Probing for Water on Moon

What is the issue?

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- NASA recently reconfirmed its 2009 assertion on the presence of water on Moon’s surface by using new data from the M3 (Moon Mineralogy Mapper).
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- Notably, the instrument had been sent to space on India’s Chandrayan –I and has thus far provided ample evidence of water on Moon.
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What is the recent news?

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- M3 was sent to space through India’s Chandrayaan-1 spacecraft in 2008 and data from it has been subjected to rigorous study worldwide.
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- Recently, NASA had stated that new data from its M3 instrument has reconfirmed presence of water (solid ice) in moon without any ambiguity.
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- NASA’s M3’s could differentiate between solid, liquid and vapour ice, and its data indicated that solid ice was patchily deposited on the moon’s surface.
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- It collected data that not only picked up the reflective properties of water molecules but also the distinctiveness in reflections by different water states.
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- Most of the newfound water ice lies in the shadows of craters near the poles, where the warmest temperatures never reach above -250°F (-150°C).
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- Notably, because of the very small tilt of the Moon’s rotation axis, sunlight

never reaches these regions.
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What are the other studies that confirmed water on moon?

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- **Confirmation -** In September 2009, an analytical study of data from NASA's "M3 instrument" on board ISRO's Chandrayan - I spacecraft was published.
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- This announced the "unambiguous evidence" of presence of water across the lunar surface, which was done after reconfirmation by NASA's EXPOXI craft.
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- Notably, NASA's EPOXI spacecraft passed by the Moon on its way to comet Hartley 2, and its data was corroborated with M3's.
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- This was further verified by reassessing the data produced by a spectrometer aboard Cassini spacecraft in 1999.
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- The data from ISRO's hyper-spectral imager, an instrument used for mapping minerals, also aboard Chandrayaan-1, supplemented the evidence.
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- This is the final confirmation of water on Moon, something that had been hypothesised since the first lunar missions in the 1960s.
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- **Subsequently -** Another of ISRO's instruments on Chandrayaan-1, the Moon Impact Probe (MIP), had produced compelling evidence of water on the Moon.
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- Notably, MIP, a 35-kg cube-shaped instrument with the Tricolour on all sides, is the first Indian object to land on the Moon.
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- After 2009, several studies have pointed to the presence of water, in different forms although most of these have used the same data sets as used in 2009.
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- In August 2013, scientists looked at the same M3 data and detected magmatic water (that originates within the Moon's interior), on the lunar

surface.
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How is water distributed on the lunar surface?

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- While water molecules were found mostly in the polar regions of the Moon, a 2017 study showed that water was present across the lunar surface.
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- Interestingly, the 2017 study also produced the first map of water distribution on the lunar surface using the M3 data set.
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- In February 2018, NASA reported data from two lunar missions that presented fresh evidence of water being “widely distributed” across the surface.
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- It said the water appeared to be present on the lunar surface abundantly, although it is not necessarily easily accessible.
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Source: Indian Express

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