L'INSTITUT agro

SELMET

TECH CARE

Integrating innovative TECHnologies along the value Chain to improve small ruminant welfARE management

Precision farming with small ruminants
Works & Challenges in Integrating Animals and Sensors

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Théo KRISZT – PhD Student

Before we start

A little background

- I have a software engineering background with a specialization in embedded electronics
- I mostly deal with the technological aspects of our projects

What we aim for

- To provide digital tools to monitor and assess Animal Behaviors and social networks structures in small ruminants
- Develop a sensor-based tool to provide a decision support for shepherds and farmers working in (agro)pastural and extensive livestock productions systems

In this presentation

01. RF proximity sensing

Signal strength as an inter-individual distance estimation

02. Position monitoring

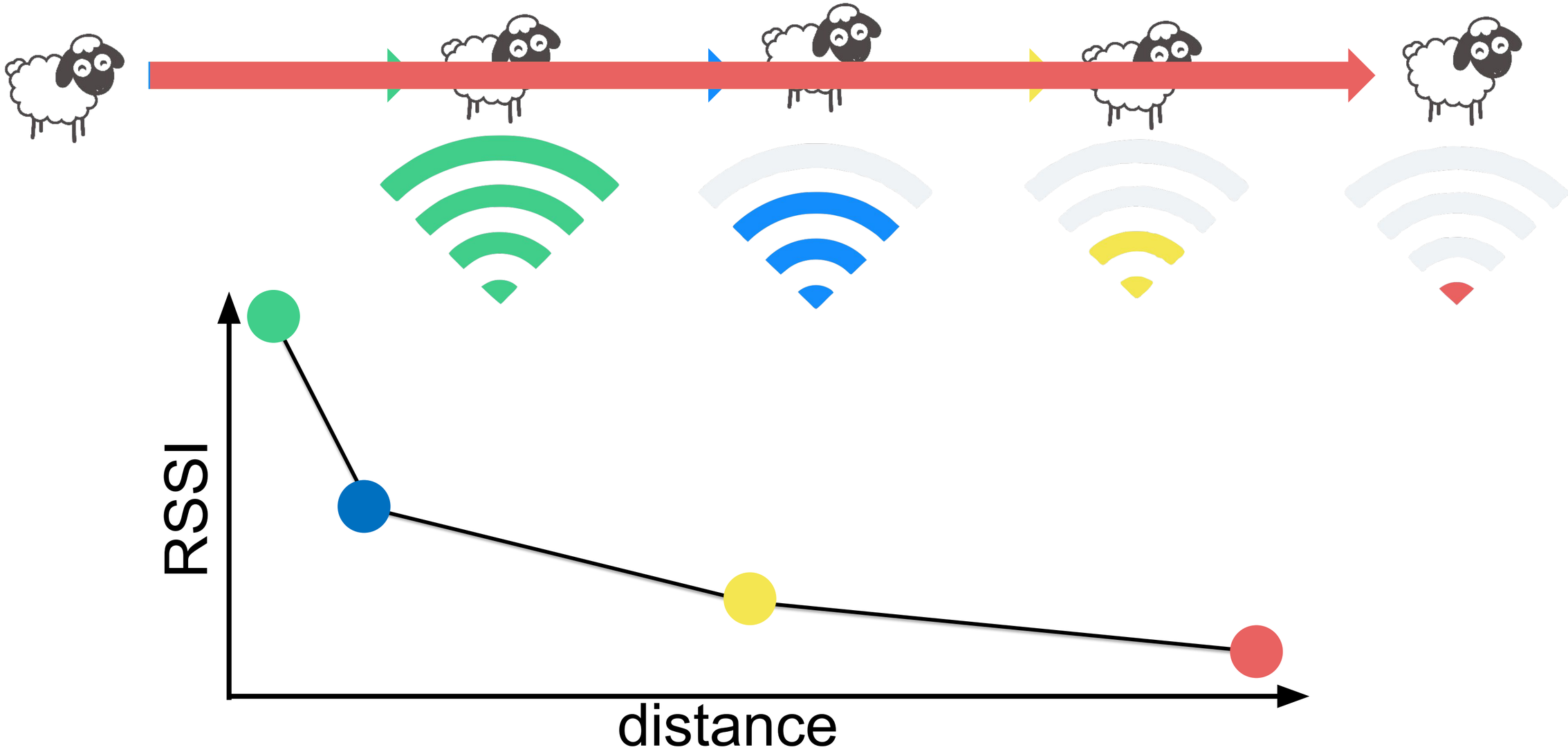
Evolution of an animal-worn position tracker with specific constraints and challenges

03. Network Coverage Planning

How to deploy wireless sensor networks in remote and underserved areas ?

