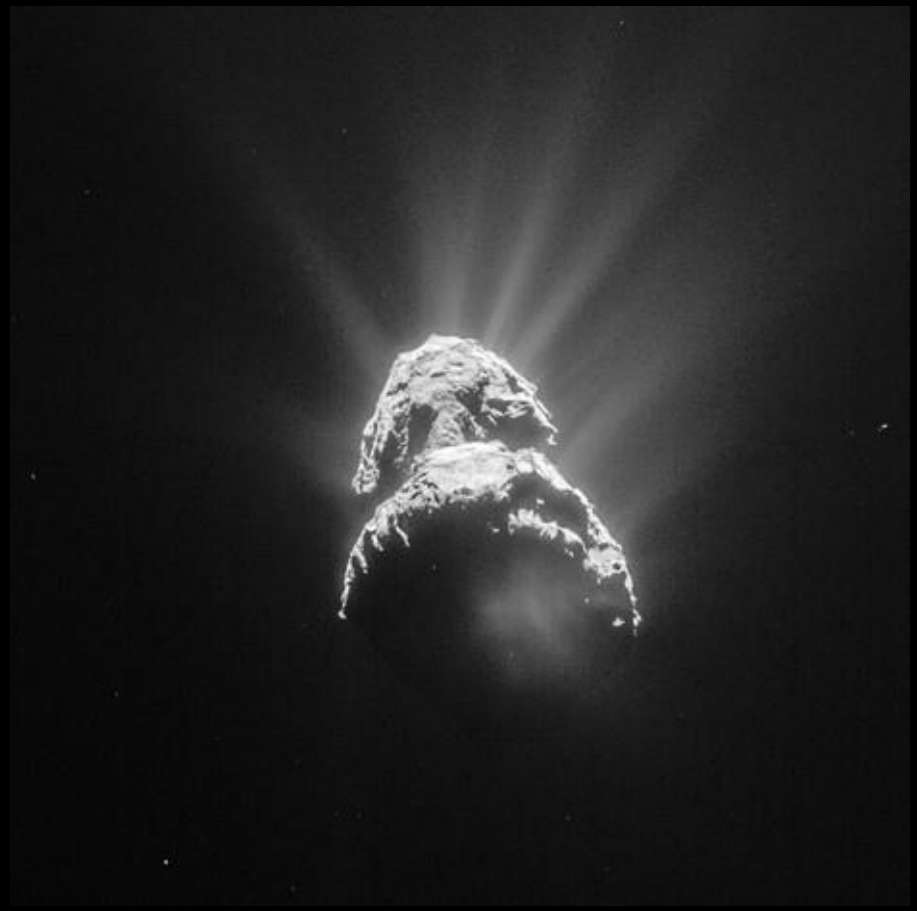
NASA-Led Team Links Comet Water to Earth's Oceans

Researchers have found that water on Comet 67P/Churyumov–Gerasimenko has a similar molecular signature to the water in Earth's oceans. Contradicting some recent results, this finding reopens the case that Jupiter-family comets like 67P could have helped deliver water to Earth.

In the water-ice from a comet, the ratio of deuterium (D) to hydrogen (H), or D/H, tells us about the comet's ice formation temperature, and from that, how far a comet formed from the Sun. It is also used to determine the contribution that comets played in providing water to the Earth. The first results from Rosetta revealed a high D/H, requiring 67P to form far away from the Sun and making it different from other Jupiter Family Comets.

A new data analysis technique, originally developed for exoplanet observations, allowed a re-analysis of the full Rosetta mission dataset. This showed that the D/H varies with the amount and iciness of the dust near the spacecraft. This variation is observed because Rosetta only measures the coma composition near the spacecraft and not the composition of the whole coma.

Laboratory studies show that HDO sticks to dust easily, increasing the D/H of ice on the dust relative to that of the nucleus. The true D/H in the gas coming from the comet itself could be determined when the spacecraft moved far enough away from the comet to avoid ice sublimating from dust.



Jets of dust covered in ice are released from the surface of the nucleus. Some of the dust is redeposited onto the surface and released again later. The D/H in the ice on the dust is much higher than the D/H of water ice that formed the nucleus leading to measurements of higher D/H when the spacecraft is surrounded by dust.

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https://science.nasa.gov/solar-system/comets/nasa-led-team-links-comet-water-to-earths-oceans/