Field Radiation Measurement Using Orpheus Robot

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SURO v.v.i.

Two experiments

- I. Ground Radioactive Contamination Measurement Experiment

- II. Lost Radiation Sources Experiment

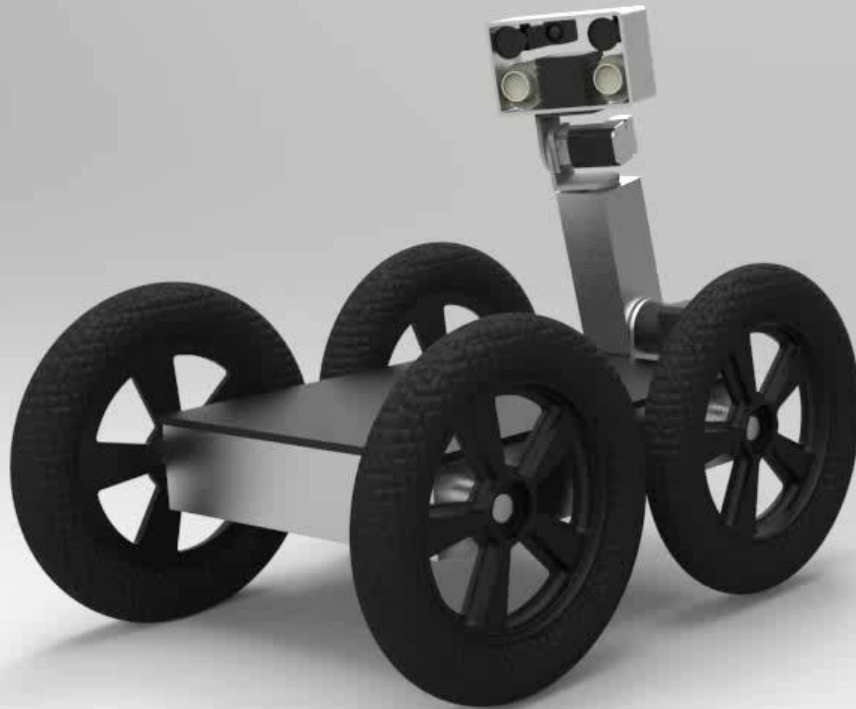- cooperation with SURO (Statni ustav radiacni ochrany)

Orpheus-AC2

- CBRN robot
- rugged construction
- inside armored CBRN vehicle
- remote control from cockpit
- 2 chemical, 2 radiation sensors
- MIL-STD tests – environmental, EMC, special
- since 11/2013 in armament of Czech Army
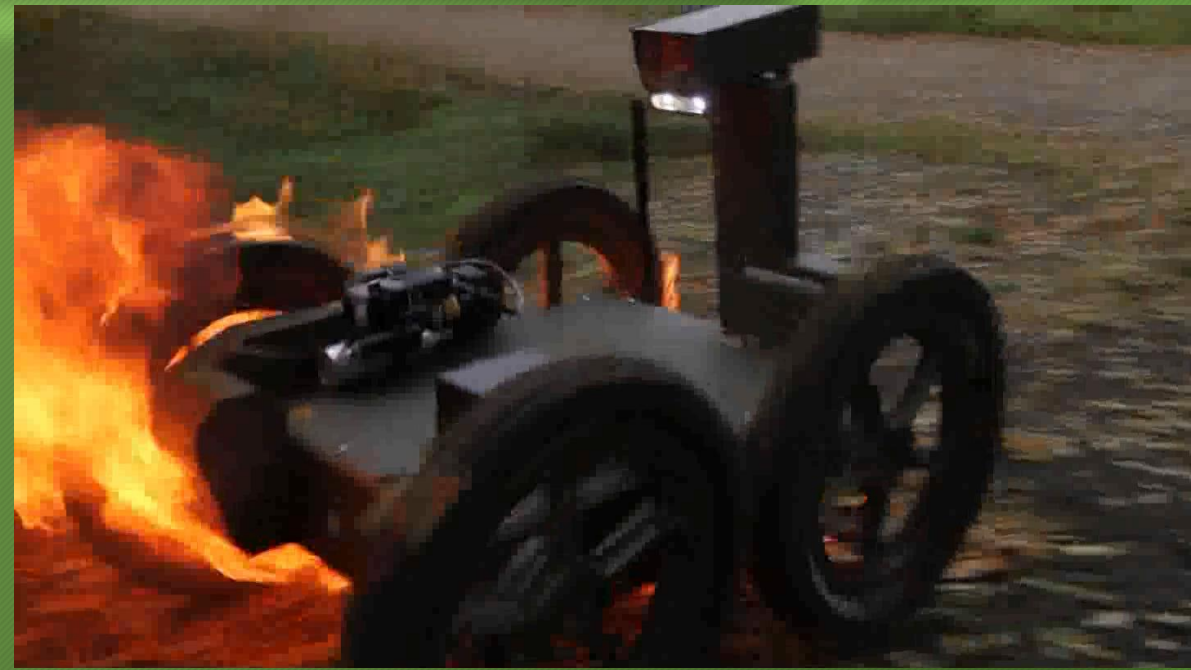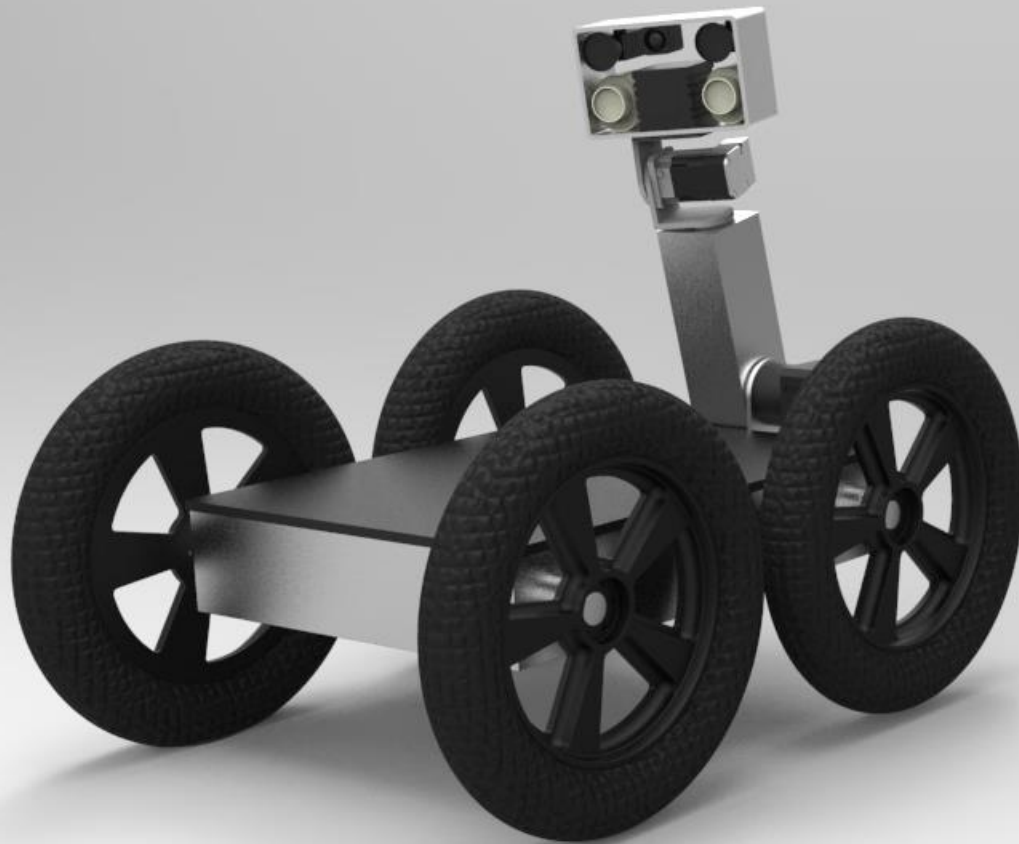
ORPHEUS-X3

