars are eliminated by negative ring-like magnetic anomalies [1, 2], some anomalies on the Moon are also supposed to be in relation with impact cratering. Impact-induced processes responsible to alter impact site magnetic properties show the pretty different time-scaling: demagnetization of rocks by action of shock wave lasts for seconds while thermal-induced after-impact metamorphism occurs for hundreds and thousands years. Transient after-impact magnetic fields have also been studied. In [3] it has been shown that solar wind magnetic field or local magnetic field could be strengthened by interaction with plasma ejected in basin-forming events producing magnetic anomalies on the Moon. In [4] magnetization of impact ejecta particles from Lonnar crater in India have been studied to reveal magnetic field probably generated at an early stage of ejecta formation.

**Impact plumes: modeling, observations, magnetic fields:** Simulations of air blast and impact-generated plumes had a great kick after SL-9 collision with Jupiter [5,6,7,8]. Magnetic field disturbances observed after Tunguska event 1908 explosion have been explained by interaction of the post-airblast plume with ionosphere [9]. Transient magnetic fields, recorded in Irkutsk geophysical observatory at a distance of about 1000 km from the epicenter of the explosion, lasted for two hours and reached tens of nanoteslas. Disturbances in Z and H-components were positive at the beginning and then negative [10]. By numerical simulations [11] it has been shown that the induced magnetic field is non-dipole and patchy with positive and negative sectors.

Noticeable transient magnetic fields can be generated by interaction of ionosphere with plumes after oblique impacts while moving across the Earth's magnetic field. Any asteroid entering the atmosphere creates a hot rarefied tail behind, violating hydrostatic pressure equilibrium. Due to buoyancy hot air in the wake from the lower atmosphere rushes through this channel up and uprange. The gas bulk particles involved in the uplift motion get decelerated and falling back. At dense layers of the atmosphere the plume gas compresses, its kinetic energy is converted into heat. After crater-forming oblique impact main portion of the impact plume expands spherically but ejecta curtain moves up and downrange with velocities of several km/s, drag air, creating an atmospheric plume similar to the Tunguska air blast plume. On constrains of energy release into atmosphere we can estimate the acting curtain diameter as about of one third of a transient crater diameter. Asymmetry of the curtain is a key feature for generation of transient magnetic fields. It has been shown [12] that in oblique impacts larger craters produce more asymmetric ejecta. Expanding spherically the main cloud screens downrange and up range jets of the impact plume. In general, a pattern of electric currents generated in ionosphere due to interaction with the plume is more complicated than in the case of air blast.

**Magnetization of impact ejecta:** The induced transient magnetic field occurs after the plume uplift and gravitational collapse at a height of about of 100 km. Ejecta particles with velocities above 1 km/s precipitate after deceleration in the atmosphere, they can move at a height of 100 km for a long time [13]. At this layer particles stay hot, but cool swiftly leaving it. Magnetization revealed by ejecta particles is closely related with its thermal history. Their natural remnant magnetization must demonstrate strong positive or negative anomalies, because while cooling below Curie point they are affected by the plume-generated transient magnetic field.

The question is: could sedimentation of these particles reveal patchy magnetic anomalies?

Though natural remnant magnetization of impact ejecta collected on the rim of Lonnar crater [4] has been found weak, it shouldn't discourage us because this crater is too small to produce non-symmetric plume ejecta and, hence, induced magnetic fields under consideration.

Transient magnetic fields generated in oblique crater- and airblast- forming events could occur on ancient Mars, and also in transient impact atmospheres on the Moon, if the latter ever had core dynamo and Mercury.

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