



Giant impacts on early Mars and the cessation of the Martian dynamo

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Although Mars currently has no global dynamo-driven magnetic field, widespread crustal magnetization provides strong evidence that such a field existed in the past. The absence of magnetization in the younger large Noachian basins suggest that a dynamo operated early in Martian history, but stopped in the mid-Noachian. Within a 100 Ma period, 15 giant impacts occurred coincident with the disappearance of the global magnetic field (Lillis et al., GRL 2008). Here we investigate a possible causal link between the giant impacts during the early and mid-Noachian and the cessation of the Martian dynamo at about the same time. Using 3D spherical mantle convection models, we find that impact heating associated with the largest basins ($D > 2500$ km) can cause the global heat flow at the core-mantle boundary to decrease significantly (10-40%). Such a reduction in core heat flow may have led to the cessation of the Martian dynamo.