

Radar School – Group 1

Location: ESR and VHF lowel
Time: 20 - 22 UT (2300-0100 EEST)

Scientific justification: Following the study by Ogawa, we want to observe polar cap/auroral ion upflow between 20 and 22 UT (11PM-1AM here) using the Svalbard ISR. We would like to do this by running the ISR in the folke mode. In the case that we do not observe any ion upflow our backup objective is to observe structure corresponding to the auroral oval. Given the current conditions we expect the oval to be located between Svalbard and Tromso. To measure this we would like to set the 32m ISR to 30 degrees.

Radar School – Group 2

Time: 20 - 22 UT (2300-0100 EEST)
ESR
Desired mode: Folke, duel for both the 32m and 42m radars
32m: Southward, Scanning in elevation from 30° to 70°
42m: Fixed, field-aligned
Tromsø
Desired mode: Fixed, tau7, low elevation, 30°, northward

For our experiment, we would like to study the auroral oval for signatures of precipitation from the EISCAT Svalbard Radar (ESR) and the Tromsø VHF radar. Due to auroral precipitation being more common at midnight, operating the radar closer to 00:00 UT we optimize the probability of observing various auroral features.

Radar School – Group 3

Time: 18 - 20 UT (2100 to 2300 EEST)
Location: ESR 32 m and 42 m, RISR on support
Mode: Beata
Antenna Program/ Scan Pattern: CP-3

We propose to use the EISCAT Svalbard Radar during the middle time slot, 21:00 to 23:00 LT in order to measure polar cap patches. In addition, we will use data from RISR operating in support in order to study polar cap patch evolution from dayside to nightside. If no patches occur, we may be able to see ion outflow from the 42 meter detector pointing along the field. We will use the ESR in Beata mode using the scan pattern CP-3, in order to do a north-south scan with the 32 meter detector.

Radar School – Group 4

Location: PFISR
Time: 18-20 UT or 20-22 UT (2100-2300 EEST or 2300-0100 EEST)

We suggest using PFISR to look for PMSEs, which were first observed at Poker Flats. According to Körner and Sonnemann (2001, 10.1016/j.jastp.2004.07.026), PMSEs are likely to be observed in mid- August due to the high water vapor content in the upper mesosphere. Due to their low occurrence altitude in the upper mesosphere, the relevant radar mode would be D-region focused (MSWinds). Barker coding would provide the necessary very high range resolution required to observe these thin features and possible layering within them. Since PMSEs are not fast evolving features, there is no need for a specific beam revisiting pattern. We suggest scanning with 16 beams in an evenly spaced 4x4 grid to gain larger spatial coverage and thus increase detection likelihood. Due to the diurnal occurrence variation of PSMs with a peak around local noon (Huaman et. al 2001, 10.1029/2000RS001004), observing either from 18-20 UT or 20-22 UT

(10-12 or 12-14 LT at Poker Flats) would likely yield the best results. We theorize a connection between sporadic E-layer and PMSE occurrence and thus hope to observe both. The proposed radar experiment would be well- suited to observe sporadic E-layers as well.

Radar School – Group 5

Time: 18-20 or 20-22 UT / 2100-2300 or 2300-0100 EEST

Location: PFISR

Polar mesospheric summer echoes (PMSE) occurrence is most probable in the period between May and early August in the region between 80 km to 100 km of altitude. The most probable frequency range for PMSE detection is between 50 MHz to 250 MHz. The proposed objective is to characterize PMSE observation at higher frequency using PFISR, as explained below. If we do not detect PMSE, we will concentrate on what we observe which may include sporadic E and particle precipitation.

Experimental Design:

We want to use PFISR and are basing our experiment off of a previously run experiment ThemisD1 that can be found here <https://amir.com/database/61/experiment/20180715.001/> because of its already proven effectiveness at detecting PMSEs.

We plan to use 22 beams in barker mode to increase the chance of PMSE detection, and examine spatial extent of PMSEs, and would like to adjust from long pulse to alternating code to get more ionospheric context.

We request the 2nd or 3rd time slot to maximize the probability of detecting PMSEs, which occur most often between 10:00-12:00 AKST according to <https://www.sciencedirect.com/science/article/pii/S1364682610001598>.

Radar School – Group 6

Time: pre-noon timeframe in Alaska / early evening EEST - 1900-2100 EEST

Location: PFISR, Poker Flat, Alaska

Experiment: MSWinds26

We aim to observe and investigate a variety of ionospheric phenomena present in the D and E-region ionosphere using PFISR, located in Poker Flat, Alaska. Due to the short nature of the observation window and the uncertain chance of observing of signatures such as sporadic E-layer enhancements or PMSEs (polar mesospheric summer echo) we would also like to maximise our chance of observing field aligned particle precipitation signatures. The ideal observation time would be pre-noon Alaska time since evidence suggests precipitation activity in the morning, corresponding to early evening EEST.

