



International Amateur Radio Union Region 1

Europe, Middle East, Africa and Northern Asia

Founded 1950

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|-------------------|--|----------------------|--------------|
| Subject | Man-made noise measurement campaign | | |
| Society | VERON | Country: | Netherlands |
| Committee: | EMC | Paper number: | C7-03 |
| Author: | | | |



Vereniging voor
Experimenteel
Radio Onderzoek
in Nederland

VERON manmade noise measurement campaign

Purpose

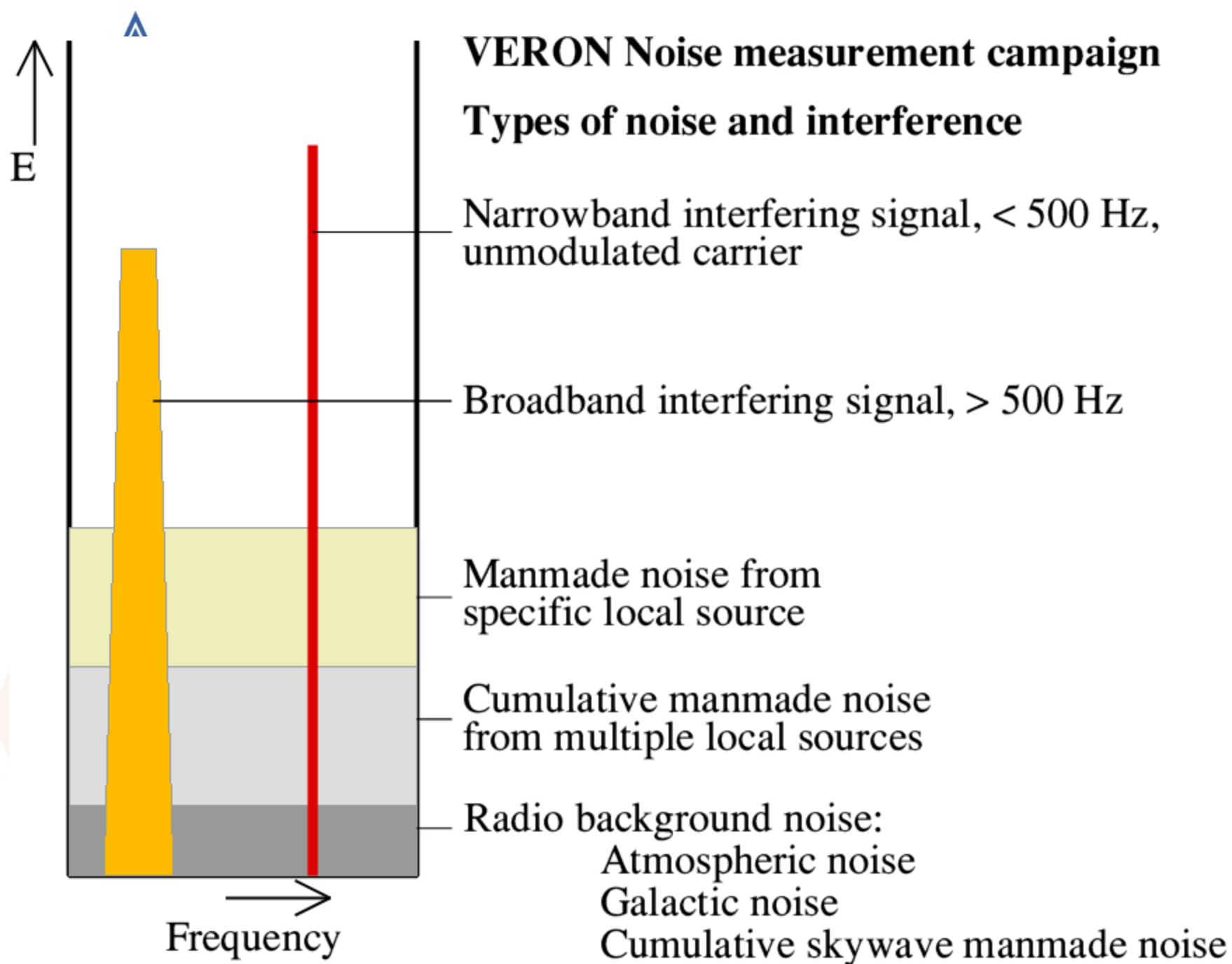
To gain insight in actual manmade noise levels today

The number of RFI signals

At a sample of radio amateur stations

In various types of environment

Focus on manmade broadband noise from local sources + RFI





Setup of the measurement campaign

Six types of environment are defined:

1. Quiet Rural: no habitation, no infra structures within 2 km.
2. Rural: up to 10 addresses within 100 m, > 100 m from built-up area.
3. Residential 1: 11 – 50 addresses within 100 m.
4. Residential 2: 51 – 100 addresses within 100 m.
5. Residential 3: > 100 addresses within 100 m.
6. Residential 4: large appartement buildings & cuty centers.

For every type of environment measurements are performed at 10 locations.



Bands

All amateur radio bands from 472 kHz to 50 MHz, including 5 MHz.

Timing of the measurements

472 kHz – 10 MHz direct after noon

14 – 28 MHz before noon

50 MHz finally

This is chosen to discriminate the local manmade noise from the skywave noise, using the attenuation by the D-layer.



Measurement equipment

1. Rohde & Schwarz measuring receiver ESH2, 9 kHz – 30 MHz
2. High sensitive loop antenna 472 kHz – 10 MHz (PA0KDF)
3. High sensitive loop antenna 14 MHz – 28 MHz (PA0KDF)
4. Active dipole & downconvertor 50 -> 10 MHz (PA0KDF)
5. Datalogger, based on Raspberry Pi computer + ADC board

All antennas are calibrated in cooperation with Radio Agency NL



Data processing by the datalogger

ESH2 o/p voltage digitized and translated into electrical field strength in dB μ V/m.

