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On the origin of Saturn's polar auroral arcs

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Abstract

Saturn's main auroral emission similarly to Earth's is suggested to be associated with the open-closed field line boundary. The polar auroral emissions at Saturn, emissions located poleward of the main emission consist of several arc-like and spotty features. In this study we focus on the arc-like structures observed with the UVIS instrument onboard Cassini and we characterize them into three groups: 'bending arcs' arcs whose one end is connected to the main emision, 'oval aligned arcs' arcs oriented parallel to the main emission and 'moving arcs' arcs which move with time inside the main emission. We study their occurrence rate, location, size as well as their associated expansion or contraction of the main emission. Finally, we compare the auroral arcs at Saturn with those in the terrestrial aurora and we examine their relation to a combination of solar wind parameters such as northward IMF, strong IMF magnitude and high solar wind speed.