SENSORY HEAD

3DOF ARM

TANK-LIKE DRIVE

ROBUST CONSTRUCTION

ORPHEUS-AC2 DRIVE SYSTEM

Possible Missions
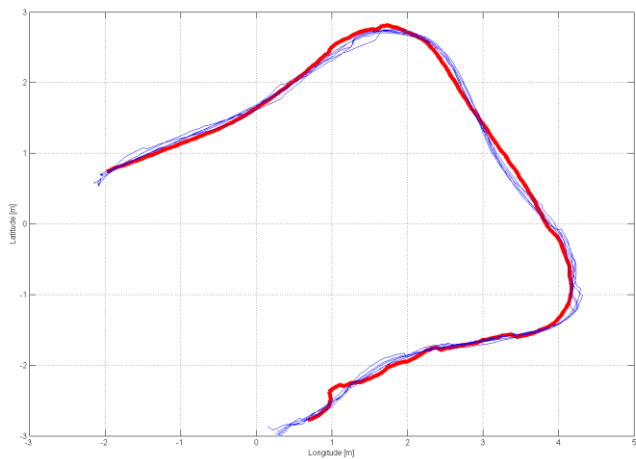

RECONNAISSANCE AND MAPPING
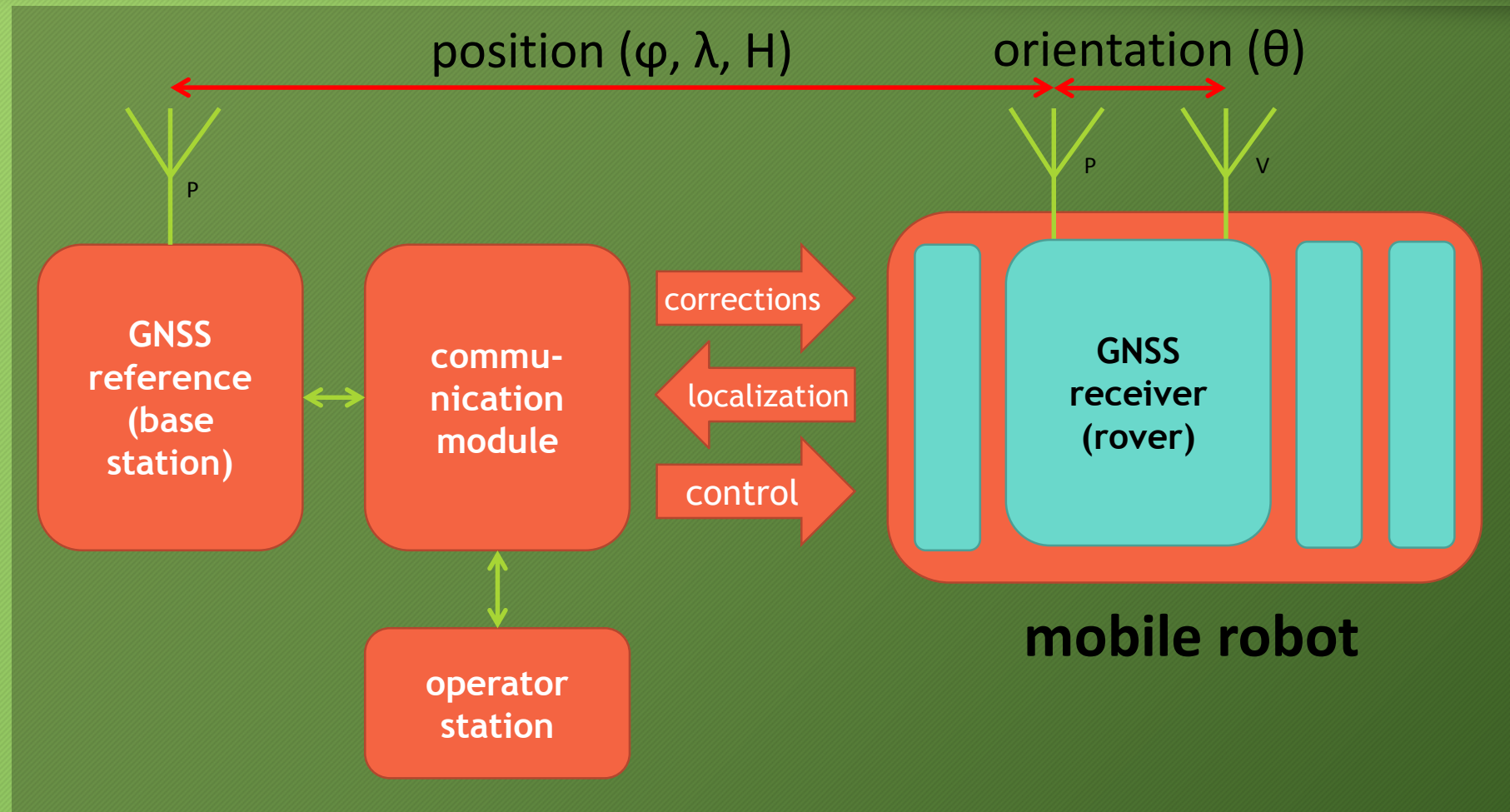
CBRNE

FIRE FIGHTING

MULTISPECTRAL MAPPING