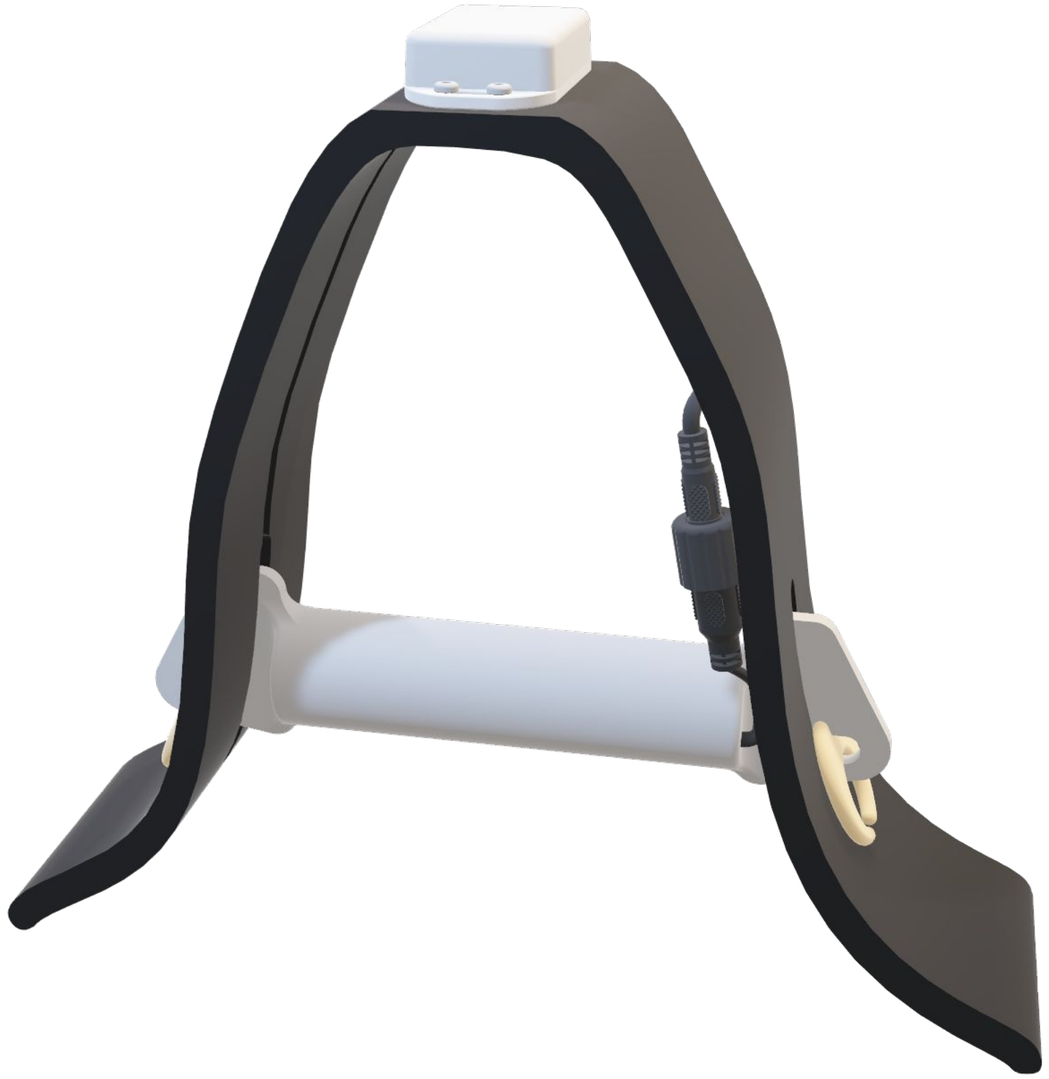
01. RF proximity sensing

Radio waves as a sensor



Design considerations

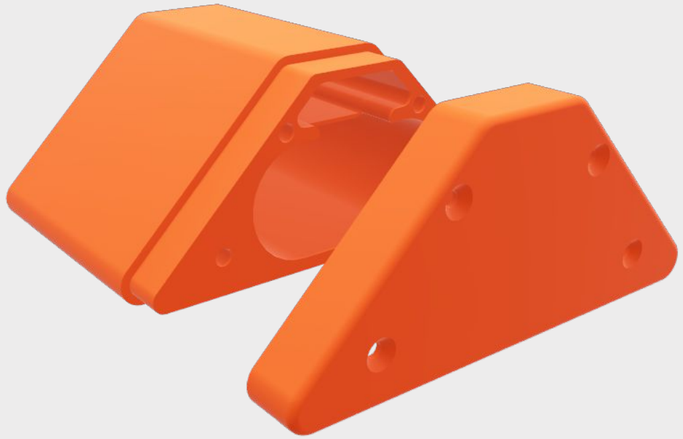
Careful considerations must be taken into account regarding both the animal’s well-being and the collar functions

