

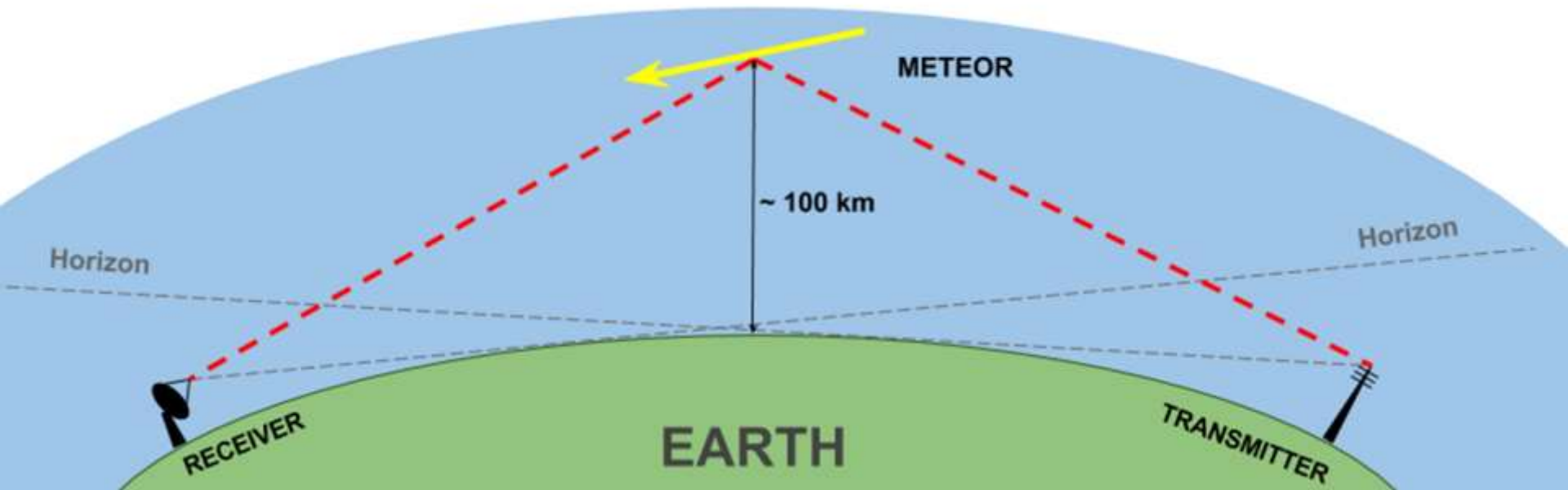


The BRAMS network : description and daily operation

H. Lamy & the BRAMS team

European FRIPON meeting
Paris Observatory, June 11-12, 2018

Forward scatter

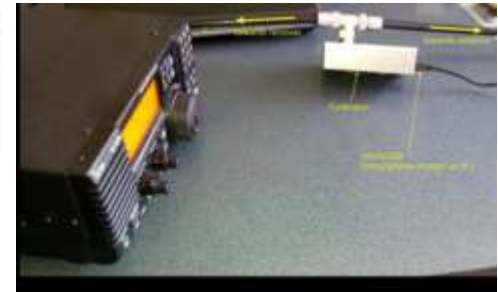
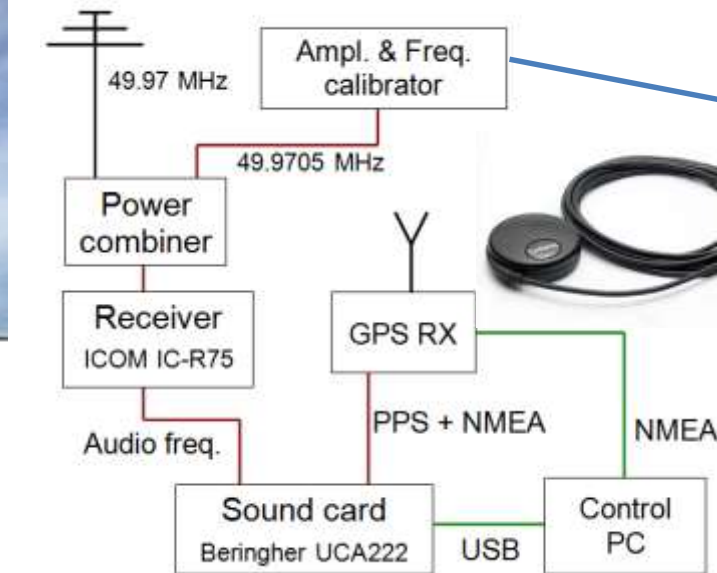