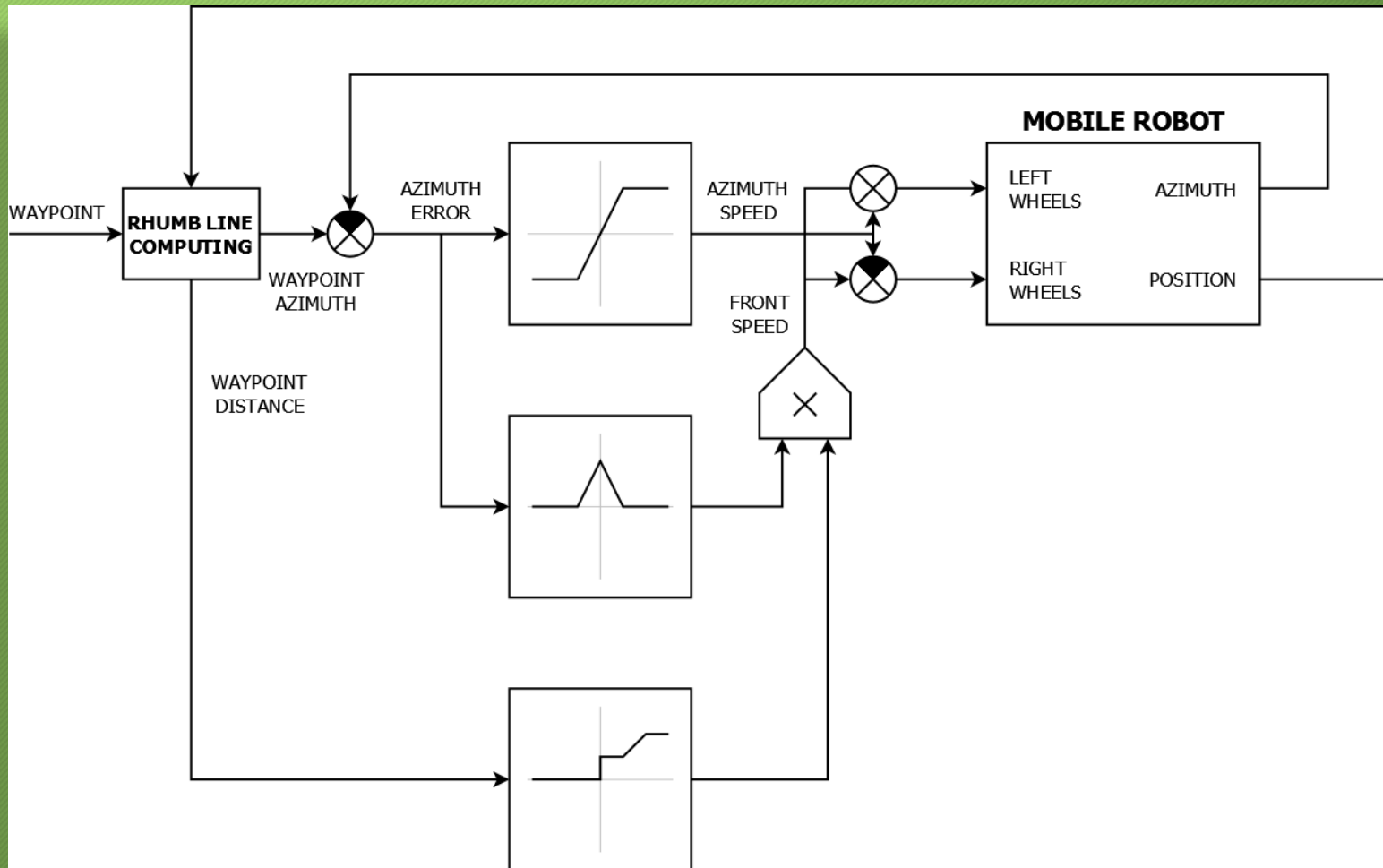ENVIRONMENT MEASUREMENT

Outdoor Navigation – RTK GNSS

- GNSS with custom Base Station
- known precision
- also azimuth – RTK compass

- automatic waypoint generation
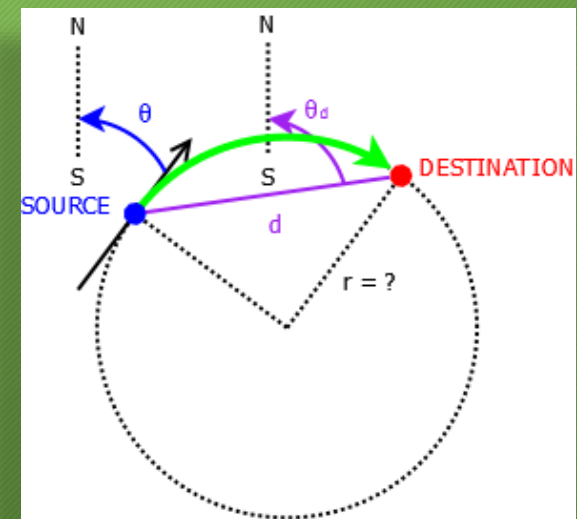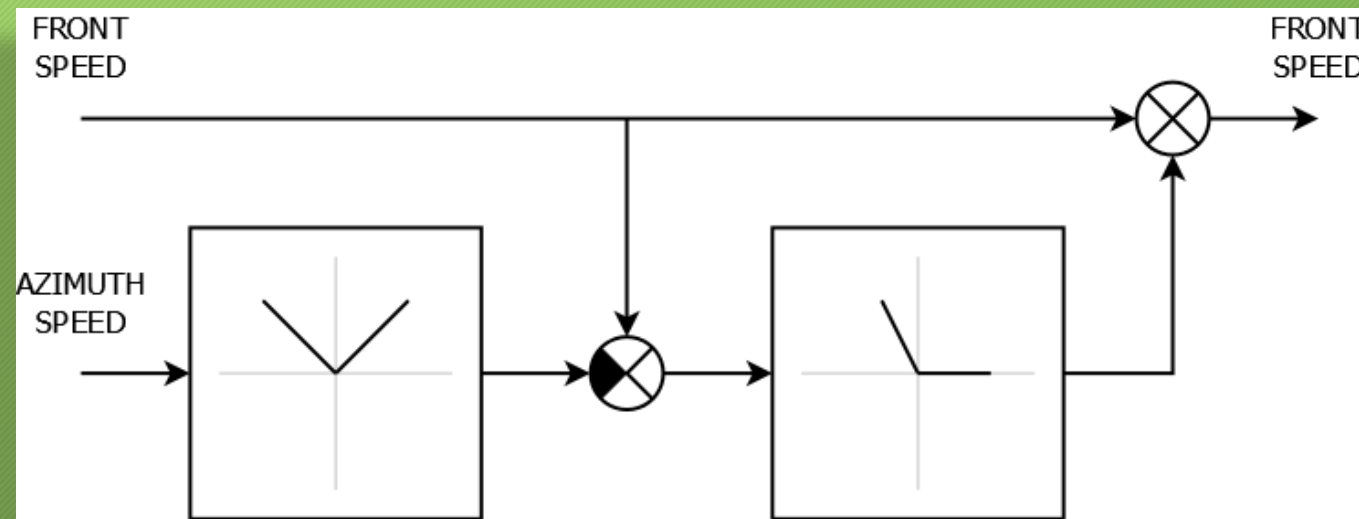- automatic mission return
