Jupiter's elusive bald patch

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Abstract:

The detailed morphology of Jupiter's UV auroral emissions is definitely very complex. To some extent, this complexity depicts the zoo of processes taking place inside, and sometimes, outside Jupiter's enormous magnetosphere. One is naturally more inclined to focus on the bright emissions, but recent progresses in cosmology teach us that there is also important information in the darkness. In this present, preliminary study, we are exploring a dark region of Jupiter's polar aurora -"Jupiter's bald patch"- located poleward of the main emission (oval). It appears to be bordered by patchy features belonging to auroral regions often referred to as the swirl and flare regions. These regions contain the poleward most auroral features. Therefore, it is legitimate to ask whether this dark region, even closer to the pole, is actually the polar cap, implying some level of reconnection of Jupiter's strong magnetic field with the interplanetary magnetic field.

An ongoing HST campaign is providing stunning high temporal and spatial (and spectral) resolution time tagged images of Jupiter's northern and southern aurora. They show that the bald patch is conspicuous on some images but much less obvious in others. They also suggest that it is not always completely devoid of emission, possibly alluding to a weak, intermittent, Dungey-like cycle.