
Constraints on the timing of cometary bombardment relative to Earth's growth

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Résumé

Isotopic signatures of Xe are different in the mantle and in the atmosphere of the Earth. While mantle Xe is chondritic (Peron & Moreira, 2018; Broadley et al., 2020), atmospheric Xe would have evolved from the so-called primordial U-Xe, which is a mixture of $\sim 80\%$ chondritic Xe and $\sim 20\%$ cometary Xe (Marty et al., 2017). This naively suggests that the cometary bombardment only happened after the Earth was fully formed. The bombardment of comets is thought to have been triggered by the giant planet instability (Gomes et al., 2005) early in the history of the solar system. The timing of this instability is still uncertain (Morbidelli et al., 2018), but recent simulations seem to favour a very early instability (Clement et al., 2018). We present our ongoing project to constrain the timing of cometary bombardment relative to Earth's growth, using numerical simulations on one hand, and laboratory isotopic measurements of meteorites on the other hand.

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