Late Accreted Mass: How much material?

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Abstract : We define « Late Accretion » the very final phase of Earth growth, subsequent to the Moon-forming event. From the dynamical point of view Late Accretion is due to the collisions with the Earth of planetesimals left-over from the main phase of terrestrial planet accretion. This bombardment was very intense soon after the Moon-forming event and declined on average with time. The Late Heavy Bombardment, a surge of the terrestrial bombardment rate about 4 Gy ago (i.e. ~ 500My after the Moon-forming event) is part of the Late Accretion process but it is only a modest contributor, presumably delivering only a few percent level of the total Late Accreted material.

How much mass was delivered during Late Accretion is not precisely known. An estimate can be obtained from the concentration of Highly Siderophile Elements (HSEs) in the Earth mantle. However, HSEs are not necessarily a reliable tracer of Late Accretion. Some HSEs might pre-date the Moon forming event; also, the biggest projectiles during the Late Accretion phase might have been differentiated and might have not delivered all of their HSE content to the Earth's mantle. We will present an estimate of the amount of mass delivered during Late Accretion based on geochemical and isotopic considerations. We will conclude that it is unlikely that the Earth acquired more than 1% of its mass during Late Accretion.