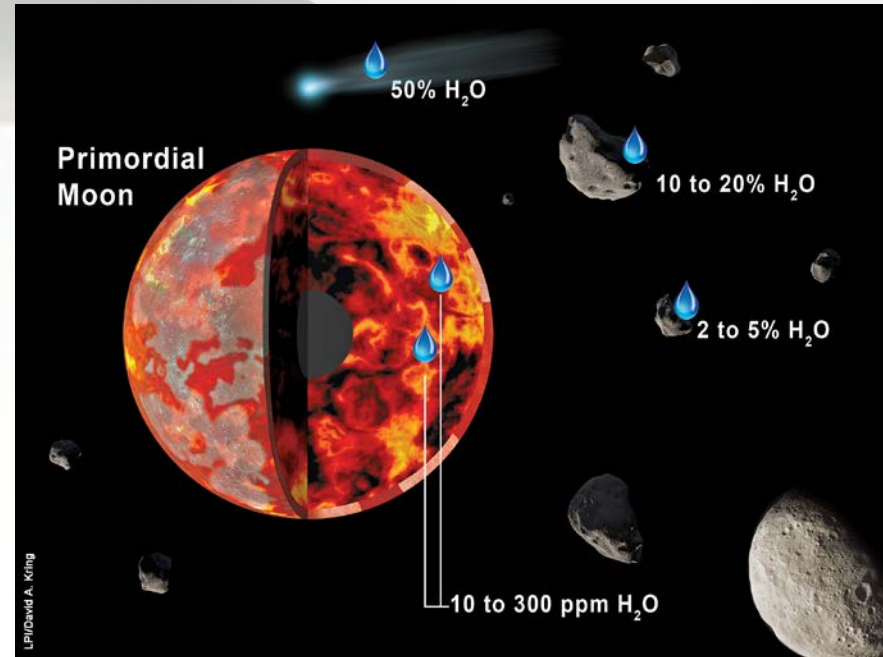


Water Delivery to the Early Moon

New evidence for the origins of water on the Moon challenges the Apollo-era view of a “dry” moon.

- Researchers combined chemical and isotopic data (e.g. D/H ratios) from lunar samples to determine wet asteroids (primarily carbonaceous chondrites) delivered the majority of lunar water, and comets contributed only a small proportion (>20%) of volatiles to the Moon.
- A bulk water content of ~100 ppm is estimated, and was likely delivered during a period when the surface was covered by a magma ocean, which lasted 10-200 million years after the moon-forming impact. The measured isotopes also indicate that this magma ocean had a conductive lid to prevent significant loss of water.
- This relatively early addition of volatiles indicates that the types of planetary objects impacting the Earth-Moon system were primarily asteroids and not comets for the first 500 million years of geologic history, and that this was likely to be the main source of water delivered throughout the inner solar system.



The Moon may have obtained water when it was still partially molten as its primordial crust was forming. At that time, the Moon was being pummeled by impacting asteroids and comets that deposited water into the lunar interior.