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Jupiter's ultraviolet polar auroral emissions

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Abstract

Using the images obtained with the Hubble Space Telescope Imaging Spectrograph (STIS) we analyse the FUV auroral emissions on Jupiter. The polar emissions, located poleward to the main oval are magnetically connected to the outer magnetosphere and possibly related to a different sector of the Dungey and Vasyliunas cycle flows. These polar emissions have already been highlighted during a few distinct time periods. Based on winter 2000-2001 observations, *Grodent et al.*[1] defined 3 distinct regions : the swirl region, the active region and the dark region as shown (see Figure 1). The active region hosts bright transient features, called polar flares [2], which brightness can rise from a few kR to several MR in tens of seconds. Other bright transient features observed in the same region are long-lived and quasi-sun-aligned polar auroral filaments [3].

Our study focuses on the morphology and the brightness of the emissions in the active and the swirl regions. These polar auroral features exhibit large variations in intensity, position and morphology variations. We analyse the occurrence of fast and bright events such as flares compared to quieter events and we estimate the apparent motion velocity of the emission maximum. Finally, we discuss the nature of these spectacular but poorly explained features of the jovian aurora and we provide valuable constrains for modelling.

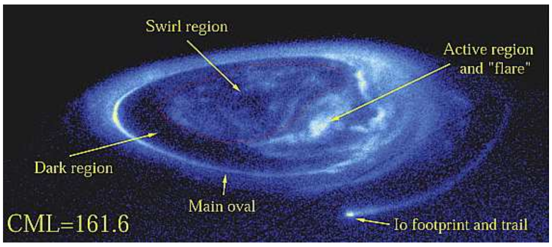

Figure 1 : illustration from *Grodent et al.* [1] of the recurrent auroral features appearing in the Jupiter northern hemisphere: the main oval, the Io footprint and its trail, and the rest of the emission poleward of the main oval, that we refer to as the polar aurora: the dark region, the swirl region and the active region where "flares" and "arcs" are often observed.

References

[1] Grodent, D. et al. (2003) *JGR,* 108*,* A10, 1366.

[2] Waite Jr, J. H. et al. (2001) *Nature,* 410, 787-789.

[3] Nichols, J. D., et al. (2009) *GRL*, 36, L08101.