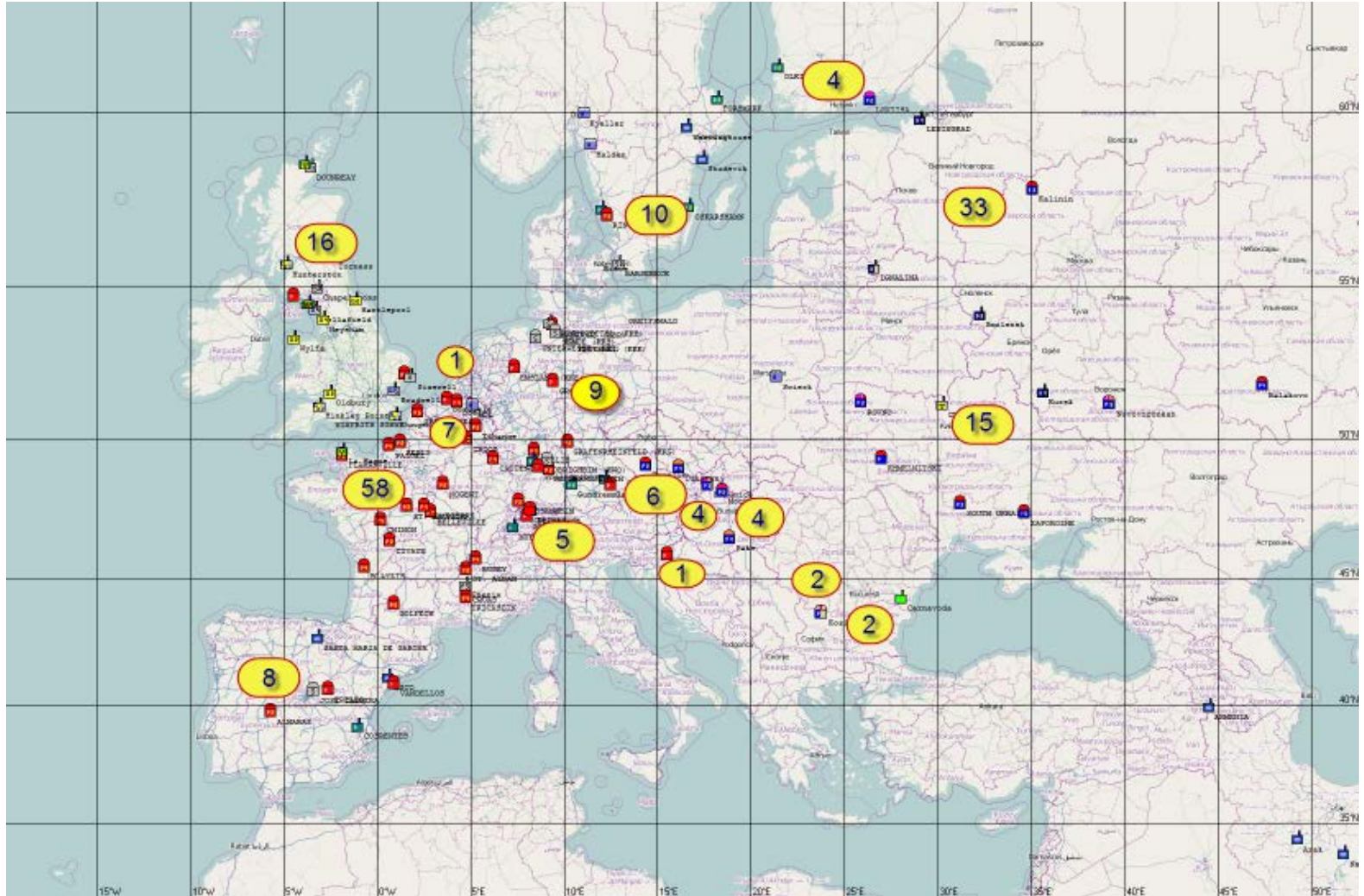


DEMAs experiences with unmanned aerial vehicles for radiological measurements

August 25, NSFS XVII – Roskilde, Denmark

Carsten Israelson and Jeppe Vöge, Danish Emergency Management
Agency, Nuclear Division.