Antenna factor, antenna noise floor, bandwidth conversion measurement bandwidth (500 Hz) into reference bandwidth (2.7 kHz), correction numbers for average detector and logamplifier, are taken into account of in the datalogger software.

A measurement is done in a period of 30 seconds and an average E is calculated. Then antenna is rotated 90°, and a second measurement is done. This results in a highest value, a mean value, and a lowest value per measurement frequency.



Two types of measurements

1. Measurements of the floor of broadband noise in each band.
2. Measurements of RFI signals, broadband (>500 Hz), and narrowband (< 500 Hz).

For the measurements of the noise floor, measurements are done on at least 2 frequencies, depending on the width of the band.

Pro band the results are saved in a plot file and in a data file.



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Post processing

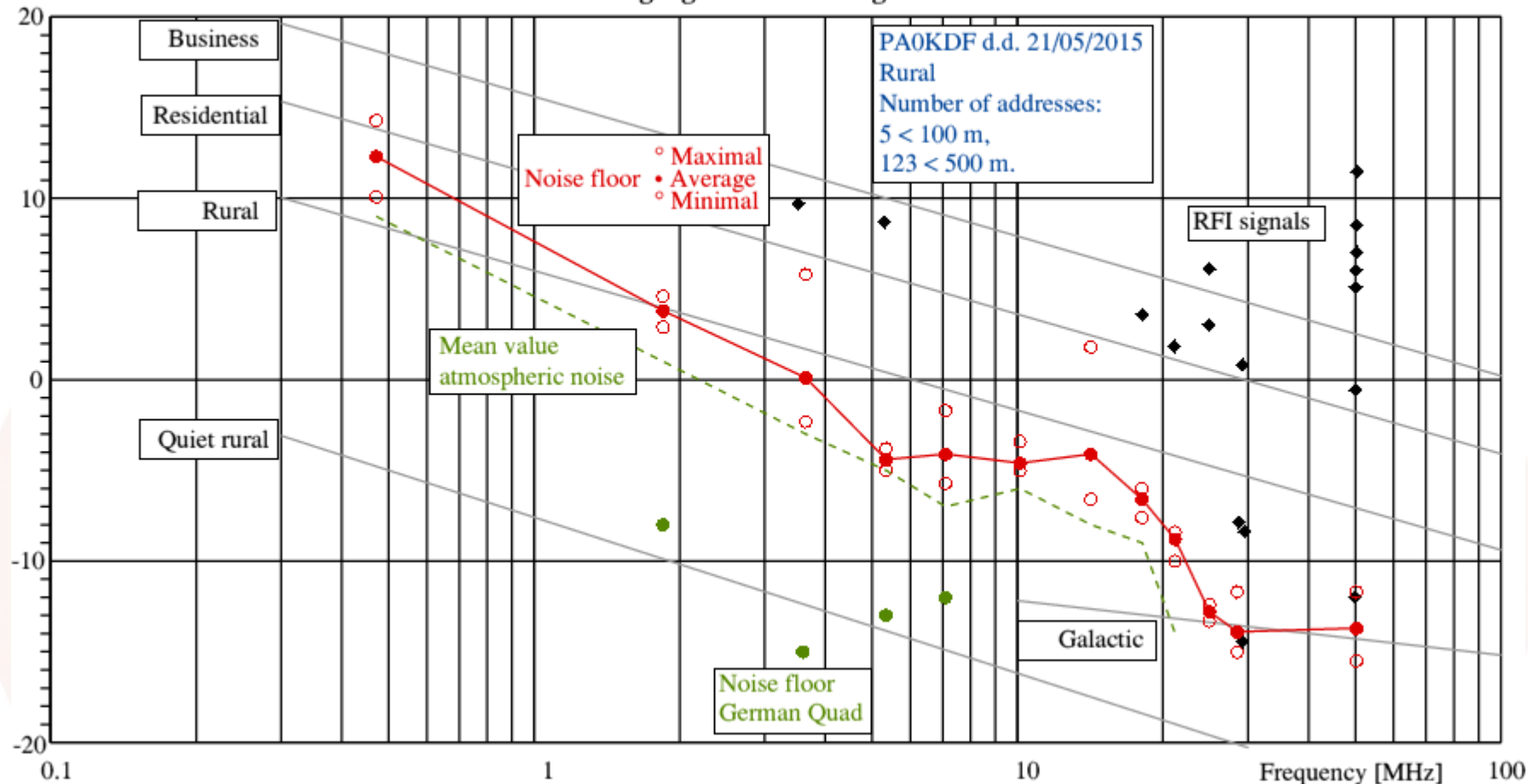
A comprehensive plot is made showing all the measurement results for a location for all bands, and relate it to ITU manmade noise data.



VERON Noise and Interfering signal measurement campaign

[dB μ V/m]

