

Numerical simulations of the giant impact onto the magma ocean

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The Giant Impact (GI) hypothesis is one of the most important phenomena in the planetary science and geoscience as the origin of the Moon.

According to this scenario, a Mars-sized impactor hit the proto-Earth and generate circumterrestrial debris disc, which is later accumulated into the Moon.

Lately, however, the GI has been challenged; the isotope ratios of particular elements show nearly identical values for the bulk component of the Earth and that of the Moon.

This means that the circumterrestrial debris disc should come from the proto-Earth.

However, to date, almost all of the numerical simulations of canonical GIs has concluded that the post-impact disc tends to be impactor-rich.

In order to resolve this mismatch, recently, a scenario to form the Moon from the magma ocean on the proto-Earth is suggested.

According to the scenario, the majority of heating occurs in the magma ocean on the proto-Earth, which results in the ejection of the target-originated materials.

In order to check whether this scenario is favourable to explain the origin of the Moon, we have carried out a parameter survey of the scenario.

As a result, we found that the canonical GIs can form the target-rich debris disc and concluded that the canonical GIs would form the Moon.

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