Nuclear Power plants close to Denmark



Nuclear Division: Monitoring

FAST RESPONSE

1. Nuclear Monitoring Stations, NMS (non stop)
2. Mobile measurements (predefined measurement routes with point measurements)

LATER RESPONSE

3. Carborne Gamma Spectrometry (continuous)
4. Airborne Gamma Spectrometry (continuous)



Airborne gamma systems AGS

- After plume passage
- Land mapping
- Hot-spot identification



Unmanned aerial vehicles in DEMA



X8 Helikopter

- Weight: 5240 gr.
- Dimensioner: 55*55*45 (LxBxH)
- Flyve computer: Mikrokopter Flight control system
- Fail-safe system: Mikrokopter, Return to home, autoland, low batteryland, return in case of link loss
- Producent: Danish Aviation Systems ApS
- Max kinetic energy: 374 joule
- Automatisk flyvning: Ja, og kontrollen kan overtaget manuelt vha. Fjernstyring.
- Der anvendes godkendte radiofrekvenser. 433 mhz og 5.8 ghz



DJI Phantom 2

- Weight: 1284 gr.
- Dimensioner: 35x35x19 cm. (LxBxH)
- Flyve computer: DJI Phantom
- Fail-safe system: DJI
- Producent: DJI
- Max kinetic energy: 125,8 joule
- Automatisk flyvning: Ja, og kontrollen kan overtaget manuelt vha. Fjernstyring.
- Der anvendes godkendte radiofrekvenser. 2.4 ghz



Trænings helikopter

- Weight : 846 gr.
- Dimensioner: 36x36x13.5 cm. (LxBxH)
- Flyve computer: DJI Naza
- Fail-safe system: DJI
- Producent: Danish Aviation Systems ApS
- Max kinetic energy: 65,8 joule
- Automatisk flyvning: Ja, og kontrollen kan overtaget manuelt vha. Fjernstyring.
- Der anvendes godkendte radiofrekvenser. 433 mhz og 5.8 ghz



Ebee drone

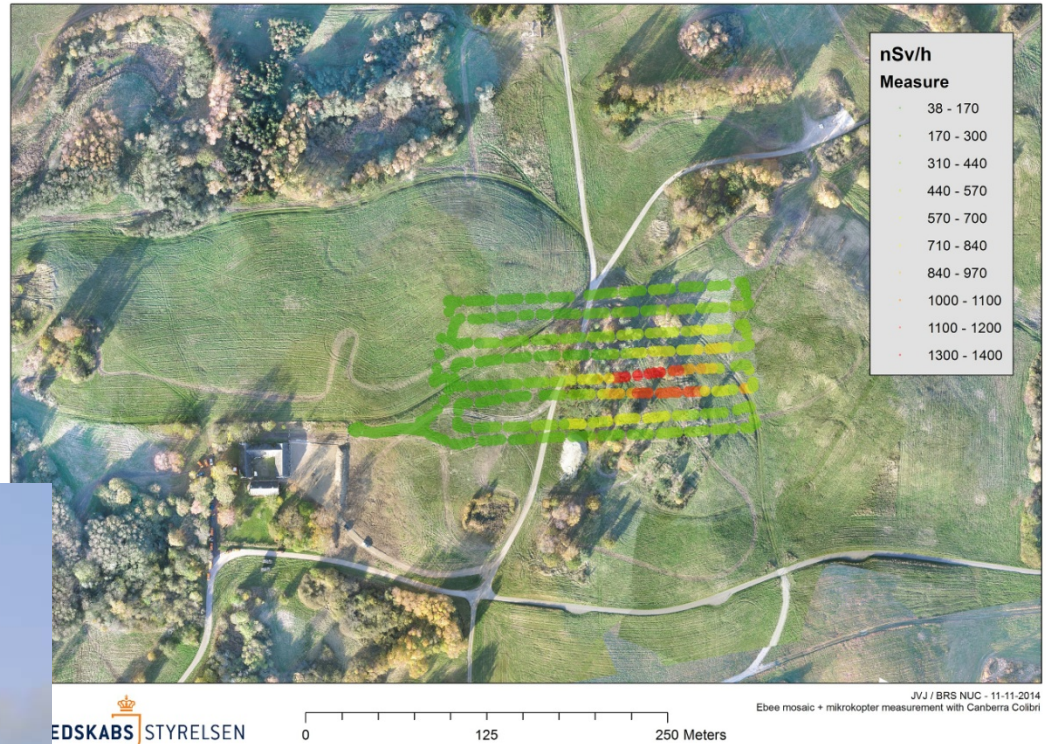
- Weight : 690 g.
- Dimensioner: 40x96x10 (LxBxH)
- Flyve computer: Sensefly Ebee
- Fail-safe system: Return to home, autoland, low batteryland, return in case of link loss
- Producent: Sensefly
- Max kinetic energy: 140 joule
- Automatisk flyvning: Ja, og kontrollen kan overtaget manuelt vha. Fjernstyring.
- Der anvendes godkendte radiofrekvenser. 2.4 ghz

Proof of concept....



- X8: Used for inspections and search and find missions
 - Air time ca. 20 min
 - Payload up to 1500 g
 - Stability in 12-14 m/s
 - Monted with HD video + termisc camera or other equipment
 - Can be operated manual or "assisted manual" (GPS), auto start and landing
- Canberra Colibri dose rate monitor
 - CsI detector
 - Auto logging function with GPS coordinates.