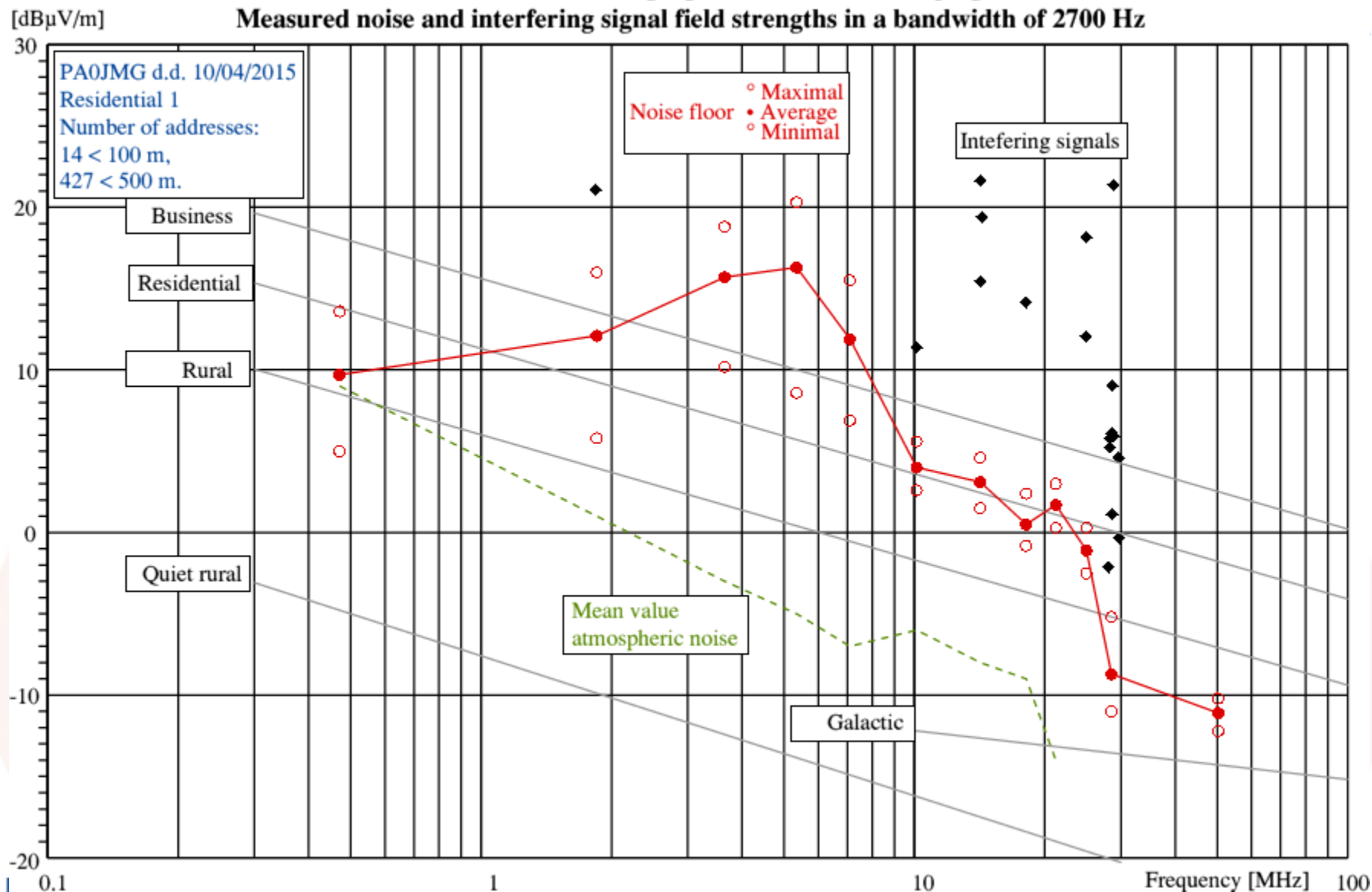
Measured noise and interfering signal field strengths in a bandwidth of 2700 Hz





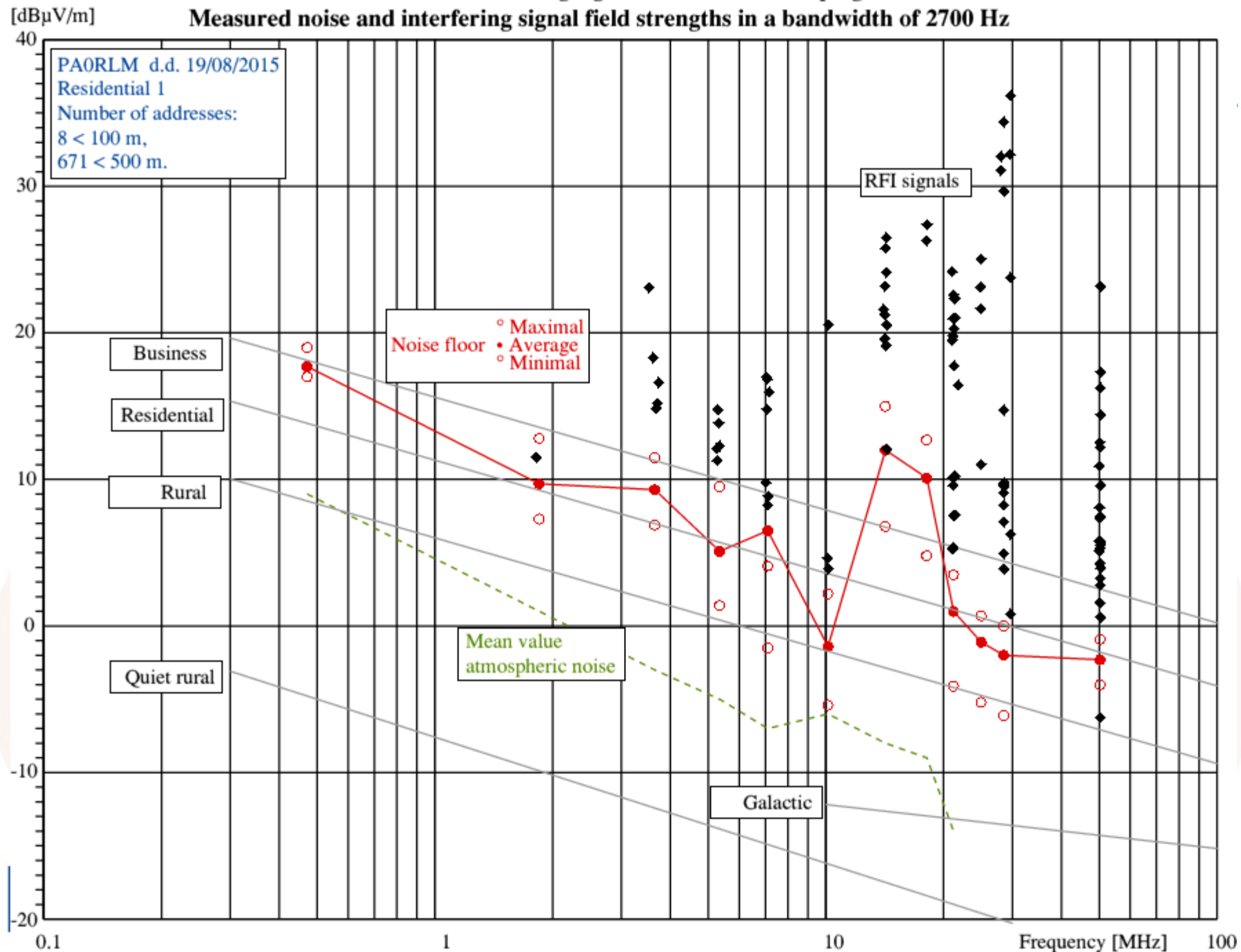
VERON Noise and Interfering signal measurement campaign

