

**Twentieth Meeting of the Cross Polar Trans East Air Traffic Management Providers' Work Group (CPWG/20)**

(Anchorage, Alaska 26-29 October 2015)

**Agenda Item 5: Provide status on CPWG/19 Actions**

**PLANNED ROCKET LAUNCHES FROM NORWAY**

**(Action Item CP 15-09)**

(Avinor)

**SUMMARY**

This paper presents information on two planned rocket launches with impact on polar flights, scheduled for late November/ early December 2015.

**1 Introduction**

- 1.1. In November/ December 2014 a rocket launch campaign was carried out where a large danger area over the polar region was published for an extended time period.
- 1.2. At CPWG/19 information was presented on the coordination that had taken place between Andøya Space Center and Avinor after the campaign, with the purpose to give feedback and work to reduce the impact of other airspace users in future campaigns.

**2 Discussion**

- 2.1. Andøya Space Center (ASC) will launch two scientific sounding rockets from Andøya in the period November 27-December 18 2015, on behalf of customer the National Aeronautical and Space Administration (NASA). Launch window between 0530-1030 UTC.
- 2.2. The rockets that will be launched are four stage solid propellant rockets. Each of these rockets will result in four danger areas each. The two first stages on both rockets will have impact in existing danger area close to the launch site. The third stage for both rockets will have impact in international waters and affect airspace under administration of the Norwegian Civil Aviation Authority. The fourth stage for both rockets will have impact in international waters and affect airspace under administration of Icelandic, Danish, Russian and Norwegian Civil Aviation Authorities (CAA). Further Campaign information can be found in attachment A
- 2.3. ASC will inform if there for any reason during the period are days the danger areas will not be utilized. 24 hours before a planned launch ASC will inform about the intention to launch, and at least one hour before launch, a specific launch window will be coordinated.
- 2.4. Andøya Space Center (ASC) is responsible for cancellation of all NOTAMs as soon as the operation for specific danger areas has ended.

Map showing third and fourth stage impact for CAPER/RENU2 missions:

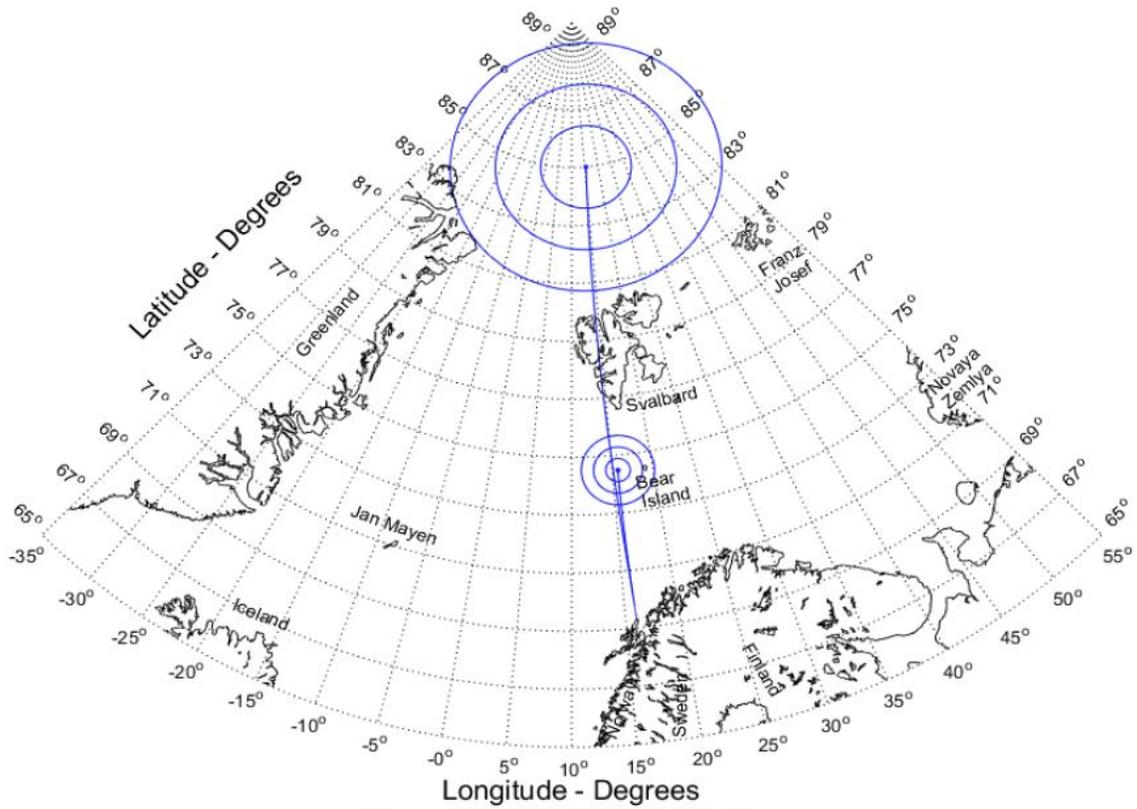


Figure 1. Impact Dispersion Map

### 3 Recommendation

3.1. The Meeting is invited to note the information provided in this paper.

## Attachment A

### CAMPAIGN INFORMATION

#### INTERNATIONAL ROCKET CAMPAIGN FROM ANDØYA SPACE CENTER

Andøya Space Center (ASC) will conduct a scientific international rocket campaign with launching of two sounding rockets from ASC, as specified below:

