Field Deployment of two GNSS in collaboration with the ISINGLASS sounding rocket mission in Alaska

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1. Extended Abstract

Two GNSS receivers were installed in Alaska in February 2017. One was installed in Venetie, Alaska, 250 km north of Fairbanks, and the other was installed at the Poker Flat Rocket Range. The goal was to enhance space weather monitoring of total electron content (TEC) and scintillation through the use of both GPS and GLONASS observations. For each receiver, the GNSS high-rate 50 MHz data, as well as the RINEX and summary scintillation files, are stored. The data are then pulled into the Madrigal database for processing, and TEC maps are generated with scintillation statistics over-plotted. Since the GLONASS constellation is at a higher inclination than GPS, incorporating GLONASS measurements improves coverage of these highly dynamic, high latitude regions. The placement of these receivers also addresses the current lack of GNSS coverage in the important auroral/sub-auroral regions of northern Alaska. Finally, both the Venetie and Poker Flat locations offer the benefit of co-located optical equipment. The Venetie location is of particular importance because of its role in the ISINGLASS sounding rocket mission (February 2017, Poker Flat Rocket Range, Alaska). Venetie is underneath the apogee of the ISINGLASS rocket trajectories, and the GNSS receiver there will provide valuable background scintillation and total electron content (TEC) data and differential TEC data for this experiment. ISINGLASS is designed to sample the auroral ionosphere at multiple locations simultaneously and to obtain gradient measurements of plasma parameters. The plan is that two identical rockets, launched from the Poker Flat Rocket Range, will be flown into two separate auroral events (ie, quiet early evening arc vs dynamic rayed arc). Each rocket has a large sub-payload, and four small deployable payloads. The in-situ measurements of plasma parameters at multiple locations will be stitched together using ground based measurements and data assimilation to produce a localized map of plasma parameters and gradients. The GNSS data will be of particular importance by its monitoring of auroral ionospheric structuring at both small and large scales. Our intent is to report on the initial results, focusing on the GNSS measurements, of this experimental campaign.