BRAMS



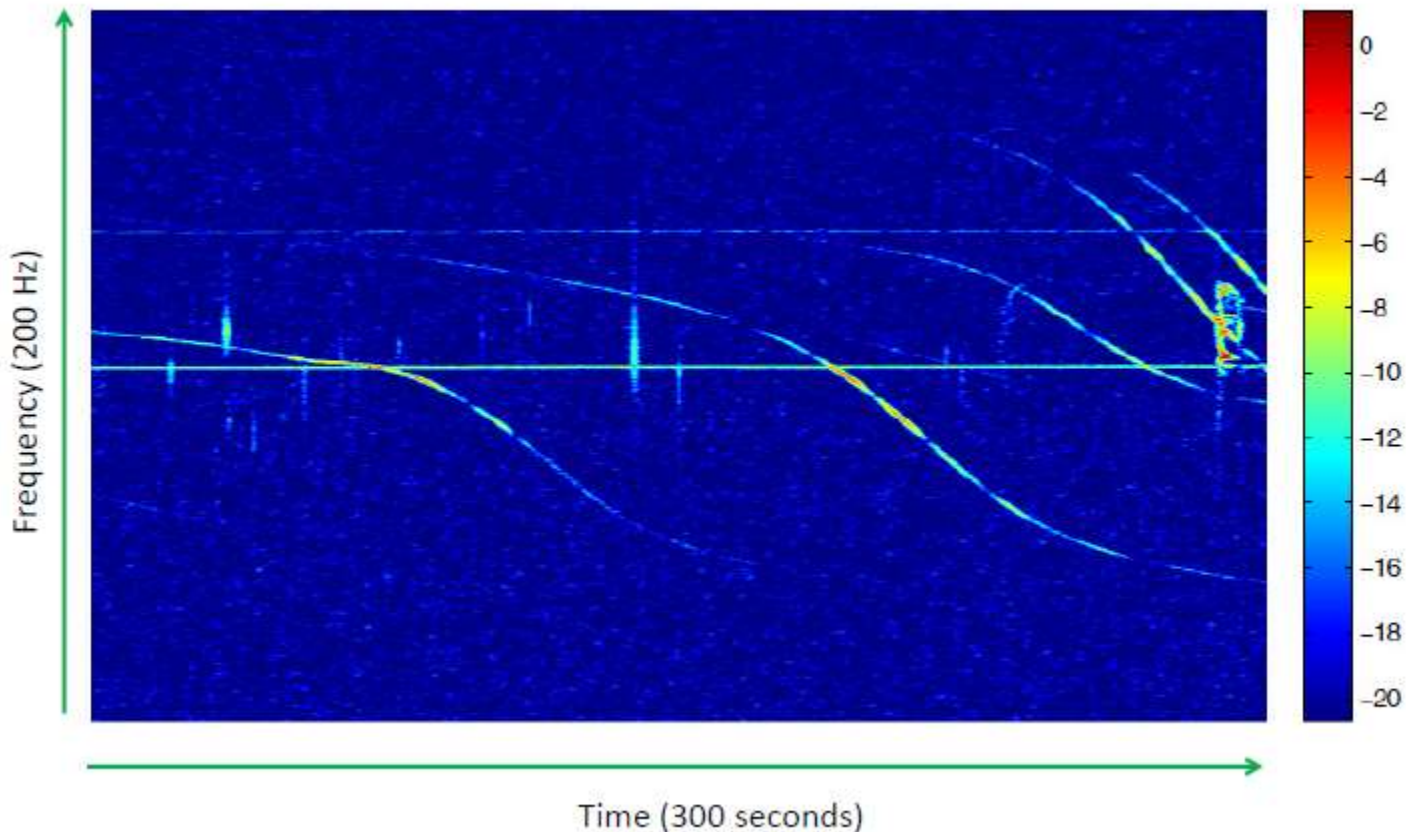
$f = 49.97$ MHz
P = 150 Watts
Continuous wave
Circularly polarized

