INTERFEROMETRIC MAPPING OF DUST CONTINUUM, HCN AND HNC 3-mm EMISSIONS IN COMET 17P/HOLMES USING IRAM PLATEAU DE BURE. J. Boissier[1], D. Bockelée-Morvan[2] , N. Biver[2], J. Crovisier[2], E. Lellouch[2], R. Moreno[2], [1]IRAM, 300 rue de la Piscine, Domaine universitaire, F-38406, St-Martin d'Hères, France (boissier@iram.fr), [2] LESIA, Observatoire de Paris, F-92195, Meudon, France.

We carried out observations of comet 17P/Holmes with the Plateau de Bure interferometer of Institut de RadioAstronomie Millimétrique (IRAM). The observations were performed on October 27 and 28 UT 2008, soon after its outburst of October 24. They include mapping and single-dish measurements of the *J*(1–0) lines of HCN and HNC at 88.6 and 90.6 GHz, respectively, and mapping of the dust continuum emission at these frequencies (i.e., λ = 3 mm). The observations lasted 9 hours on October 27, and 7 hours on October 28. The interferometer was in compact configuration with effective baselines ranging from 15 to 100 m. Five to six antennas were available. The angular resolution was about 6'' (~7000 km at the distance of the comet) for both dates.

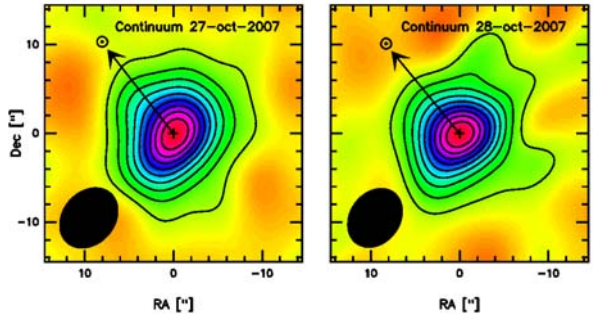

Fig. 1: Continuum 3-mm maps of comet 17P/Holmes. The angular resolution is ~5.7 × 7.3".

Continuum emission: Figure 1 shows the maps of the continuum, which results from the thermal radiation of millimetre-sized particles. Between the two days, the signal in the interferometric beam decreased by ~20%. In contrast, molecular emissions measured with the IRAM 30-m telescope and similar beam sizes decreased by about a factor of 3 per day [1]. The radial distribution of the continuum brightness from ρ = 3500 to 25,000 km from the nucleus points to a more compact distribution than the 1/ρ distribution expected for a steady state coma. If one assumes that the mm-sized particles were produced during or soon after the outburst, the radial distribution implies that particles with outflow velocities from ~10 m/s to ~80 m/s are contributing to the 3-mm radiation. The small evolution of the radial distribution and brightness of the 3-mm continuum radiation between the two days rather suggests a sustained production of mm-sized particles in the days following the outburst, e.g., from the fragmentation of low-velocity chunks.

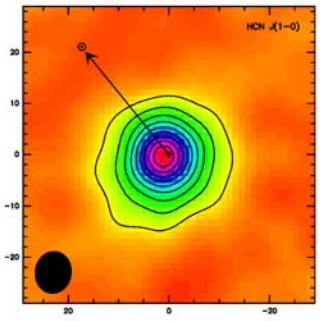

Fig. 2: Map of HCN *J*(1–0) *F* = 2–1 1ine in comet 17P/Holmes observed on October 27, 2008. The angular resolution is 6.0 × 6.9".

Molecular lines: Gases in the coma of 17P/Holmes were produced from the sublimation of grains issued from the nucleus fragmentation. The map of the *J*(1-0) line of HCN (Fig. 2) should provide constraints on how gas production proceeded. The interpretation of this interferometric map, which uses aperture synthesis over a 9 h time interval, is however complicated by the rapid temporal evolution of the gaseous coma at this timescale. This is illustrated by the evolution of the line area within the primary beam (54") which decreased by 25% from 26.9 to 27.3 UT (Fig. 3), at a much smaller rate than did the HCN *J*(3-2) line area within the IRAM 30-m 9" aperture [1]. Such a behavior is expected from modelling of cometary outburst[2]. A first analysis of the HCN map will be presented, as well as preliminary results concerning HNC *J*(1-0) emission.

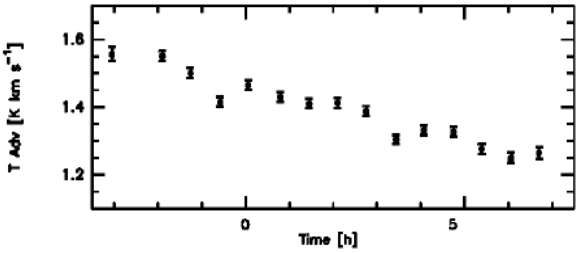

Fig. 3: Temporal evolution of the line area of HCN *J*(1–0) *F* = 2–1 within the primary beam of the PdB antennas. Time origin is 27 October UT.

References: [1] N. Biver et al. (2008) this meeting. [2] Biver N. et al. (2007) Icarus 187, 253–271.