

Red arcs in the subauroral regions as observed by the Athabasca all-sky camera.

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Stable auroral red (SAR) arcs are global red (630 nm) emissions without green (558 nm) emissions in the subauroral region. It is known that SAR arcs are often observed during geomagnetic storms. However, it is less clear how they initiate, in terms of association with disturbance in the main oval. Previous studies found that SAR arcs lacked green emissions at their initiation as well as later times. On the other hand, we report SAR arcs that were formed by bifurcating from the main oval.

SAR arcs are usually observed at between $L=2$ and 4, which are the locations of the plasmopause during storms. Using a multi-spectral all-sky imager at Athabasca, Canada ($L=4.6$, $MLAT=62$), we simultaneously observed both SAR arcs and the auroral oval. As a result, we found 11 events of isolated red arcs from September 2005 through June 2006. The red arcs were selected as not seen in the green line (558 nm) and were located equatorward of the main auroral oval. The red arcs were observed during non-storm times and the Dst index was more than -30 nT. This is probably because that the arcs are within the field of view at Athabasca only during non-storm times when the plasmopause is located at relatively higher latitudes.

SAR arcs are thought to be caused by plasmaspheric particles being interacted with ring current particles. Four out of the 11 arc events included observations of their initiations. They appeared to initiate by bifurcating from the main oval at the times of northward-turnings of green/red arcs in the main oval, which was previously expanding equatorward. These observations suggest that the isolated arcs were generated by the interaction of plasma sheet particle with particles in the plasmasphere that was located at higher latitudes during quiet times.