

# Accepted Manuscript

Crystallization and cooling conditions for the diogenite formation in the turbulent magma ocean of the asteroid 4 Vesta

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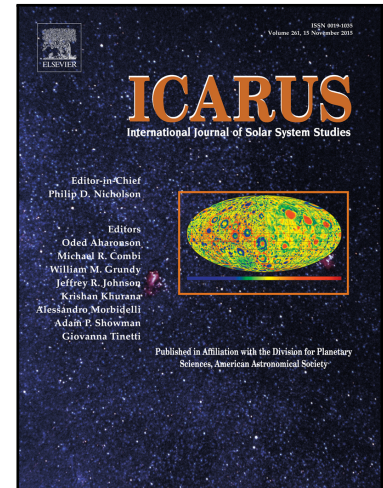
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**Highlights**

- The manuscript investigates the evolution of the magma ocean of Vesta with a new model consistently combining fluid dynamics, thermal evolution, and thermodynamics. The through combination of physics and chemistry is new for the study on Vesta.
- We have three parameters, grain size of settling crystals, the thickness of a conductive lib, and the redox state of the magma, and show that the grain size has the most crucial role on the development of orthopyroxenite.
- We conclude that the grain size crystallized in the magma ocean was 1cm and that the magma ocean had a lib with the thickness of 1km. The success of the estimation is quite new that provide important constraints on the evolution of the Vesta's magma ocean, which we believed to be published in Icarus.

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