#### **RENU 2 (Rocket Experiment for Neutral Upwelling 2)**

The experiment will transit the cusp region during a neutral upwelling event to measure small-scale electrodynamics. The payload is equipped with a suite of instruments that will build on previous observations of this phenomenon. The scientific objectives of the RENU 2 mission are to acquire new data necessary to advance the state of knowledge regarding neutral upwelling in the cusp.

#### **CAPER (Cusp Alfvén and Plasma Electrodynamics Rocket)**

The CAPER mission will make significant advances in understanding of dayside magnetosphere-ionosphere coupling by building on the small number of previous rocket experiments in the cusp region of the Earth's magnetic field. By including the same key instruments flown on complementary missions in the nightside aurora, CAPER will establish the role and nature of Alfvén wave acceleration in the cusp and discover the causes of the observed differences in the Langmuir waves in the cusp versus the nightside.

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Project/campaign name:	RENU2/CAPER
Period:	November. 27 <sup>th</sup> –December 18 <sup>th</sup> , 2015
Number of launchings:	2
The launch window will be:	Any day between 05:30 hrs and 10:30 hrs. UTC within the period.

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#### **RENU 2**

Four stage solid propellant, unguided, rail launched sounding rocket. Consisting of the following:

<b>MK I Mod 5 Talos:</b>	Length: 3,733 m, Diam: 0,765 m, Weight: 2001,6 kg
<b>Terrier:</b>	Length: 4,316 m, Diam: 0,457 m, Weight: 1047,3 kg
<b>Black Brant VC MK3:</b>	Length: 4,175 m, Diam: 0,438 m, Weight: 1306,5 kg
<b>Nihka:</b>	Length: 2,149 m, Diam: 0,439 m, Weight: 411,4 kg
<b>Payload:</b>	Length: 5,360 m, Diam: 0,439 m, Weight: 351,5 kg

Nominal Launch angles: Azimuth: 357,7°, Elevation: 80,5°

Launch Pad coordinates: N69° 17' 39,3" E16° 01' 09,4"

Apogee: 719,8 km

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**CAPER**

Four stage solid propellant, unguided, rail launched sounding rocket. Consisting of the following:

<b>MK I Mod 5 Talos:</b>	Length: 3,733 m, Diam: 0,765 m, Weight: 2001,6 kg
<b>Terrier:</b>	Length: 4,316 m, Diam: 0,457 m, Weight: 1047,3 kg
<b>Oriole:</b>	Length: 4,435 m, Diam: 0,558 m, Weight: 1288,7 kg
<b>Nihka:</b>	Length: 2,149 m, Diam: 0,439 m, Weight: 411,4 kg
<b>Payload:</b>	Length: 4,740 m, Diam: 0,439 m, Weight: 244,5 kg

Nominal Launch angles: Azimuth: 357,6°, Elevation: 80,5°

Launch Pad coordinates: N69° 17' 38,4" E16° 01' 06,5"

Apogee: 895,3 km

**HAZARD AREAS, AIR (NOTAM):**

The following Danger areas for air traffic will be activated before launch:

**EN D476 R&B 1.**

This area will contain 1. and 2. stages for both rockets

**CAPER/RENU2 stage 3:**

This area will contain 3<sup>rd</sup> stage for both rockets

A circle with Origo in nominal impact point (DDMMSS.S):

734658.4N – 0162033.3E

Radius: 73.5 nmi

Vertical: Unlimited

**CAPER/RENU2 stage 4 and Payload:**

This area will contain 4<sup>th</sup> stage for both rockets

A circle with Origo in nominal impact point (DDMMSS.S):

844430.9N – 0142231.8E

Radius: 283.5 nmi

Vertical: Unlimited

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Telemetry/radio frequencies: 2220,5 MHz/2251,5 MHz/2279,5 MHz/2370,5 MHz/2235,5 Mhz

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Point of contact:

Morten Larsen

Telephone: +47 76 14 44 22

Telefax: +47 76 14 44 01

Mobile: +47 90 52 57 28

E-mail: [morten@andoyaspace.no](mailto:morten@andoyaspace.no)

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