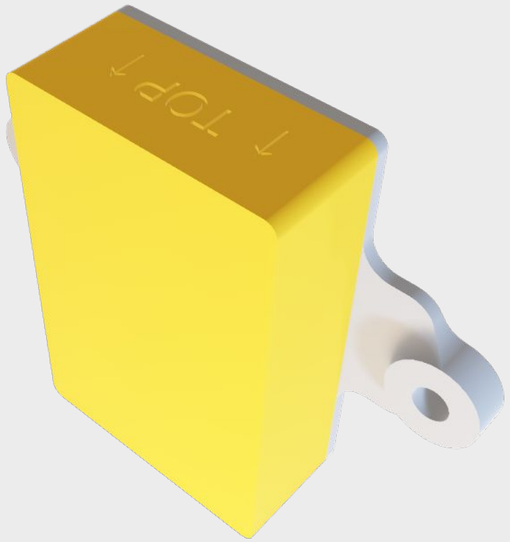


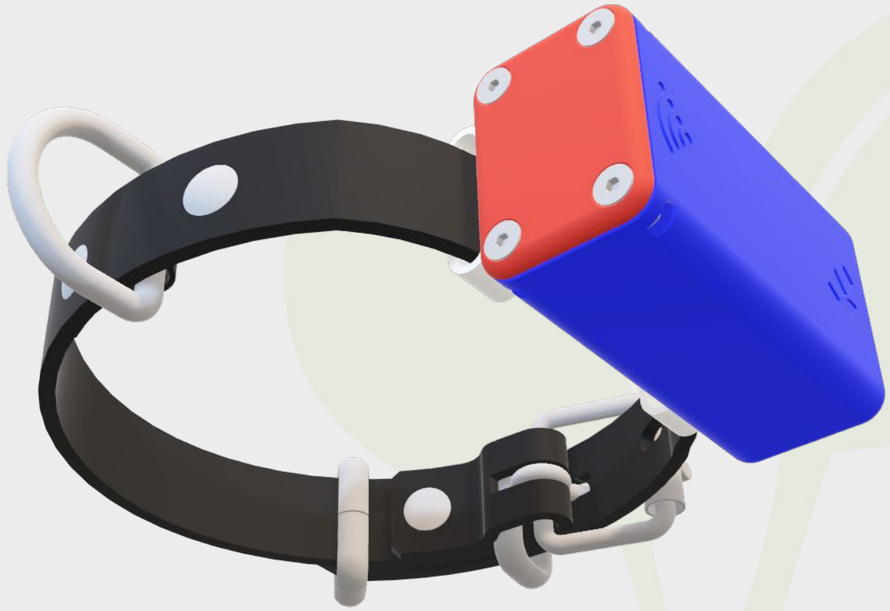
02. Tracking animals Positions

Evolution with 3D printing

Several revisions along the years made it possible to correct design flaws and add new functionalities







Further Thesis Works

A multi-sensor tool for high precision position monitoring tool

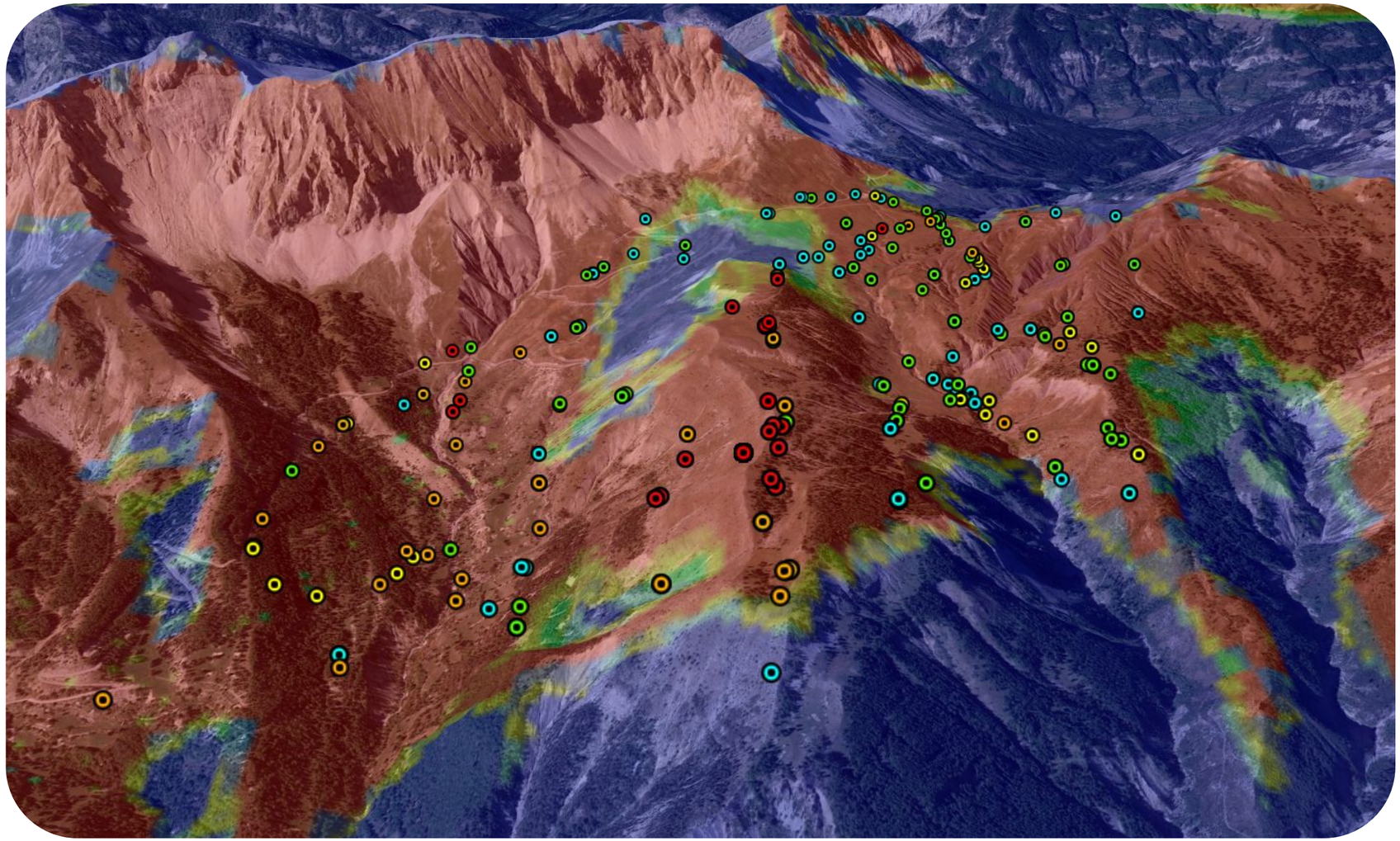
A Decision Support Tool for extensive livestock production systems management