Measured noise and interfering signal field strengths in a bandwidth of 2700 Hz



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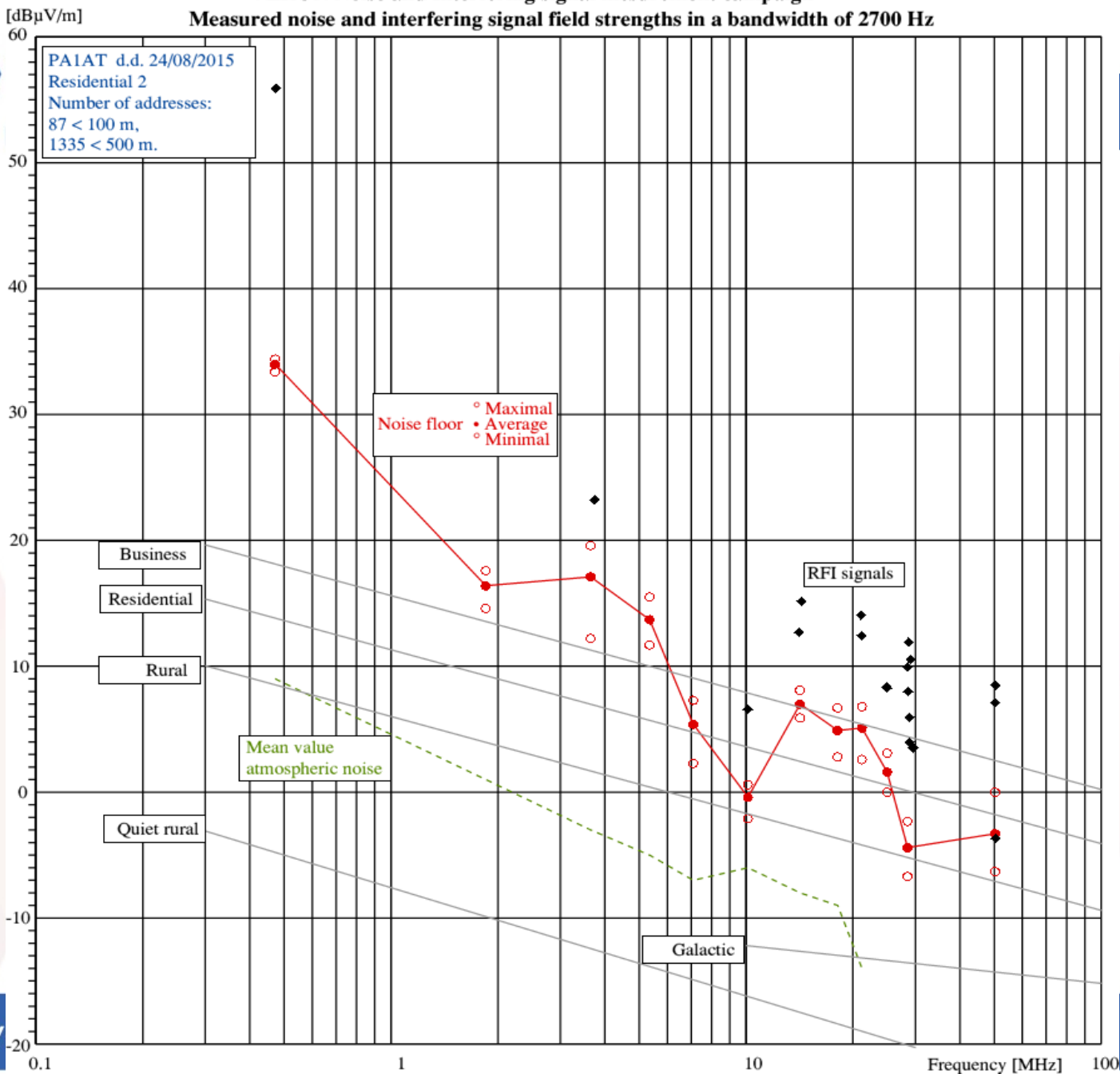