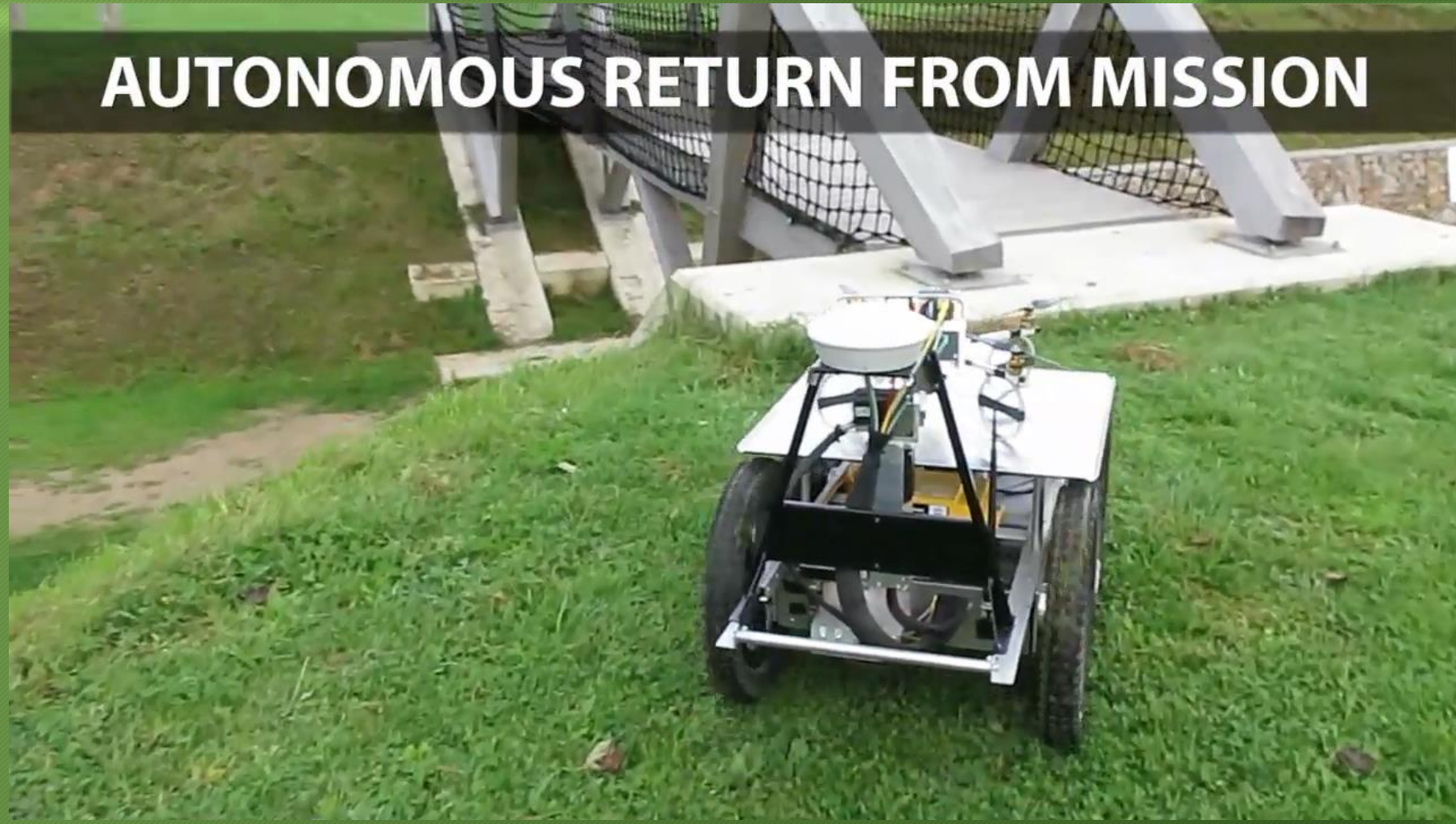
GNSS Scheme

Navigation Scheme

Momentum Reduction Scheme

Current Status – outdoor

- ORPHEUS-X4 prototype and URANUS quadro
- robots may be combined to extend mission capabilities
- teleoperated and autonomous operation

