COMET 17P/HOLMES IN OUTBURST. D. Bockelée-Morvan, LESIA, Observatoire de Paris, F-92195, Meudon, France, dominique.bockelee@obspm.fr.

Comet 17P/Holmes is a periodic comet of the Jupiter family whose total visual magnitude is normally not brighter than m_v = 15. It passed perihelion on 4 May 2007 at q = 2.05 AU from the Sun. On 24 October 2007, at 2.44 AU from the Sun and 1.63 AU from the Earth, the comet suddenly increased in brightness from m_v ~ 16 to m_v = 2.5 and became a naked eye object [1]. This huge outburst was likely caused by a sudden fragmentation of the nucleus, followed by the subsequent production of a large quantity of grains scattering sunlight. Comet 17P/Holmes underwent a similar outburst shortly before the 6 November 1892, at the time of its discovery, followed by a similar event on 16 January 1893 [1].

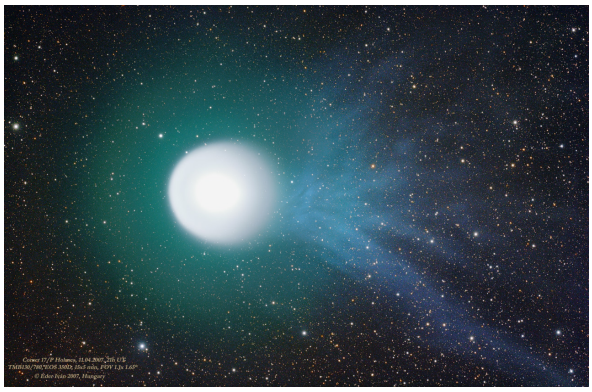

Figure 1: Comet 17P/Holmes on 4 November 2007. Copyright Eder Ivan (Hungary).

Soon after the announcement of the 2007 outburst, observations could be scheduled on short notice at many observatories over the world. Images of the inner coma showed an asymmetric distribution, jets and bright expanding blobs [2, 3, 4, 5, 6]. Unlike the case of the fragmented comets C/1999 S4 (LINEAR) and 73P/Schwassmann-Wachman 3, images taken by the Hubble Space Telescope did not show any fragments near the nucleus of the comet [7]. At larger scales the dust coma presented a bubble-like shape quickly expanding in interplanetary space [2, 3, 4]. The dust thermal radiation could be detected at millimetre wavelengths [8, 9]. The contribution of amateur astronomers was unvaluable for alerting on the outburst and for the study of the temporal evolution of the global structure of the dust cloud over months.

Spectroscopic and spectro-photometric observations in the visible, infrared and radio wavelength ranges detected amounts of gases larger than those produced by comet C/1995 O1 (Hale-Bopp) at the same heliocentric distance [10, 11, 12, 13, 14]. Molecules like H_2O, CO, C_2H_6, C_2H_2, CH_3OH, H_2CO, HCN, CH_3CN, HC_3N, H_2S, SO, HNC, CS could be detected [10, 12, 13]. These molecules were released from icy grains heated by solar radiation. The spectral signature of water ice at 2 and 3 μm was detected in near-IR spectra [15]. The production of several species, including radicals, could be monitored in the weeks following the outburst, up to until early 2008 for some species observable by millimetre spectroscopy [12, 16, 17].

The high amounts of liberated gases soon after the outburst offered a rare opportunity to search for weak spectral signatures of rare isotopes and measure isotopic ratios. The $^{12}C/^{13}C$ and $^{14}N/^{15}N$ ratios were measured in both HCN and CN [12, 18, 19]. The $^{32}S/^{34}S$ ratio in CS was determined [12]. The $^{14}N/^{15}N$ ratios inferred in HCN and CN indicate a factor of two ^{15}N enrichment with respect to the Earth atmospheric value. This provides the first evidence for the presence of high ^{15}N anomalies in the volatiles that composed the icy phase of the outer solar nebula. The consistency of the $^{14}N/^{15}N$ ratios in CN and HCN is compatible with HCN being the prime parent of CN in cometary atmospheres.

In this talk, I will present an overview of the observational campaign of comet 17P/Holmes.

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