ØVELSE CONTEX 2014



Major mapping and reporting exercise: CONTEX 2014

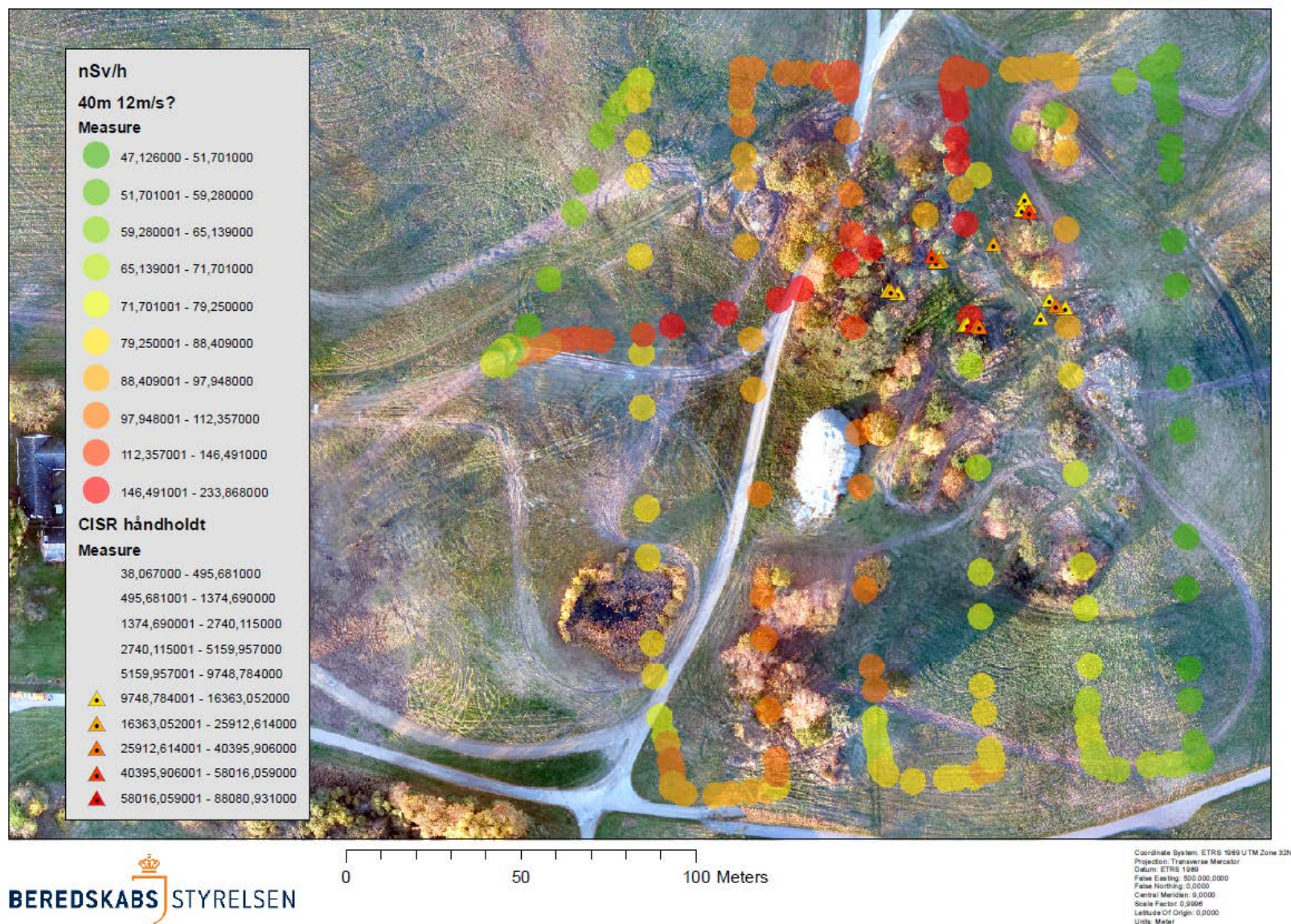
Testing of dose rate measurements from drones

Kildesøgning



RECEX 2015 - INSTRUMENTATION TEST

JVJ / BRS NUC - 24/3-2015
Ebee lufffoto CONTEX Nov 2014
Measurement with Canberra Colibri
Øvelse med Forsvaret / CONTEX mini



Fix wing aerial vehicle— Sensefly Ebee



- Used for mapping
 - Covers aprox. 1 X 1 km in 40 min
 - Kræver dog efterbehandling før samlet ortofoto
 - Very vindstable
 - Automatic – AOI
 - Easy to fly
- Small payload