A typical BRAMS receiving station



$$f_s = 5512 \text{ Hz}$$

Example of BRAMS data

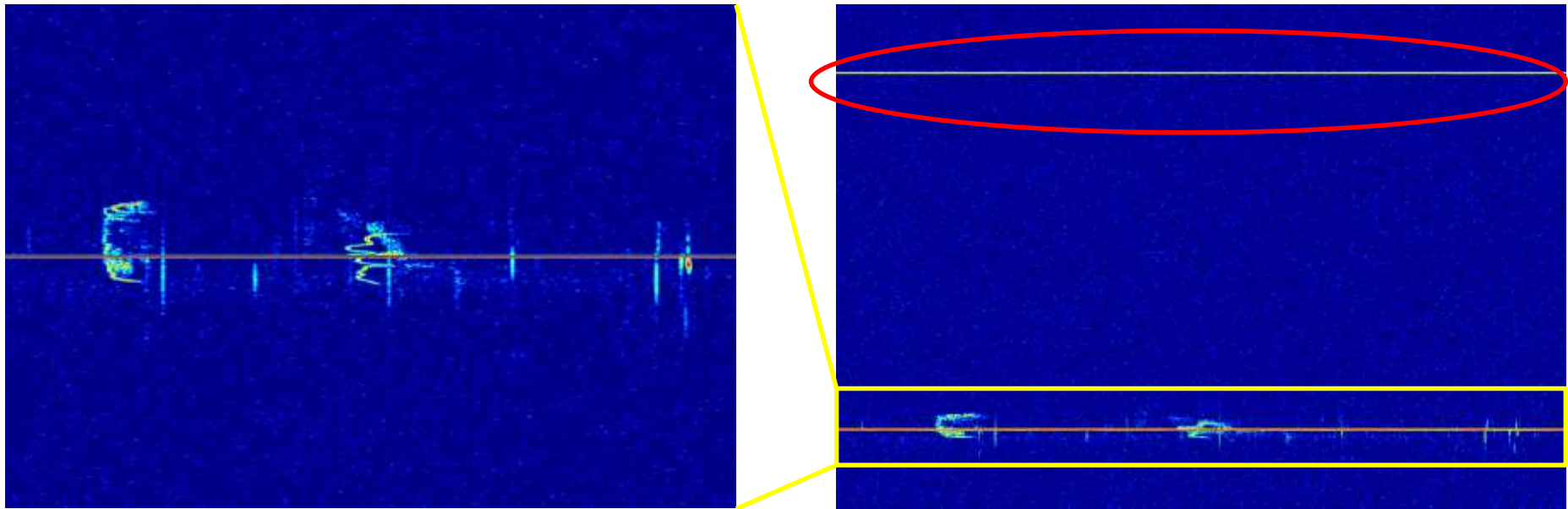


Saved as audio WAV format every 5 minutes

$f_s = 5512 \text{ Hz} \rightarrow$ FFT includes frequencies from 0 to 2756 Hz

Name of WAV files

The BRAMS calibrator



Reference for amplitude and frequency

Data transfer

- 26 active receiving stations on 8 June 2018
- 18 stations send their data **daily** in an automated way via FTP
- 4 stations send their data via FTP (FileZilla, CoreFTP) manually **weekly**
- 4 stations still send their data via USB stick **monthly**
- Pushing to have all 26 stations sending data via FTP (daily or weekly) before end of 2018. Lots of problems with the Belgian post lately ... + not fast enough.

