Compound auroral microphysics

Ryuho Kataoka[1]; Yoko Fukuda[2]; Yoshizumi Miyoshi[3]; Yusuke Ebihara[4]; Donald Hampton[5]
[1] NIPR; [2] Dept. Earth & Planet. Sci, Univ. Tokyo; [3] STEL, Nagoya Univ.; [4] RISH, Kyoto Univ.; [5] GI, Univ. of Alaska Fairbanks

Auroral microphysics still remains widely unexplored because of the limitation of high-speed imaging. Cutting-edge ground-based optical observations using sCMOS cameras with a large data storage recently enabled us to continuously observe the fine-scale morphology of aurora at magnetic zenith for a variety of rapidly varying features, such as flickering, pulsating modulation, and arc packets etc. According to the spatiotemporal scale, the fine-scale auroral morphology is important to understand the fundamental wave-particle interactions, and is potentially useful to diagnose the plasma environment of magnetosphere-ionosphere coupled system. We report two interesting examples of unexpected combinations of fine-scale rapidly varying auroras. Localized flickering aurora appeared during the instability growth of an arc, which may represent the efficient energy dissipation of Alfvenic and quasi-static activities as operated at the midnight open/closed boundary. Another example shows a pulsating modulation nearby flickering rays in the middle of surge in the pre-midnight sector, which may indicate the close relation of enhancement of Alfven waves and efficient loss of energetic particles.