What Drives The Activity Of Distant Comets?

B. P. Bonev, G. L. Villanueva, M. A. DiSanti , *et al*. 2017, Astron. J., 153, 241.

➢ *What is the Science Question?*

What drives outgassing from distant comets beyond 3 AU from the Sun?

➢ *What are the Findings?*

Observations of comet C/2006 W3 (Christensen) yielded measurements of CH_4 and C_2H_6 at 3.25 AU from the Sun and CO at 3.25, 4.02, and 4.74 AU.

Outgassing rates of CH_4 and C_2H_6, and especially CO in Comet Christensen were **among the largest** measured in any comet.

This study presented an **extremely rare opportunity** to measure a comet beyond the zone where H_2O is expected to dominate outgassing.

Native volatiles have been detected using astronomical remote sensing for only **three other distant comets.**

Only the *Rosetta* mission at comet 67P/Churyumov-Gerasimenko measured CH_4 and C_2H_6 at a similarly large distance from the Sun (3.15 AU).

➢ *What is the Impact?*

These measurements are important for understanding sublimation of ices from comets and for constraining models of comet nucleus composition.

They are also important for understanding other icy objects in the solar system, some of which may share common origins with comets [Womack et al. 2017, PASP].

➢ *Why Does it Matter to Non-Scientists?*

These results hold clues for understanding both comet formation and the origin of the solar system by providing data a to compare with theoretical models.

At 3.25 AU from the Sun, this also sets a distance record for detecting methane in a comet!

Comet C/2006 W3 Christensen Image
Credit: Michael Jager