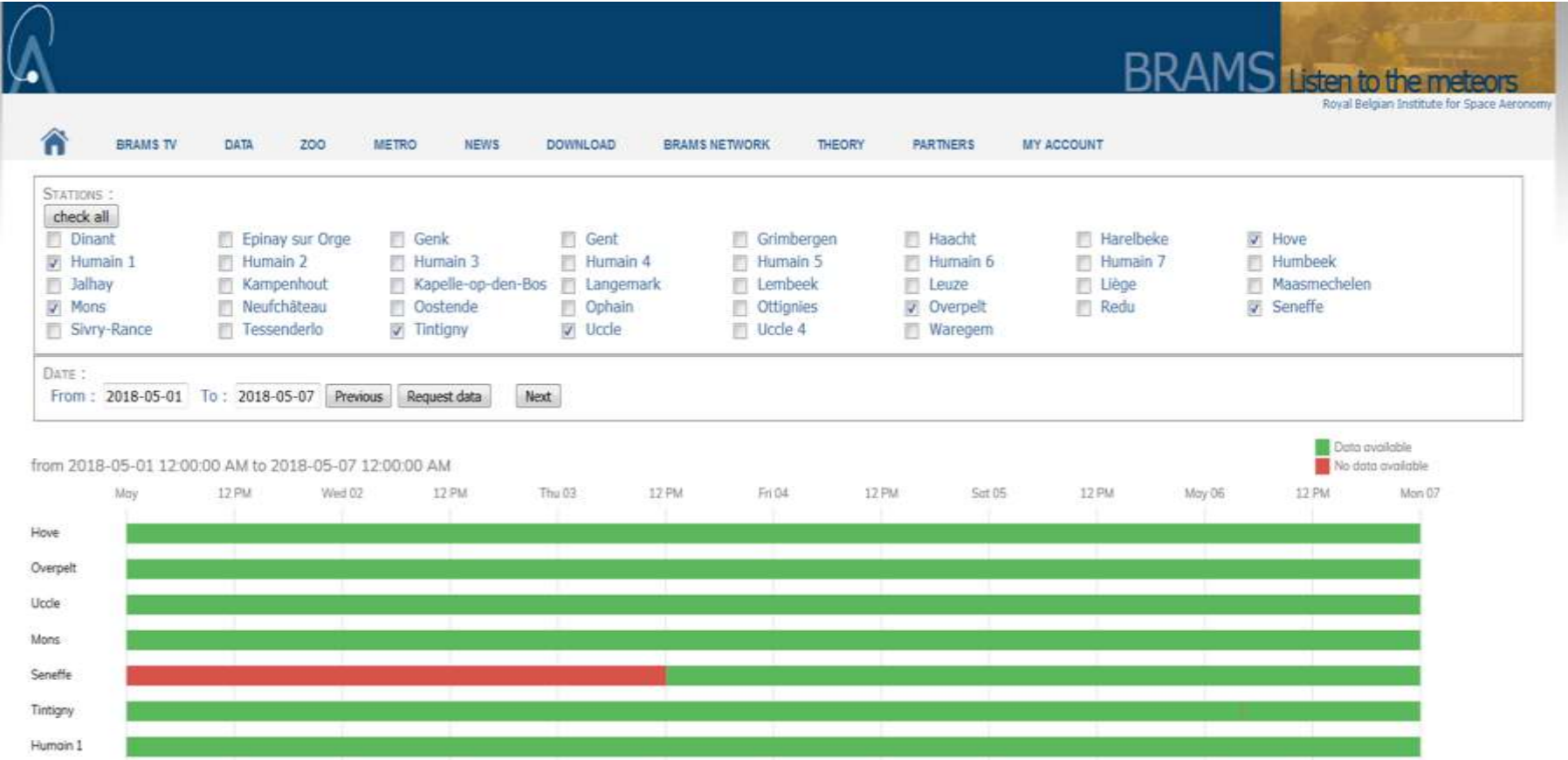
Automatic data transfer

- BRAMS FTP executable developed by Emmanuel Gamby
- Very straightforward to install
- Sends daily WAV data to the FTP server of IASB at a given hour that you choose when you install the program.
- That hour is usually 5 AM which gives enough time to another program, the BRAMS Decoder, to finish its job.
- The BRAMS decoder starts automatically at 2 AM, decodes data from the GPS from the day before, save the PPS information in a chunk of the WAV file, and decimates the signal from the antenna by a factor 4. As a result, WAV files typically change size from ~ 25 MB when recorded to ~ 3 MB when sent to IASB.