03. Network Coverage Planning

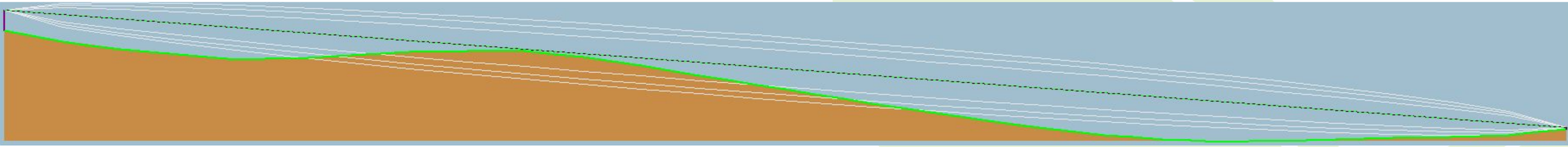
Deploying a remote LPWAN network

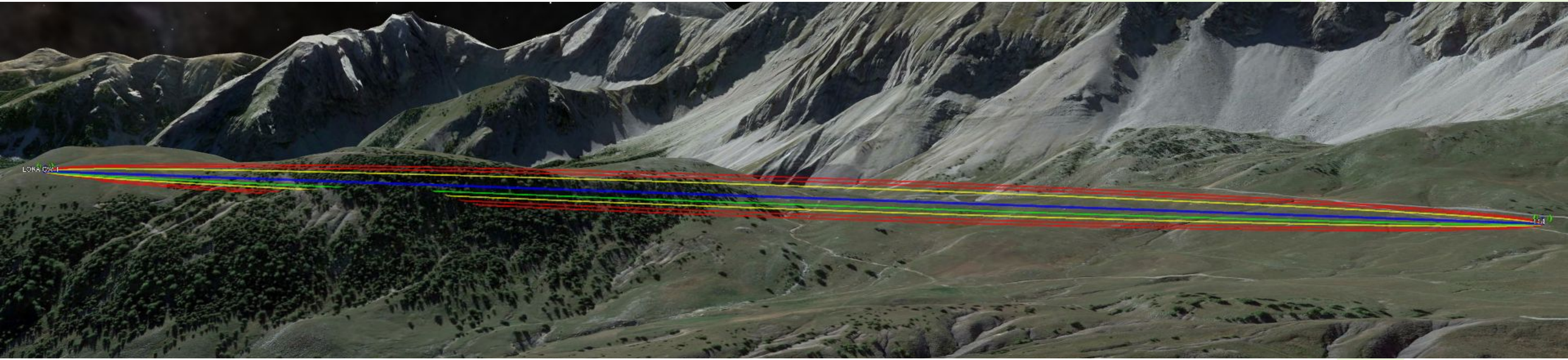
ITM assessment

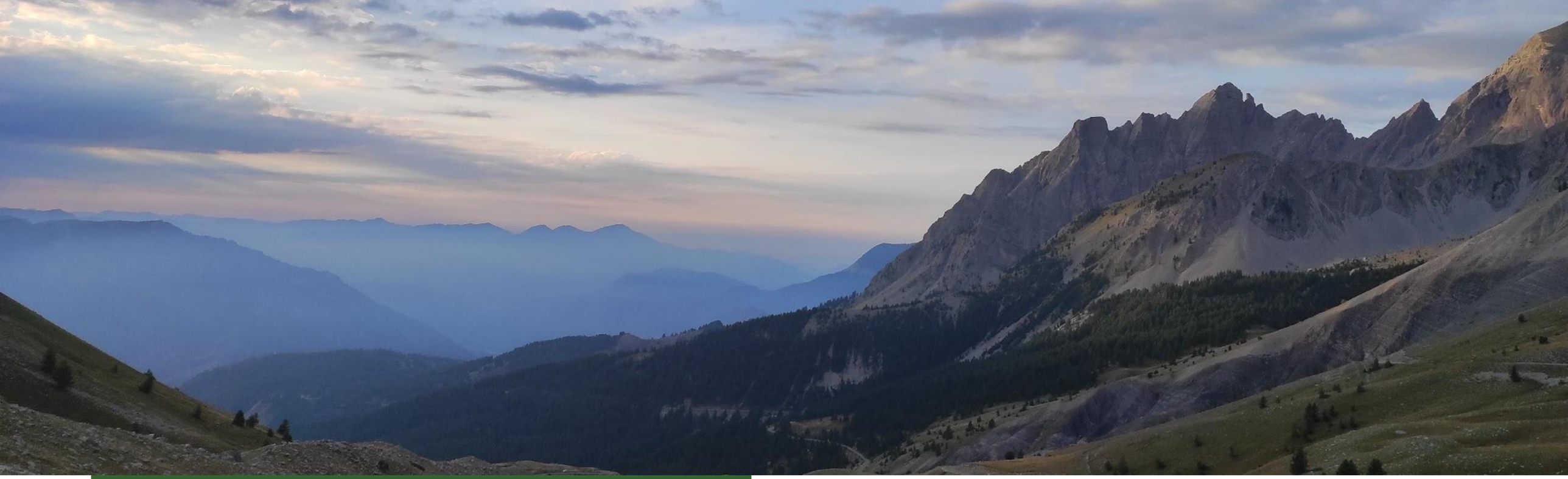
Using a simulation software relying on the Longley-Rice Model, the optimal gateway placement was first simulated then assessed in the field



Concluding on the planning methods







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Thank you for your attention

