Terrestrial Meteorites on the Moon

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The oldest Earth rocks currently known are 3.9 Gyr. Within the framework of the theory of an accumulation of the Solar system planets [1, 2] and statistical model coaccretion of a system Earth - Moon [3-5] the lack of more ancient rocks is explained by efficient recycling due to a rather intensive flow of falling planetesimals. According to this model the Moon formed in the prelunar circumterrestrial swarm. The calculations show, that essential part of swarm mass came from impact ejections from the surface of the growing Earth. In distinction to the single megaimpact hypothesis this model considers multiple macroimpacts with ejections of matter (~1-10 % of projectile masses) into geocentric and heliocentric orbits. Composition of ejected matter depends on a ratio of thickness of primitive terrestrial anorthosite-norite-troctolite crust and eclogite-basalt mantle. According to evaluations [3-5], composition of the prelunar swarm in relation to chondritic one has deficiency Fe-Ni-S (less 4-8 % of the lunar mass) and enrichments by FeO (8-12 %), Al_2O_3 (4.5-6 %) and CaO (3.7-5 %). The time of the forming of massive protosatellites and Moon it is possible to refer to a moment of accumulation by the Earth more than 80 % of its modern mass, but so far it is difficult to make it more precisely. According to the single megaimpact hypothesis the Moon almost on 100 % is a product of reaccumulation of matter visited the Earth. According to statistical theory of coaccretion it is only extreme variant. For essential advance of simulations of an early history of the Earth and its primary envelopes, and all the Earth-Moon system the searching of preserved exemplars with ages 4.5-4 Gyr, ejected from the Earth and other terrestrial planets, on most ancient lunar highlands would be very important. Probability "survivals" of similar rarities is rather small even at a falling to permanent arising lunar atmosphere. Finds of such samples of the primitive shells of terrestrial planets would advance us in solution of a problem of their early hydrospheres and atmospheres.

References:

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