R006-09
Zoom meeting B ：11/1　AM2　(10:45-12:30)
11:30-11:45

超高高度からの加速電子降下で励起される活動的オーロラアーク

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Active auroral arc powered by accelerated electrons from very high altitude

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We show that active auroral arcs are powered by electrons accelerated at altitudes reaching greater than 30,000 kilometers. We employ high-angular-resolution electron observations achieved by the Arase satellite in the magnetosphere and optical observations of the aurora from a THEMIS ground-based all-sky imager. Our observations of electron properties and dynamics at ~02:37 UT on September 15, 2017 resemble those of electron potential acceleration reported from low-altitude satellites except that the acceleration region is much higher than previously assumed. Downgoing monoenergetic electrons, whose flux often forms the inverted-V shape in an energy-time spectrogram, indicate that these electrons are accelerated above the satellite prior to precipitating to auroral altitudes. These precipitating electrons can be the main carrier of the upward field-aligned current, which is observed as an azimuthal magnetic field deflection. In the region of those accelerated current carriers, the plasma number density is expected to be small, also known as plasma cavity. The upgoing proton and converging electric field indicate a U-shape potential drop below the satellite. The lack of upgoing electrons within the loss cone is consistent with accelerated electrons that are lost to the atmosphere while exciting auroral emissions. Since the parallel acceleration makes a pitch angle more field-aligned, in contrast to the mirror force, the electron loss cone width depends on the potential drop below. These observations show that the dominant auroral acceleration region can extend far above a few thousand kilometers, well within the magnetospheric plasma proper, suggesting the formation of the acceleration region by some unknown magnetospheric mechanisms. Similar features of the acceleration and precipitation from very high altitudes are also found in other periods, and these events are investigated in detail.