AUTONOMOUS RETURN FROM MISSION

Orpheus-X3, modifications

- sensory head was deactivated
- steel/aluminum frame for GNSS antennas and scintillation radiation probe was constructed

position antenna

vector antenna

detector

69 cm

31 cm

50 cm   50 cm
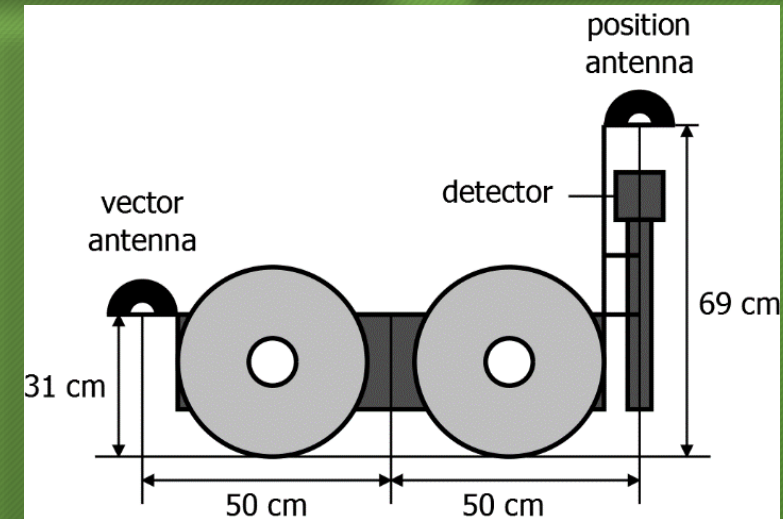
Ground Radioactive Contamination Measurement Experiment

- TASK: measure La-140 isotope dust spread on grass-covered meadow
- Data Time-synchronization, position measurement only
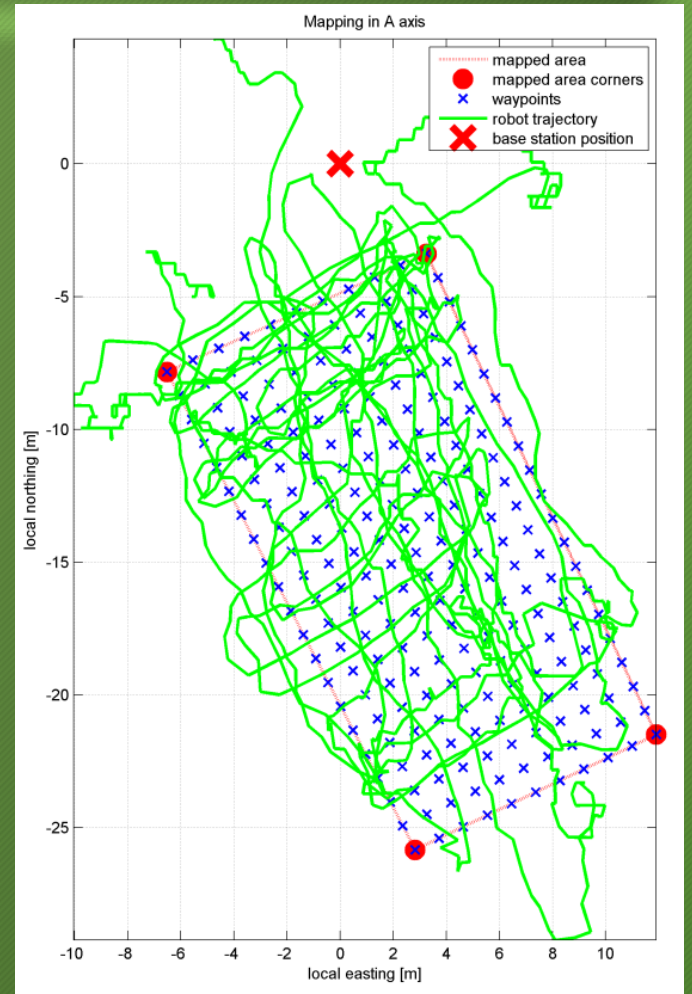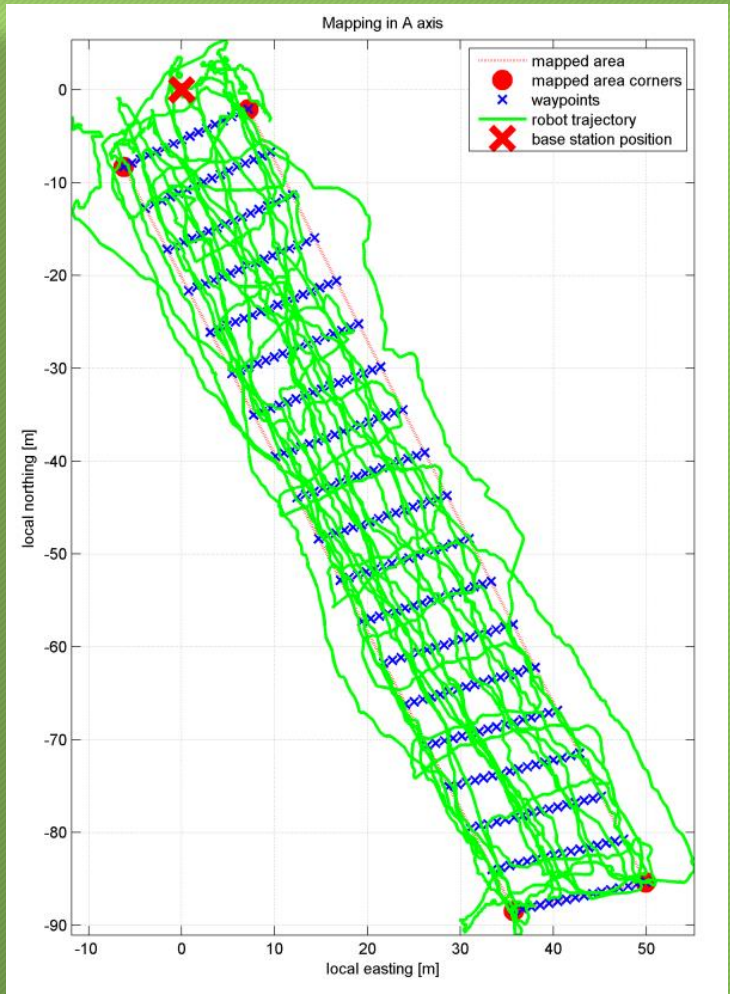- Operator control – no autonomous navigation

