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UV cometary observations by SPICAV on Venus Express

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Abstract

Several campaigns of cometary observations have been performed by the UV spectrometer SPICAV from 2012 to 2014. In this presentation we will present the results obtained for the 6 observed comets and their water sublimation rates as a function of the sun distance.

1. Introduction

The production rates of water of several comets has been derived from observations of the cometary H Lyman-α emission (e.g. 1, 3). SPICAV-UV is the UV spectrometer of the Venus Express mission dedicated to the study of the venusian atmosphere (2). The orbit of Venus Express is highly elliptic with an apocenter at 66000 km above the planet center. At apocenter, the venusian emissions are very weak and observations of other objects of the solar system are possible.

2. SPICAV Observations

The observed comets are indicated in Table 1.

Comet	Time period of observations	Number of runs
96P MachHolz 1	06/07/2012 – 23/07/2012	15
C/2011 L4 PanStarrs	30/01/2013 – 15/03/2013	38
C/2012 S1 ISON	22/10/2013 – 05/01/2014	99
C/2014 E2 Jacques	21/07/2014 – 15/08/2014	33
C/2012 K1 PanStarrs	24/08/2014 – 07/09/2014	26
C/2013 V5 Oukaimeden	10/10/2014 – 12/10/2014	15

Table 1 : List of the comets observed by SPICAV-UV/VEX

The cometary Lyman-α emission of atomic hydrogen has been observed for all the comets, for some comets (e.g. ISON), OH lines have also been observed near 308 nm. An example of cometary specrum of ISON measured by SPICAV-UV is displayed on Fig. 1

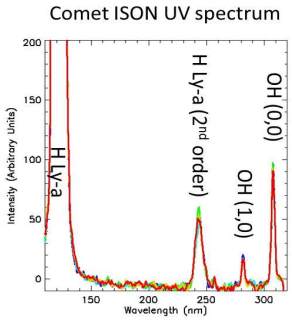


Fig. 1 Example of UV spectrum of the comet ISON measured by SPICAV-UV

Several modes of observations were used to map the emissions of the comets, large zigzag motions of the pointing were performed to derive an extended map with a low spatial resolution and small shift of the pointing were used to obtain less extended maps but with a better spatial resolution. Example of a Lyman-α map of ISON with a good spatial resolution is presented on Fig. 2

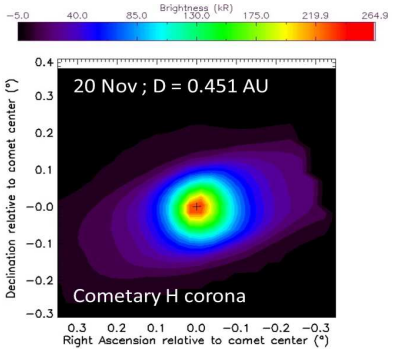


Fig. 2 Example of map of the Lyman-α emission around ISON obtained by SPICAV-UV

From these emissions, using the vectorial model of Festou (4), we have estimated the water production rates of the comets at different distances to the sun.

3. Summary and Conclusions

6 comets have been observed successfully by SPICAV-UV from 2012 to 2014. For all comets, the hydrogen Lyman-α emission is detected and for some of them (e.g. ISON), the OH emission is also detected. Spatial maps with an unp of these two emissions have been derived and will be presented as well as a first estimate of the water sublimation as a function of the sun distance.

Acknowledgements

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