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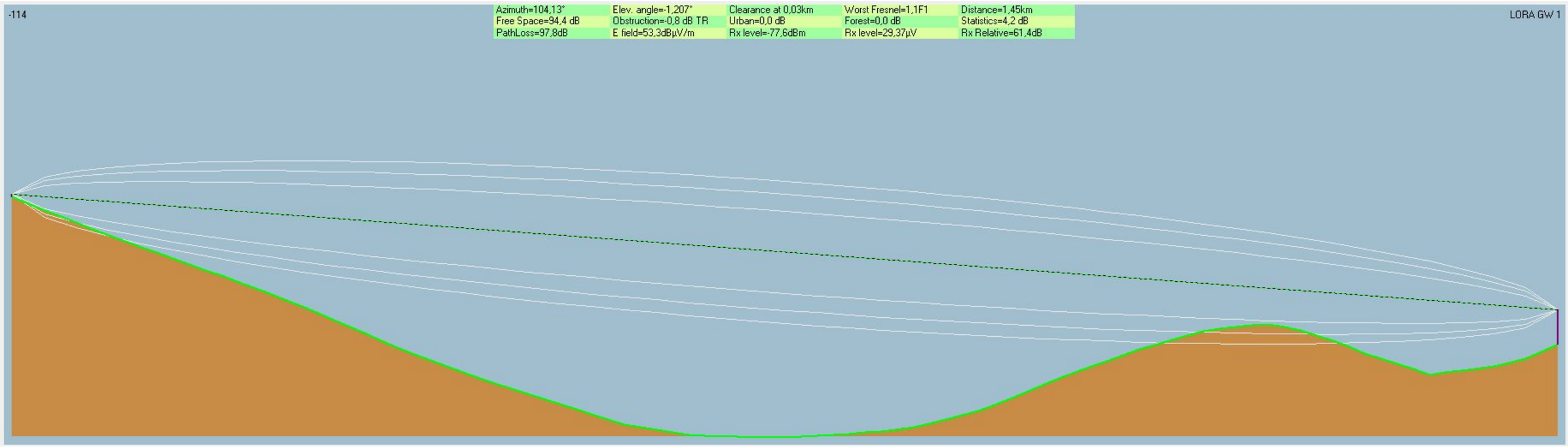
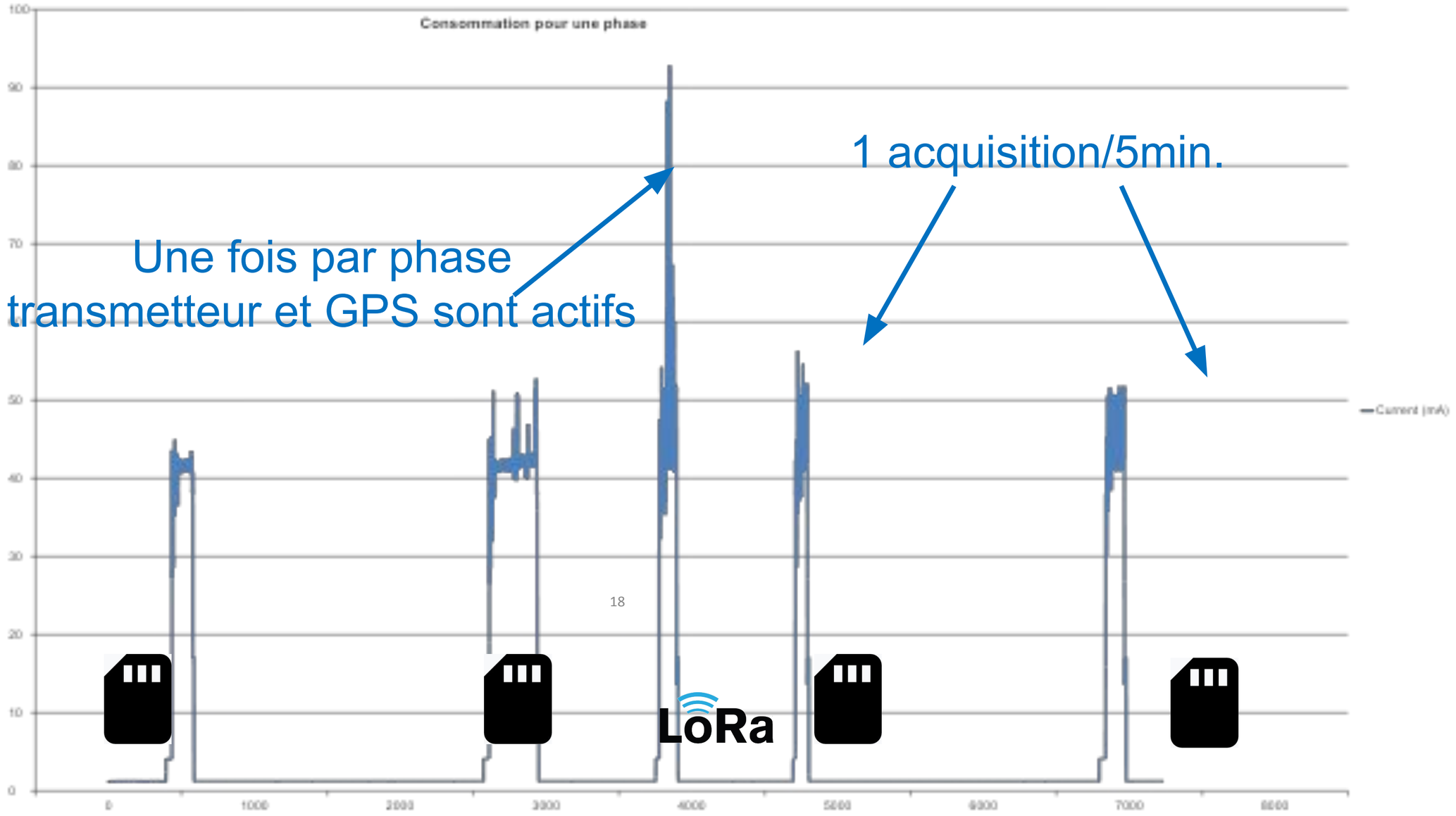