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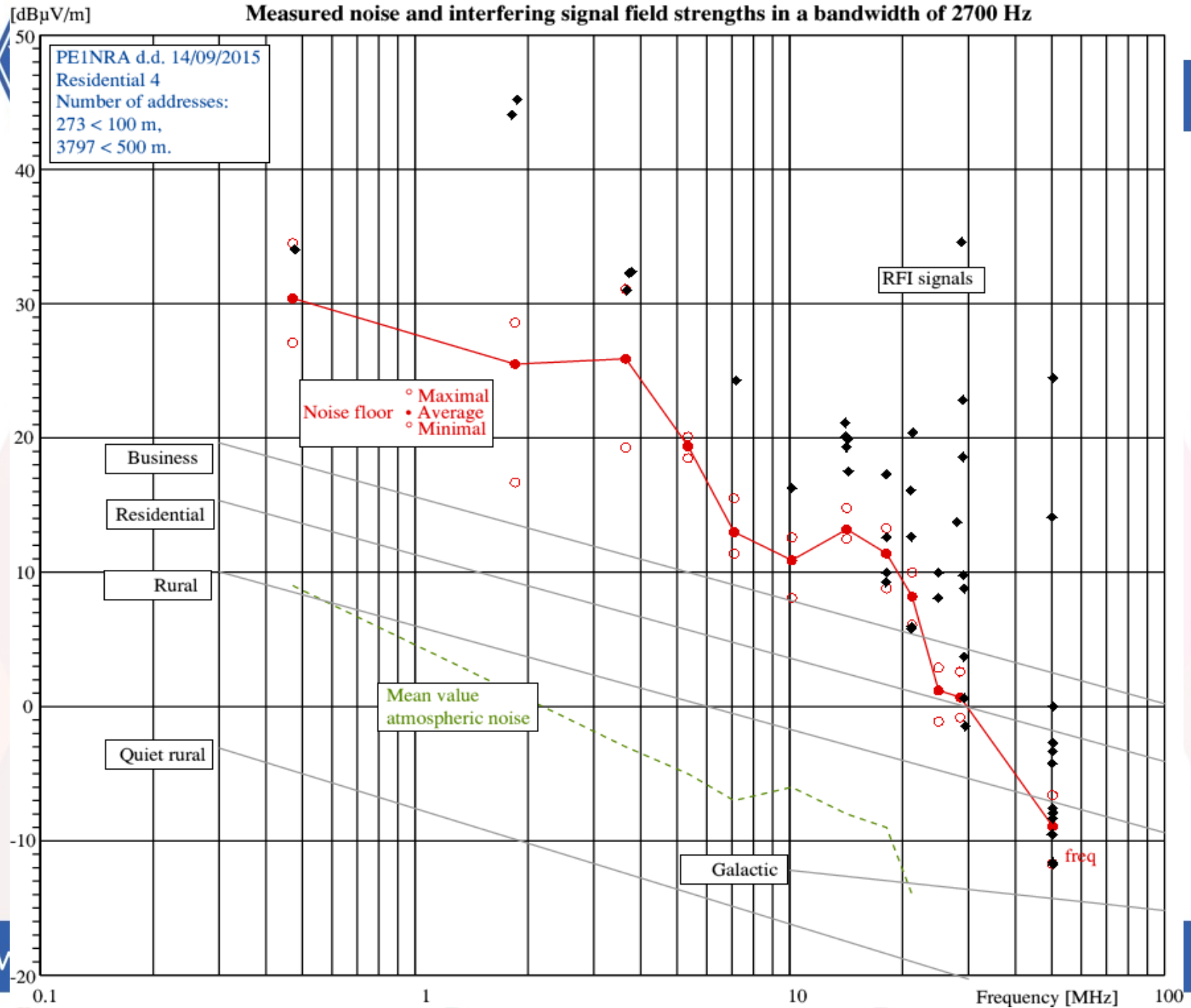
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