TRAPPIST bright comets production rates: 62P/Tsuchinshan 1, 103P/Hartley, 144P/Kushida, and 12P/Pons-Brooks

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The authors report that they obtained from TRAPPIST-South and TRAPPIST-North robotic telescopes (Jehin et al. 2011) recent observations under clear skies using cometary HB narrowband band 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).

62P/Tsuchinshan 1
Date UT=2024-01-11, Rh=1.28 au, Delta=0.51 au, DT=+17 days
Q(OH) = 9.06 +/- 0.98 E27 s-1
Q(NH) = 7.53 +/- 0.64 E25 s-1
Q(CN) = 3.15 +/- 0.12 E25 s-1
Q(C2) = 3.34 +/- 0.08 E25 s-1
Q(C3) = 6.11 +/- 0.25 E24 s-1
A(0)fp(RC) = 311 +/- 7 cm
A(0)fp(BC) = 255 +/- 18 cm

62P two weeks after perihelion is at its best, all the gaseous species are detected easily. It has a typical composition.

144P/Kushida
Date UT=2024-01-10, Rh=1.41 au, Delta=0.62 au, DT=-14 days
Q(OH) = 3.63 +/- 0.73 E27 s-1
Q(CN) = 1.05 +/- 0.04 E25 s-1
Q(C2) = 1.13 +/- 0.06 E25 s-1
A(0)fp(RC) = 76 +/- 5 cm
A(0)fp(BC) = 61 +/- 13 cm

144P is approaching perihelion, it has a faint continuum.

103P/Hartley
Date UT=2024-01-12, Rh=1.61 au, Delta=0.72 au, DT=+92 days
Q(OH) < 7.49 E26 s-1
Q(CN) = 3.36 +/- 0.32 E24 s-1
Q(C2) = 2.75 +/- 0.50 E24 s-1

Q(C3) = 3.72 +/- 1.53 E23 s-1
A(0)fp(RC) = 28 +/- 8 cm
A(0)fp(BC) = 25 +/- 16 cm

Three months after perihelion 103P is now getting very weak. OH is not detected anymore.

12P/Pons-Brooks
Date UT=2024-01-04, Rh=1.95 au, Delta=2.22 au, DT=-107 days
Q(CN) = 1.70 +/- 0.08 E26 s-1
Q(C2) = 1.74 +/- 0.14 E26 s-1
A(0)fp(RC) = 3761 +/- 83 cm
A(0)fp(BC) = 3458 +/- 153 cm

Three months from perihelion, 12P is quite active but getting closer to the Sun and it is unfortunately becoming now too low for both observatories. The last data are from a week ago (out of any outburst) and the last Q(OH) was taken on December 21 at Rh=2.1 au with a value of Q(OH) = 6.93 +/- 1.54 E28 s-1 with very similar Q(CN) and Q(C2) as the last measurements. The last outburst was detected between Dec 12.6 and 14.6 at Rh=2.2 au, with an increase of 1.5 Rmag in a 5 arcsec aperture, and a Q(CN) increase of a factor of 2, with Q(CN)=2.67 +/- 0.17 E26 s-1.

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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