TRAPPIST bright comets production rates: 13P/Olbers, C/2023 A3 (Tsuchinshan - ATLAS) and C/2021 S3 (PanSTARRS)

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The authors report that they obtained from TRAPPIST robotic telescopes (Jehin et al. 2011) recent observations under clear skies using broad band and cometary HB narrowband gaseous and dust continuum filters (Farnham et al. 2000) for the following comets and computed preliminary production rates at 10.000 km using a Haser Model (Vp=Vd=1km/s) (Haser 1957). The dust production rates proxy A(0)f(rho) were estimated by profile fitting at 10.000 km (A'Hearn et al. 1984) and corrected for the phase angle (Schleicher 2007).

C/2023 A3 (Tsuchinshan-ATLAS)
Date UT=2024-07-04, r_h=1.81 au, Delta=1.99 au, DT=-84 days
Q(OH) = 2.10 +/- 1.32 E28 s-1
Q(CN) = 5.39 +/- 0.52 E25 s-1
Q(C2) = 1.66 +/- 0.42 E25 s-1
A(0)fp(R) = 6007 +/- 68 cm
A(0)fp(BC) = 5400 +/- 198 cm

The dust production (Afrho) of this dynamically new comet which was expected to be very bright at perihelion in October, has been dropping continuously in the last 6 months to reach a minimum of 4000 cm (when the comet was close to the 0 phase angle early May). Afrho is finally rising again since one month. The gas production rates of all the species have been increasing slowly during that period of time. Another peculiarity of this Oort Cloud comet is its strong C-chain depleted composition (log(C2/CN) = -0.58 +- 0.15) and its large dust/gas ratio (log(afrho/CN) = -21.94 +- 0.04). The comet is still rather far from the Sun and it will be interesting to follow its behaviour after perihelion at lower heliocentric distance. The comet is now getting very low for both telescopes and it will be visible again only in October after perihelion.

13P/Olbers
Date UT=2024-07-09, r_h=1.18 au, Delta=1.91 au, DT=+9 days
Q(OH) = 1.62 +/- 0.79 E28 s-1
Q(CN) = 1.09 +/- 0.08 E26 s-1
Q(C3) = 1.45 +/- 0.41 E25 s-1
Q(C2) = 1.15 +/- 0.09 E26 s-1
A(0)fp(RC) = 10683 +/- 101 cm
A(0)fp(R) = 10207 +/- 180 cm

The Halley type comet just passed perihelion at 1.17 au, and it is visible again in the evening twilight. The comet is bright at 8 magnitude and pretty active with a large Afrho. Short exposures with the narrow band filters are enough to get high SNR images in all filters even at these low elevations.

C/2021 S3 (PANSTARRS)
Date UT=2024-07-06, r_h=2.4 au, Delta=2.1 au, DT=+143 days
Q(CN) = 4.46 +/- 0.60 E24 s-1
Q(C2) = 4.20 +/- 1.91 E24 s-1
A(0)fp(R) = 1170 +/- 20 cm

Five months after perihelion OH is not detected anymore, while CN and C2 are faintly detected at 2.4 au.

Notations: rh= heliocentric distance (in au), Delta=geocentric distance (in au), DT= Time to perihelion. OH, NH, C3, CN, C2 are the HB gaseous narrowband filters for the corresponding species, and BC, GC, RC are the blue, green and red dust continuum filters (Farnham et al. 2000).

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