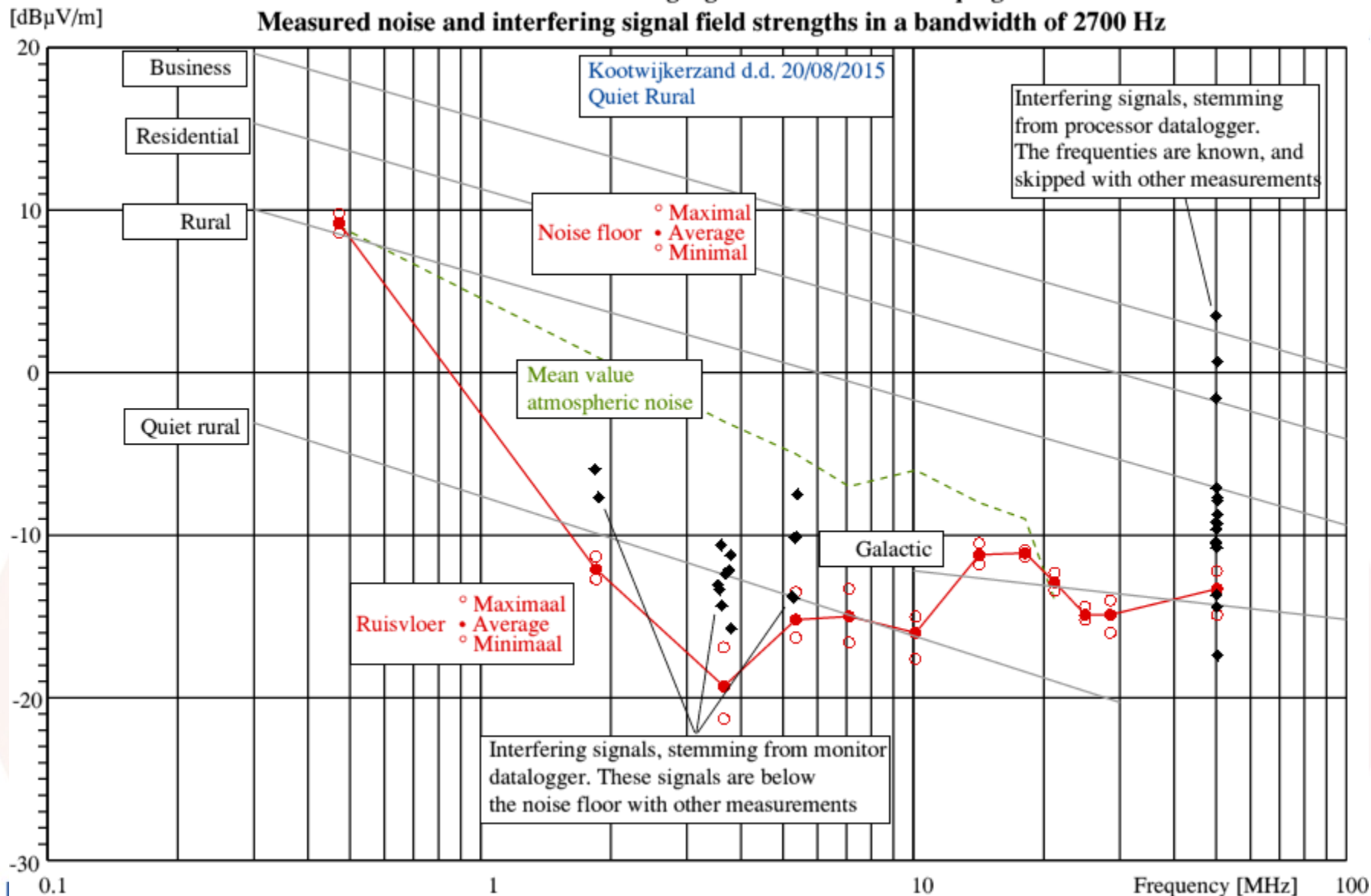
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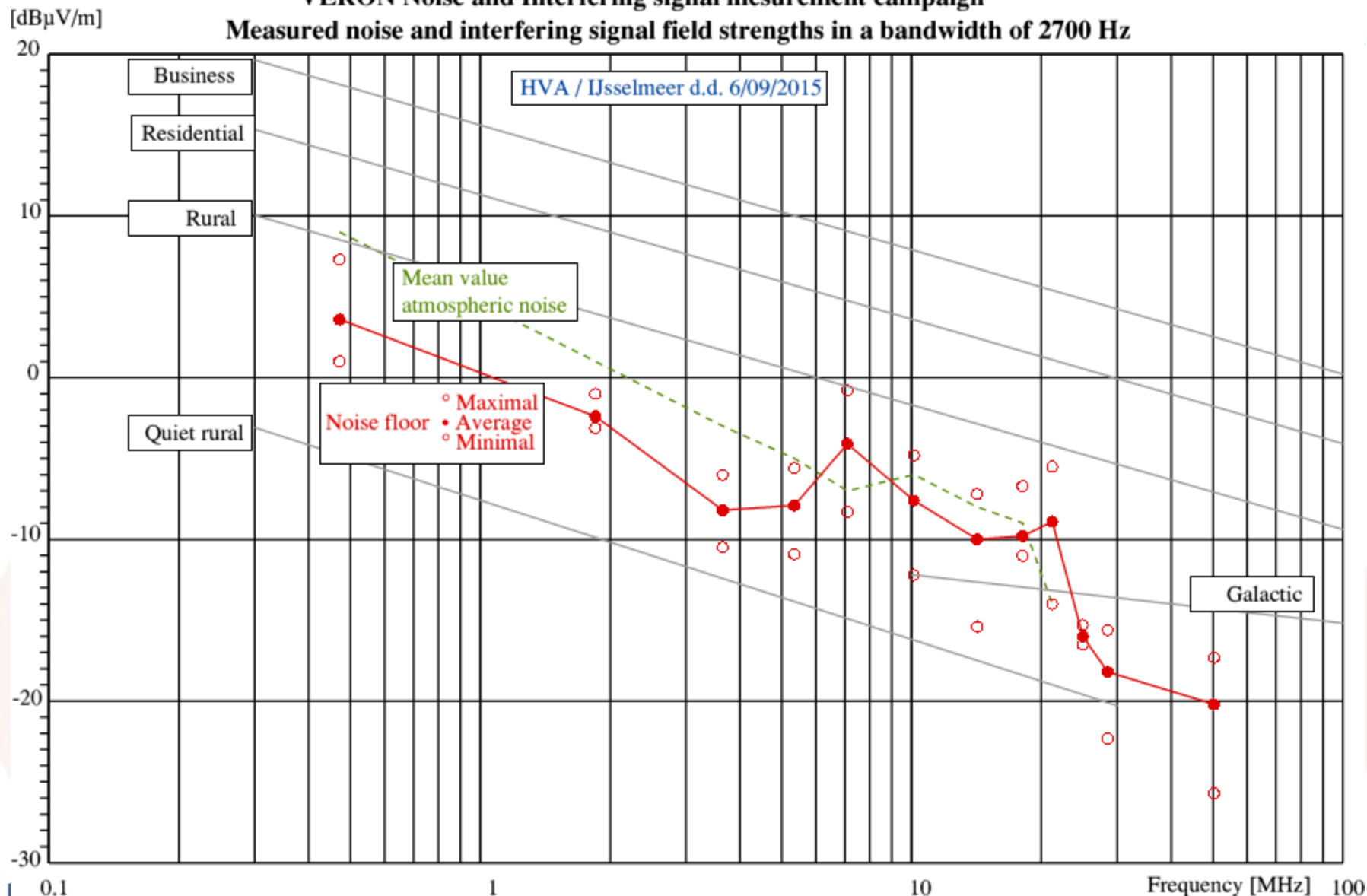