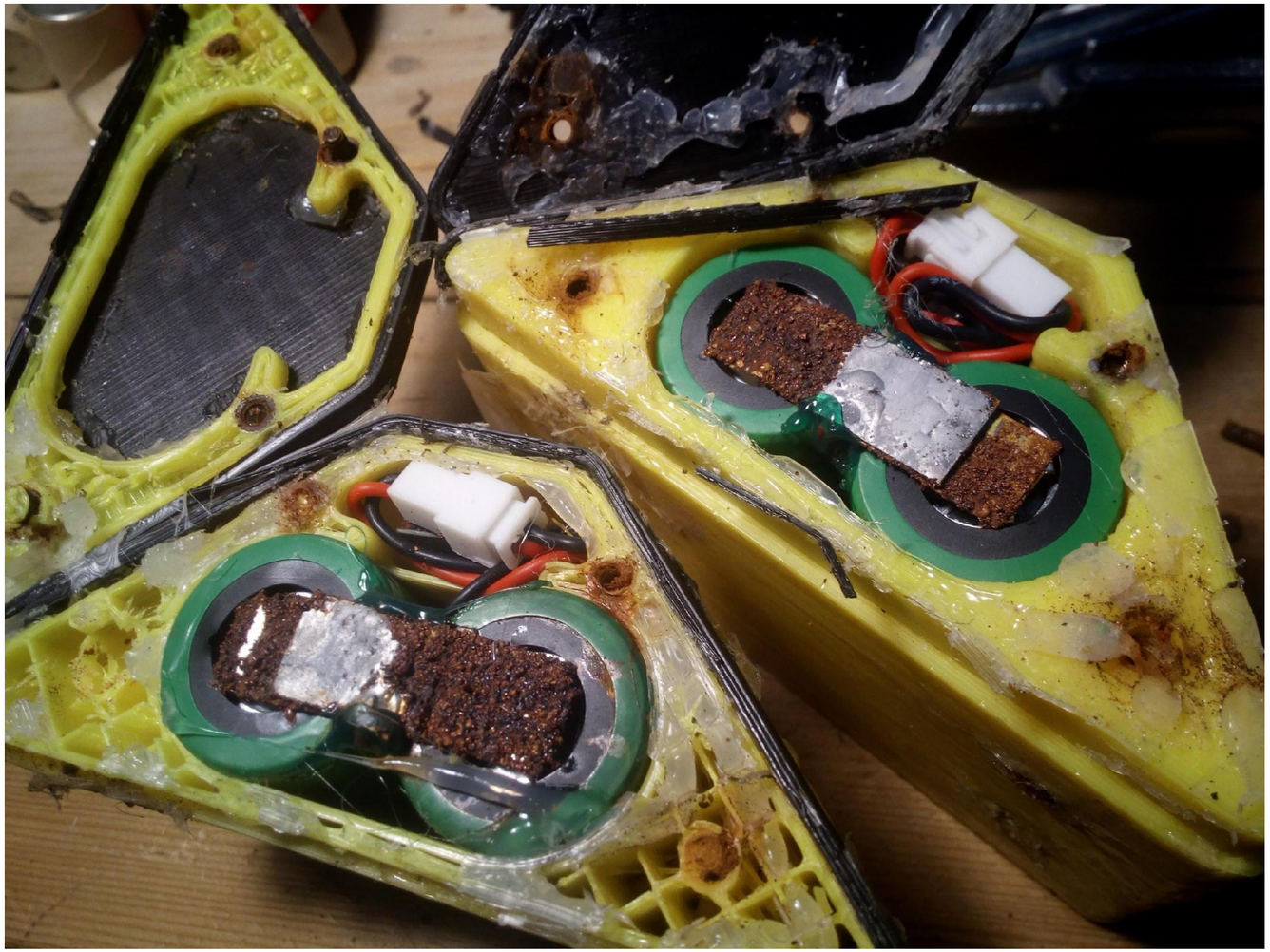
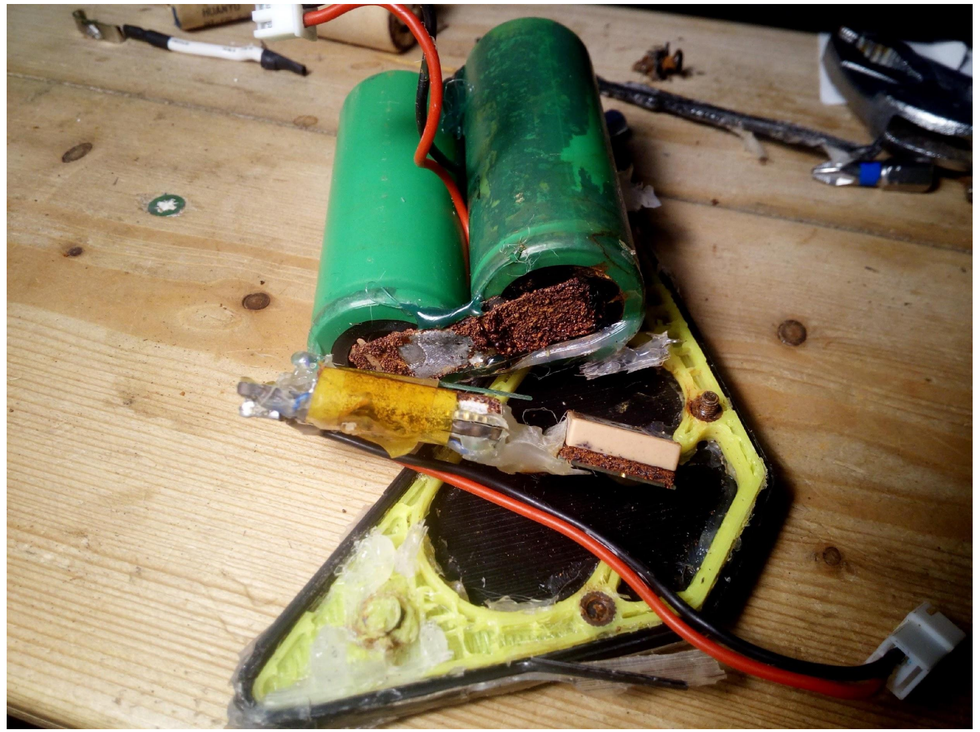