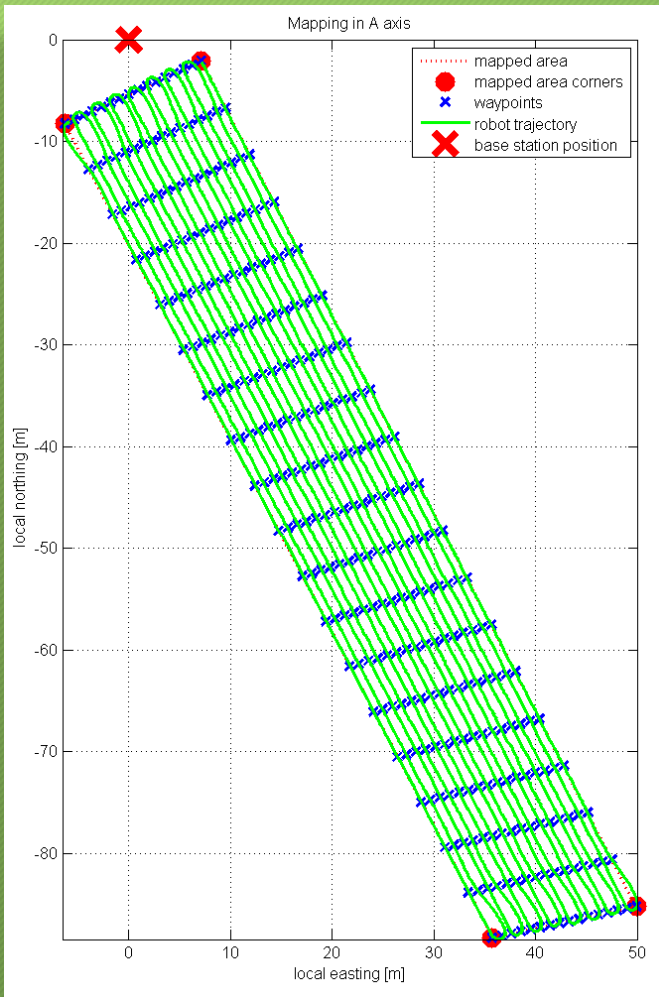# Lost Radiation Sources Experiment

- TASK: Localize randomly located sealed radiation sources

- Two parts – greater area, and smaller area with more dense measurements

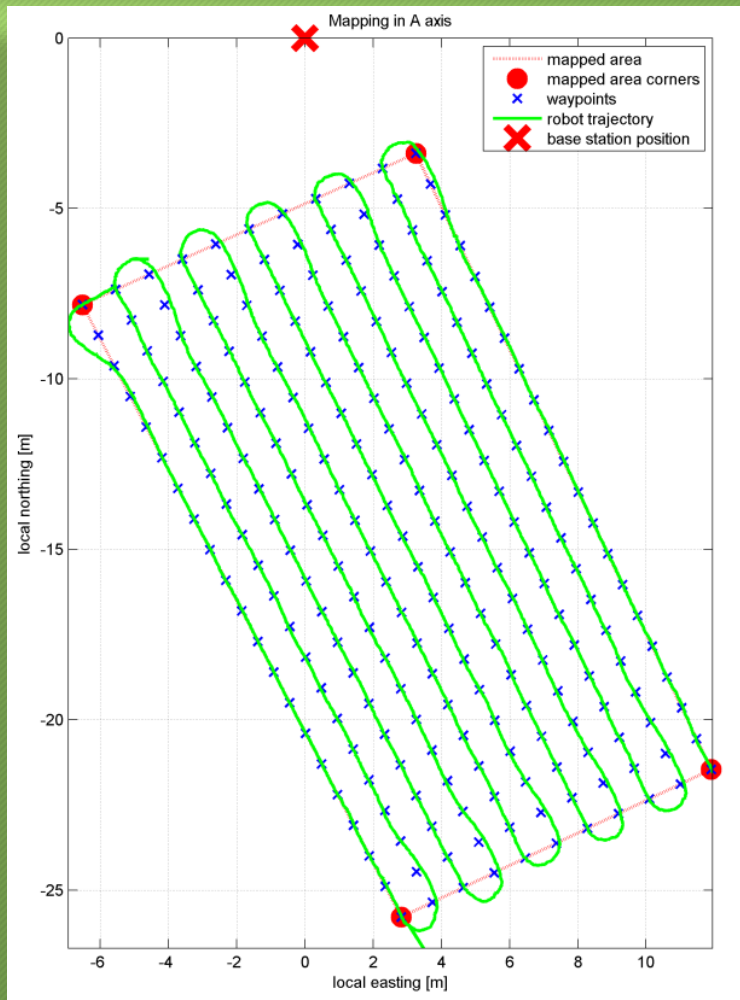- Fully autonomous navigation and selflocalization

