The once “Bone-Dry Moon” is no more! Starting in 2008, water in various forms, in different places, and with different origins has been discovered all over the Moon. The first water was discovered in lunar volcanic glasses, an entirely endogenic source. In 2009, the remote sensing Moon Mineralogy Mapper team from Brown University reported the first evidence for OH and HOH on the Moon. This is an exogenic product from solar-wind interaction with “dangling” bonds in the highly activated lunar soil. This water manifests itself as a thin, molecule-scale layer, over a large portion of the Moon, and called “space dew.” Two additional instruments on the Cassini and Deep Impact Missions further confirmed this exogenic water and expanded its nature and geographic coverage.

Later in 2009, the LCROSS Mission impacted its satellites into a permanently shadowed crater at the South Poles, one of many such craters where the temperatures are ~223 °C, which produces a huge cold sink for impacting cometary volatiles. And they observed water, methanol, and other volatiles indicative of comet and indicative of water-ice, an exogenic source predicted to occur for several decades.

Spurred on by the SIMS detection of water in the pyroclastic glasses, three groups began to search the apatite in the late-stage mesostasis in lunar basalts. As reported in 2010, SIMS analyses of these apatites yielded up to 7,000 ppm water, but most importantly a D/H signature of a cometary source. This will necessitate reconsiderations of the Earth/Moon Giant Impact scenario.