-114
Azimuth=104,13°
Elev. angle=-1,207°
Clearance at 0,03km
Worst Fresnel=1,1F1
Distance=1,45km
Free Space=94,4 dB
Obstruction=-0,8 dB TR
Urban=0,0 dB
Forest=0,0 dB
Statistics=4,2 dB
PathLoss=97,8dB
E field=53,3dBµV/m
Rx level=-77,6dBm
Rx level=29,37µV
Rx Relative=61,4dB
LORA GW 1

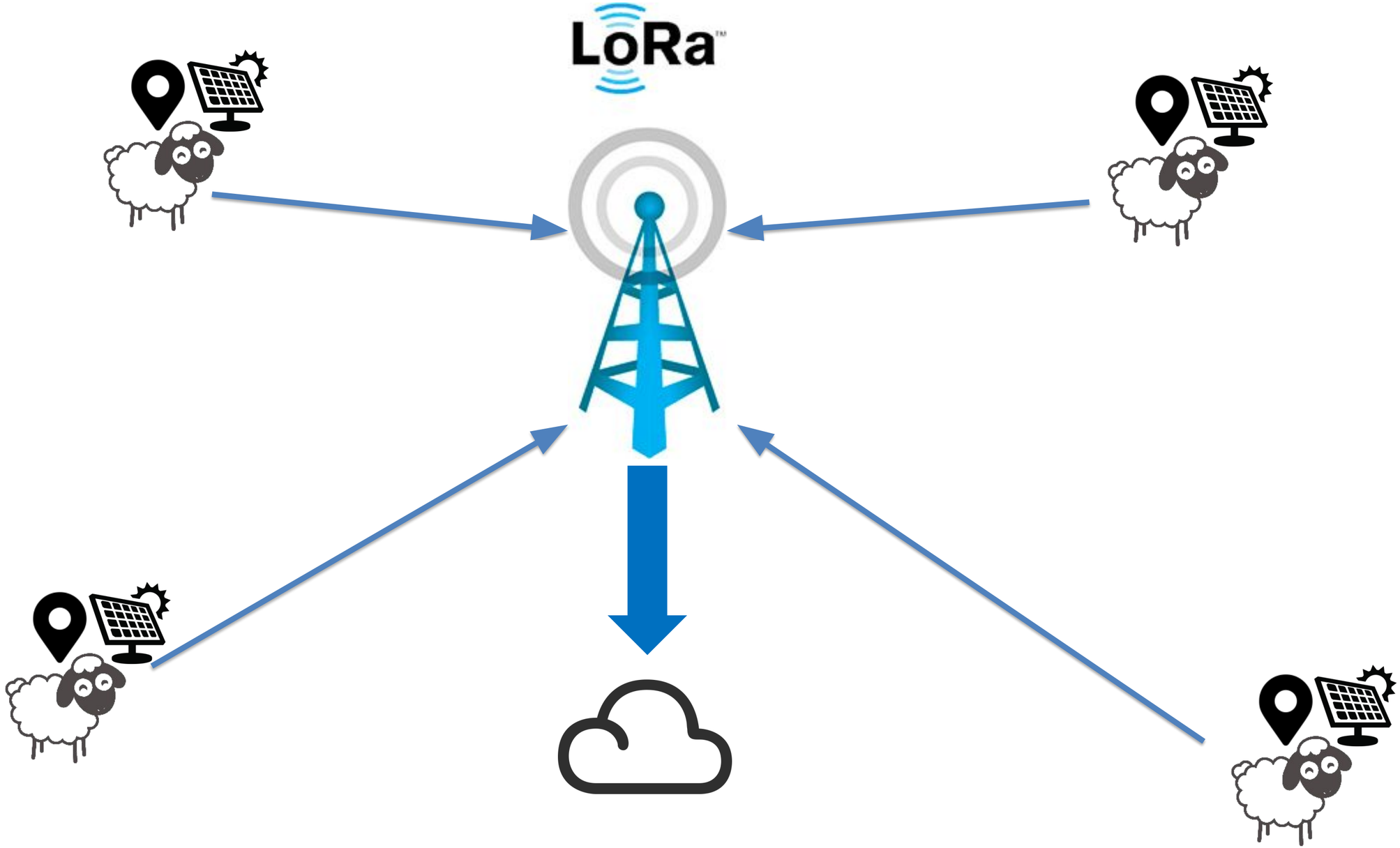

Tracker 14
Elevation=2236,7m
Elev. angle=-3,776°
Clearance=353,31m
Fresnel=15,8F1
Distance=4,82km
PathLoss=197,8dB
E field=-47,4dBµV/m
Rx level=-177,8dBm
Rx level=0,00µV
Rx Relative=-38,8dB
Lora Gateway 2



Phase typique de 20 minutes du module GPS






LoRa