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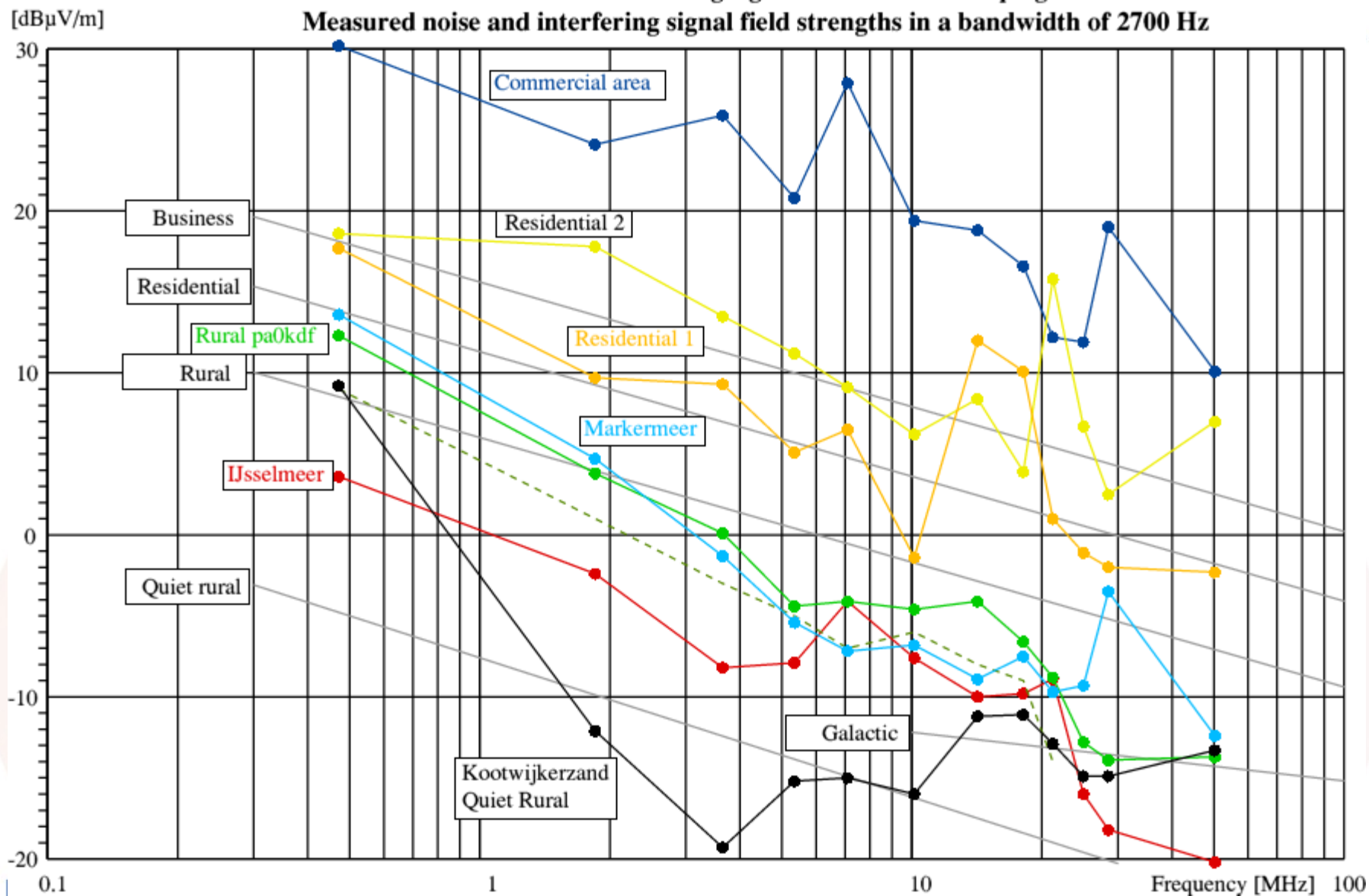
Measured noise and interfering signal field strengths in a bandwidth of 2700 Hz





