# Simulation of lunar core formation and its effect on moon-forming impacts

ZHOU YOU, YUN LIU*

State Key Laboratory of Ore Deposit Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, China. *Correspondence Email: zhouyou@mail.gyig.ac.cn you.zhou@erdw.ethz.ch

Giant impact determines the moon's chemical composition, initial state and early evolution. The simulation of giant impact has become an indispensable part in the study of early earth-moon system .

The moon has a very small core. This is an important obervational constraint in the giant impact simulation. However, the general way used in giant impact simulation is assuming that the metal particles in the disc is less than 10% of the total particles. But with recent advances in technology and new understanding of lunar formation,there are several aspects can be improved:

(1)The lunar core's radius is around 250-350km, this will allows us to reconstruct the core accordantly;

(2)With the increase of super-computing power, it is possible to use higher resolution to accurately simulate and track the iron particles involved in the moon-forming disc.

(3)In recent years, the element partition studies between metallic iron and silicates under high temperature and high pressure have made new progresses, the new data will provide further restrictions of lunar core formation.

Current giant impact simulation method is based on SPH (smoothed Particle Hydrodynamics) method. SPH is a meshfree and adaptive method. In addition, AMR-CTH and other methods have also been applied in recent years. The two key steps of SPH is the kernel function approximation and particle approximation. Details of our research methods are as follow:

(1)using high resolution models (1 million-10 million) to simulate moon-forming impacts.

(2)using new core constraints (around 250-350km) to validate current accepted five giant impact models.

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