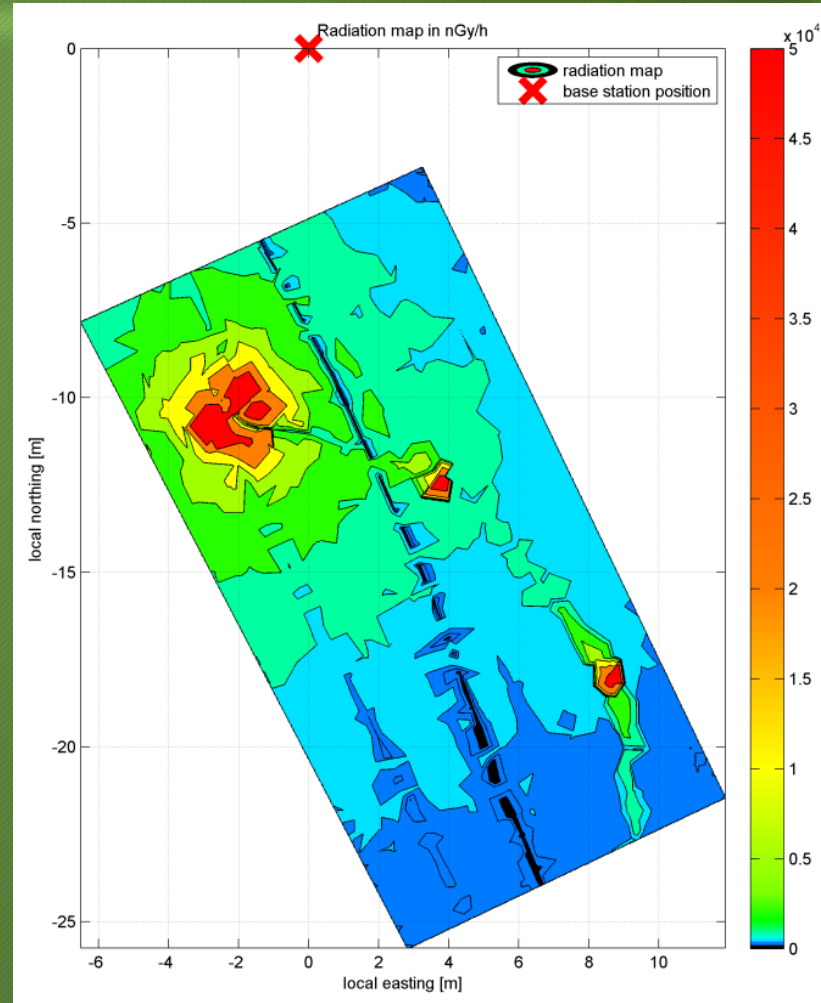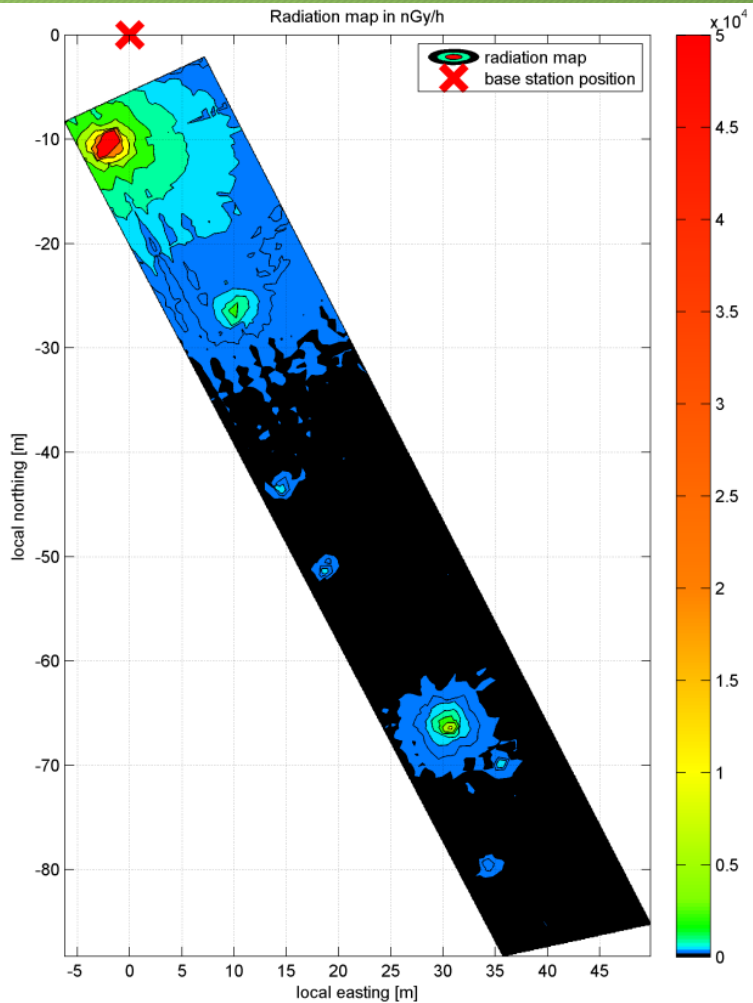# Experiment 2a – selfloc with "standard" L1 GPS
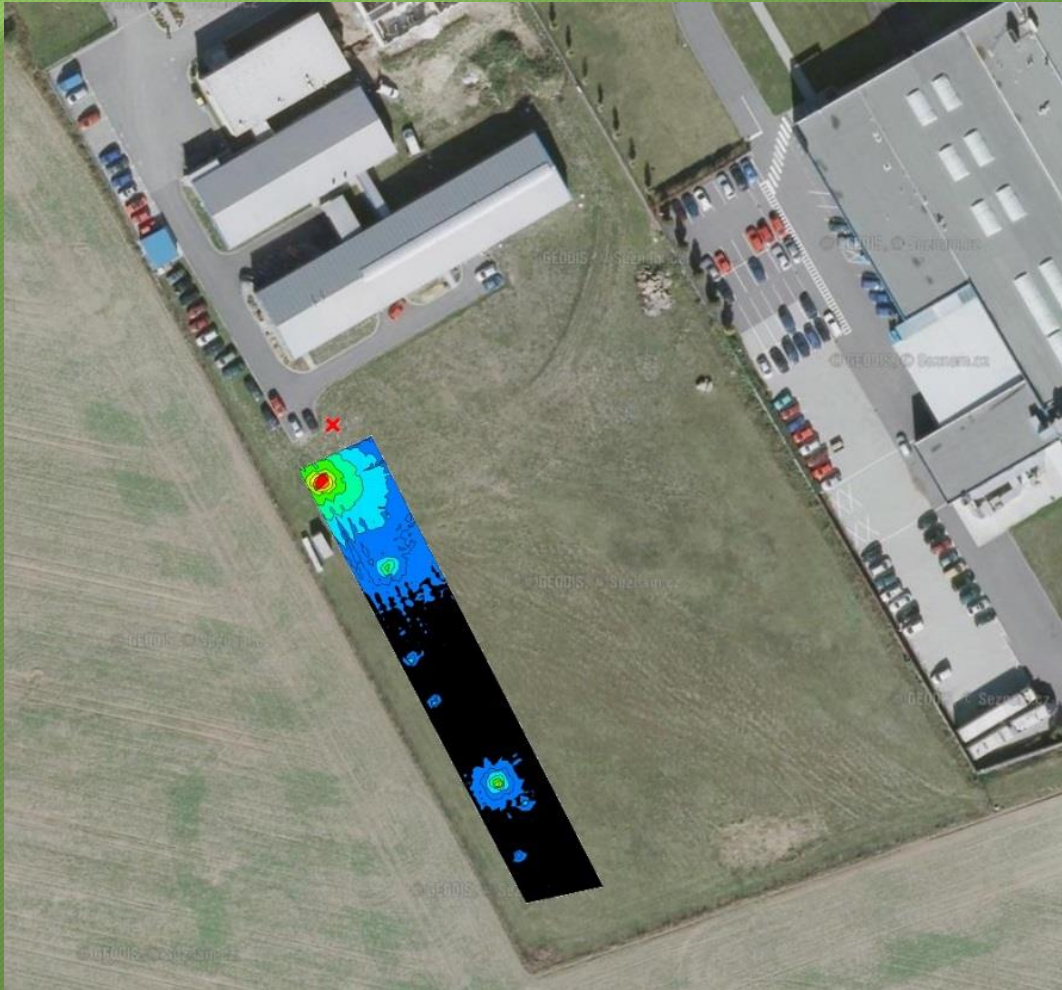
Experiment 2a – selfloc with RTK GNSS