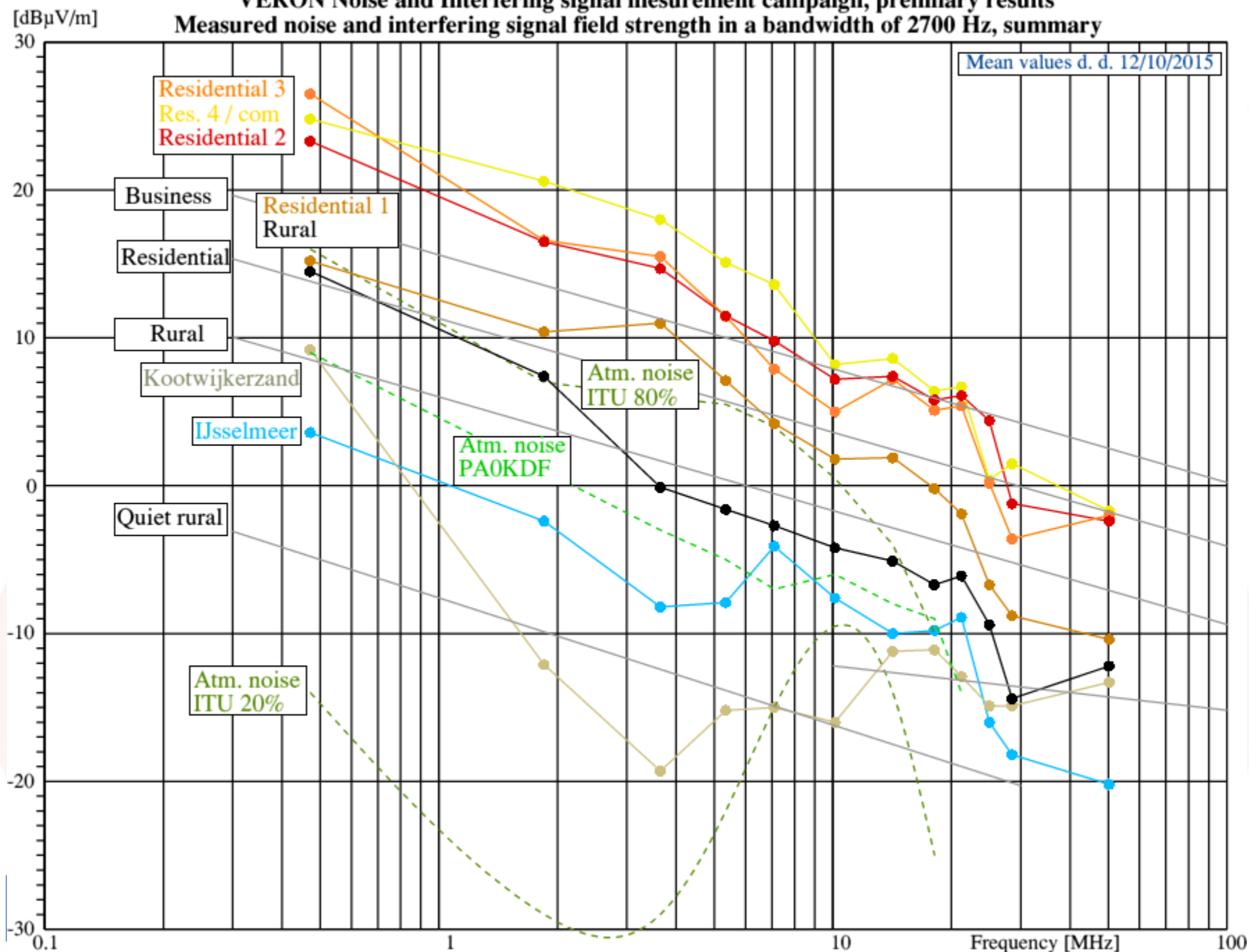
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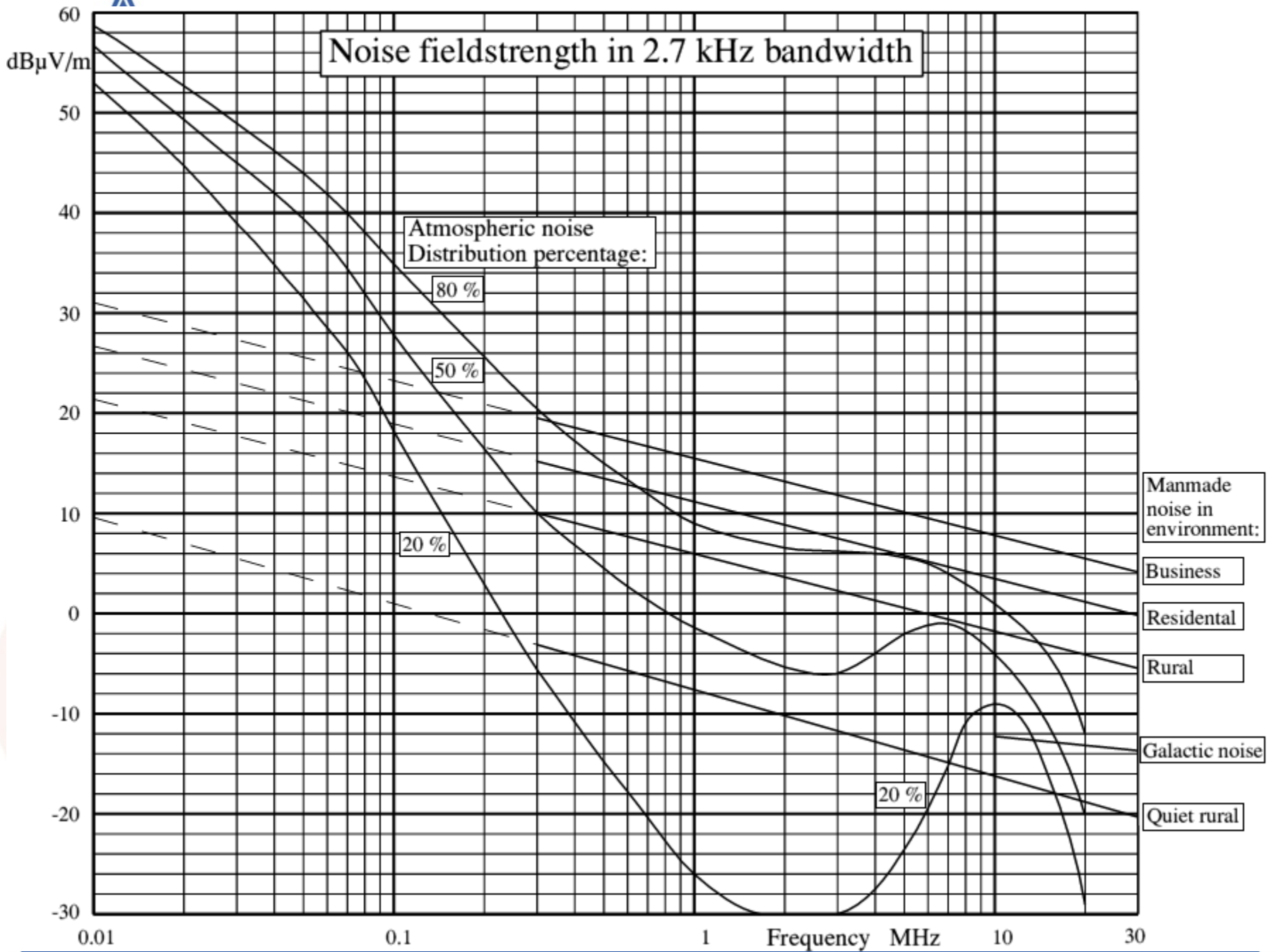
Measured noise and interfering signal field strengths in a bandwidth of 2700 Hz



VERON Noise and Interfering signal measurement campaign, preliminary results

Measured noise and interfering signal field strength in a bandwidth of 2700 Hz, summary







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