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Measurements of neutral wind and plasma drift with chemical release in the cusp region - preliminary results

KAKINAMI, Yoshihiro[1*] ; KIHARA, Daiki[1] ; WATANABE, Shigeto[2] ; YAMAMOTO, Masa-yuki[1] ; CONDE, Mark[3] ; LARSEN, Miguel[4]

[1]Kochi University of Technology, [2]Hokkaido Information University, [3]University of Alaska, Fairbanks, [4]Clemson University

A chemical release experiment was taken place on 24 November 2014 to measure neutral wind and plasma drift in the cusp region, which was named the Cusp Region Experiment (C-REX). We set up 2 cameras (one for neutral Barium (Ba) and the other for ionized Barium (Ba+)) at Longyerben and Ny-Alsund for each site. In addition, one video camera at Ny-Alsund and one camera with a grating at Longyerben were set up. The rocket was launched from Andoya at 08:05 UT and first chemical release was observed at 08:14:19 UT from Longyerben, Ny-Alsund and an airplane. Ten of 24 canisters were successfully ignited between 200 and 400 km altitude at about 600 km away from Svalbard islands. Each canister contains barium (Ba) and strontium (Sr). Evaporated gasses reflect sunshine and green and blue “space fireworks” were observed by digital cameras with filter and video as well as human eyes. The filters were developed to observe resonance scattering of neutral Ba (552.5 nm) and ionized Ba (454.5 nm), and evaluated with an integrating sphere in National Institute of Polar Research. We also observed space fireworks with a grating and successfully obtained spectrums. In this paper, we introduce our observation and show preliminary results of the experiment.

Keywords: cusp, neutral wind, plasma drift, space firework, chemical release exeprimet, neutral density anomaly