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Subducted slabs induce high heat flux at the core-mantle boundary

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Despite growing evidence suggesting chemically distinct regions and partial melting at the core-mantle boundary (CMB) throughout Earth's history, current heat-flow models assume a homogeneous thermal boundary layer. To understand the probable thermal response of bridgmanite to subducted slab, we measured the thermal diffusivity of mid-ocean ridge basalt (MORB)-bearing olivine polycrystalline as an analogy. Our results show a sharp increase in thermal conductivity with an addition of 0.1 vol. % MORB, followed by a systematic decrease with increasing MORB. When the infection point of 1.2 – 5 vol.% is exceeded, thermal conductivity jumps again with 10 vol.% MORB. If it were the case at the CMB, MORB introduced by subducted slab and scattered by mantle flow may have led to a lateral variation of heat flux. It results in plume clusters with varying scales, which either grows into superplume with mobile plume root or vanishes when MORB is drained to the inflection point.