
New measurements of Fe thermal conductivity and implications for the thermal history of the Earth's core

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Résumé

Large terrestrial planets can maintain a geodynamo for a long time, if energy is provided to sustain movements in a liquid outer core. If thermal convection were to be the main ingredient, then the temperature gradient should be super adiabatic. Therefore, the minimum cooling rate of the Earth's core is controlled by the conductive heat flow, which in turn is dictated by the thermal conductivity of the iron alloy. Unfortunately, the numerous experimental and theoretical works that have been carried out have not lifted the controversy on the thermal conductivity in the outer core, which could be between ~ 25 to ~ 250 W/m/K (see (Williams, 2018) for a review).

We performed original experiments to determine the time propagation of a heat pulse through a thin sample of Fe loaded in the laser-heated diamond anvil cell, following a previous work (

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