Ultraviolet OH prompt emission in the innermost coma of 103P/Hartley 2

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The hyperactive Jupiter-family comet 103P/Hartley 2, the target of the EPOXI mission, has been visited on 4 November 2010 at a distance of 694 km, when it was at 1.064 au from the Sun. Spectral observations of the ambient coma show that H_2O is enhanced from the central waist, while CO_2 and icy grains seem to be coming out mainly from the two lobes [1,2].

Visible observations in the OH filter of the MRI camera onboard EPOXI have been used to investigate the distribution of the OH daughter species in the coma. These data reveal an evident radial structure in the very inner coma below 35 km from the nucleus (see Figure), appearing to be coming directly from the nucleus, in the region of the central waist. This is in agreement with the water distribution found by [1].

The OH resonance fluorescence emission band at 308.5 nm, caused by the transition $A^2\Sigma - X^2\Pi\,(0,0)$, has been used indeed for years as a tracer of water parent molecules. Nevertheless, even for the active Sun, the OH fluorescence lifetime is about 10^5 s, suggesting that it is not expected to be observed so close to the nucleus.

OH has been found to cause prompt emission (PE) at both IR and UV wavelengths and has been tentatively detected in a few comets [3–6]. We report theoretical computations showing a strong possibility that the innermost OH structure observed in the MRI images of Hartley 2 could possibly be associated with OH ultraviolet PE.

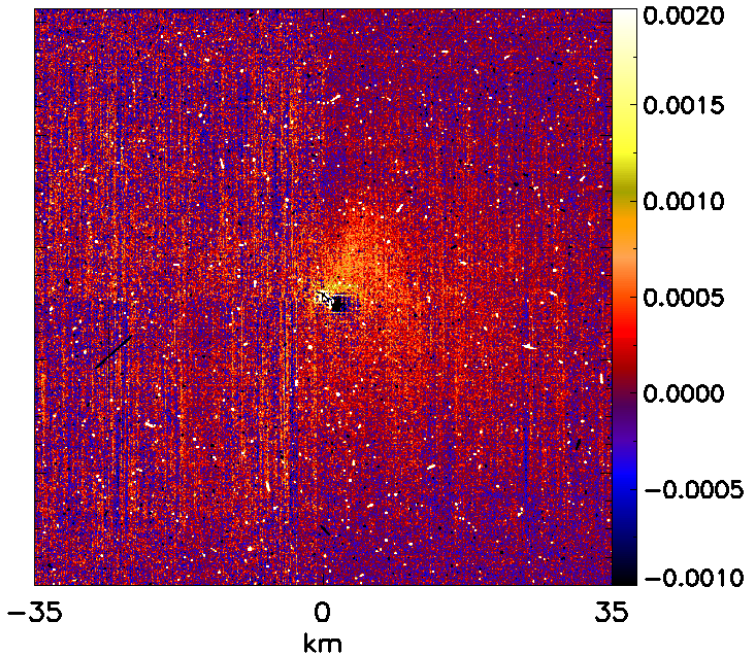

Figure: OH gas structure in the inner coma of Hartley 2 observed through the MRI camera onboard EPOXI at 8259 km from the comet. The color bar indicates brightness intensity in W m^{-2} sr^{-1} μm^{-1}.

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