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Saturn's northern auroras as observed by HST

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Abstract

A long-term program of observations of Saturn's northern UV auroras has been undertaken using the Advanced Camera for Surveys onboard the Hubble Space Telescope. Increasing numbers of images have been obtained near to opposition each year over the interval 2011-2013, the first time that the high sensitivity third-generation instrument as been able to observe the north due to the planet's season. At the time of writing, the 2013 images are presently being obtained, along with a suite of contemporaneous in situ Cassini measurements and ground-based observations. In this paper we present the images and discuss the overall morphology of the northern auroras. We show that the northern auroras exhibit broadly similar features to the southern, i.e. a quiet time oval comprising subrotating patches of emission, that is generally brighter in the morning than the afternoon, and with dawnside poleward expansions associated with solar wind compression regions. A striking feature in the 2012 data set is a persistent patch of emission in the noon region poleward of the main oval, and we consider the implications for dayside reconnection. The 2013 images in particular will be discussed, which early indications suggest will also exhibit a wide variety of morphologies.