# Stratospheric ionization during magnetic storms

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Transient mesospheric ionization was detected at an altitude of 65-70 km during the auroral breakup that occurred from 2220 to 2226 UT on June 30, 2017. During this event, the footprint of the Arase satellite was located within the field of view of the all-sky imagers at Syowa Station in the Antarctic. Auroral observations at Syowa Station revealed the dominant precipitation of relatively soft electrons during the auroral breakup. A corresponding spike in cosmic noise absorption was also observed at Syowa Station, while the Arase satellite observed a flux enhancement of >100 keV electrons and a broadband noise without detecting chorus waves or electromagnetic ion cyclotron waves. A general-purpose Monte Carlo particle transport simulation code was used to quantitatively evaluate the ionization in the middle atmosphere. Results of this study indicate that the precipitation of energetic electrons of >100 keV, rather than X-rays from the auroral electrons, played a dominant role in the transient and deep (65-70 km) mesospheric ionization during the observed auroral breakup. Based on the above results of Kataoka et al. (2019), we further discuss a possible role of X-rays to ionize the stratosphere during magnetic storms.

Reference:
Kataoka et al. (2019), Earth, Planets and Space, 71, 9, https://doi.org/10.1186/s40623-019-0989-7

 