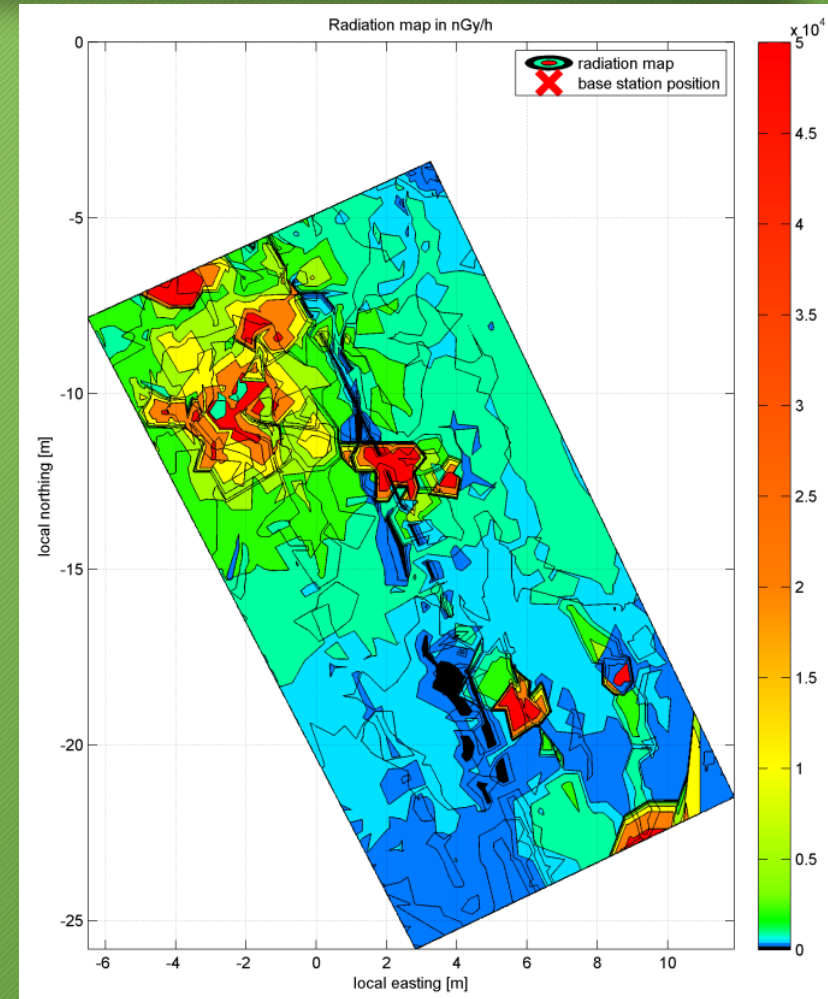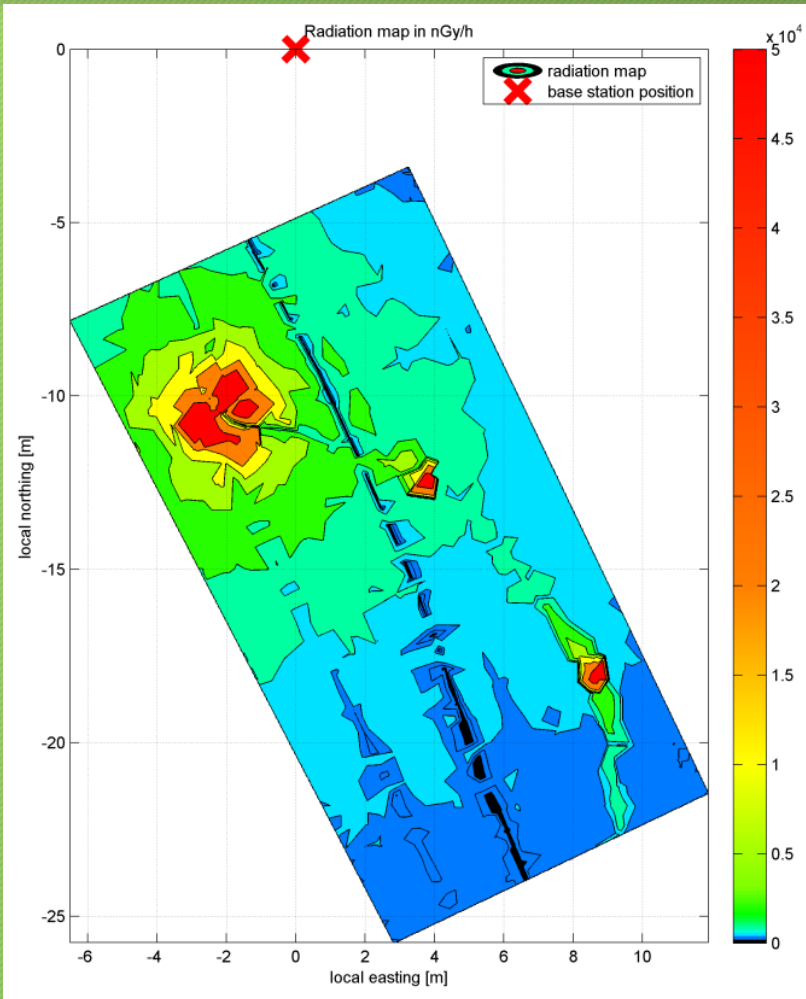# Experiment 2b – trajectory planning

Radiation Intensity Map [nGy/h]

Radiation Intensity Aligned With Orthofoto Map

RTK GNSS and GPS L1 Map Comparison

THANK YOU FOR YOUR ATTENTION