Archiving BRAMS data

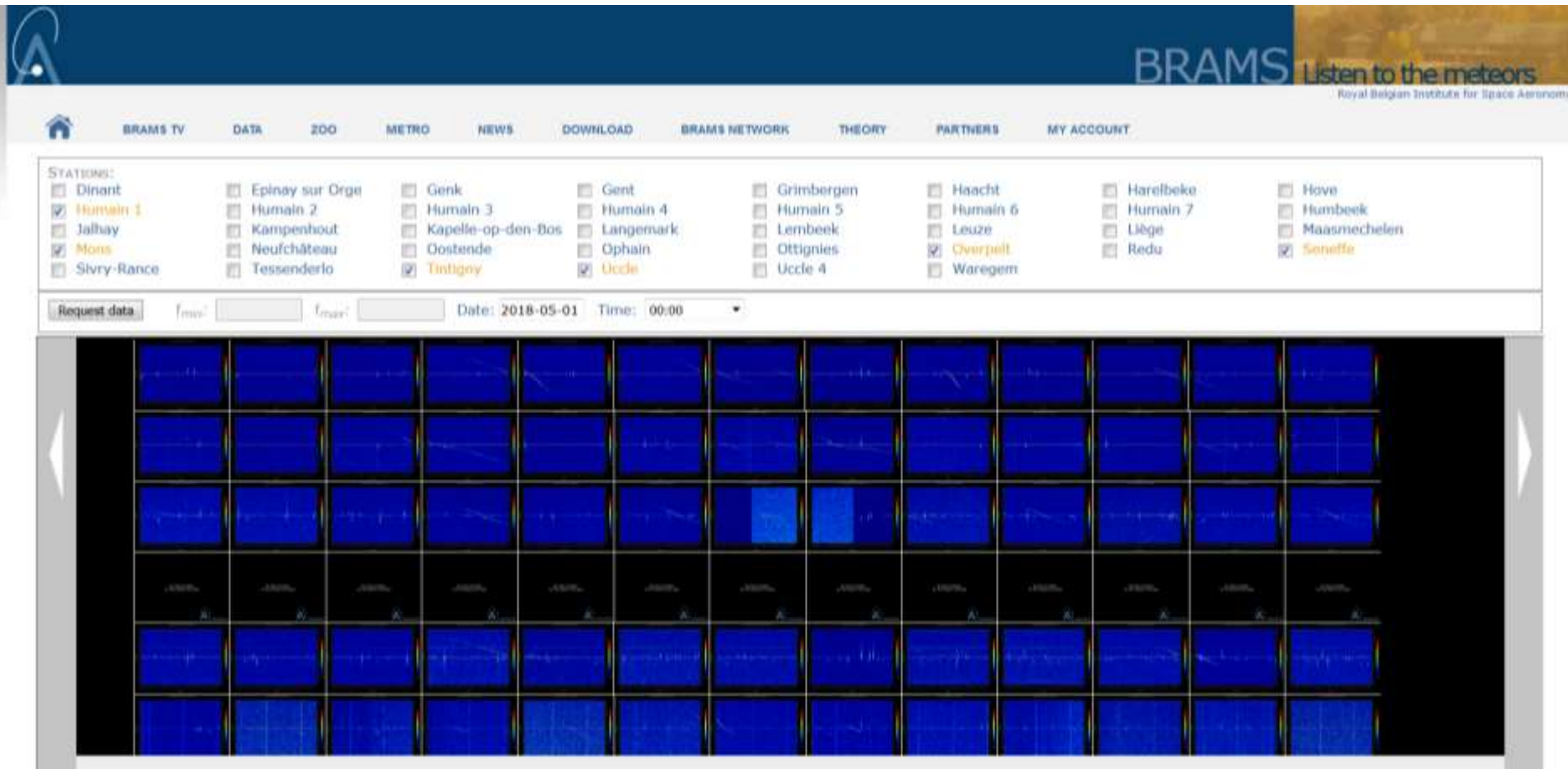
- Every day at 8 AM, a synchronisation occurs between our FTP server and data server
- Archiving is done manually using a set of programs in C developed by Emmanuel Gamby. This is called the BRAMS archiver
- Data are archived as WAV file and spectrograms are created for an easy and fast access on our servers locally.

Availability of the data



Accessing the BRAMS data

- So far no restriction at all
- WAV files and spectrograms are accessible via the BRAMS viewer



How to handle problems?

- Beacon : only problems so far due to power failures in Dourbes.
 - ✓ If short → UPS is enough (no trace)
 - ✓ If longer → interruption of the signal but signal generator and power amplifier restart automatically
 - ✓ In case of strong thunderstorms → local circuit breaker might switch off. A contact in Dourbes has to restart it manually.
- Receiving stations :
 - ✓ Whenever possible → remote solution using Team Viewer (not possible everywhere due to lack of internet or lack of permission to install TV).
 - ✓ Depends on the problem → software problems can be fixed with or without the help of the station owner (see above) but antenna / cable problems must be solved on site.
 - ✓ Lately lots of problems with the ICOM-R75 receivers. Solved by Michel Anciaux who identified the defected component and so we were able to repair all damaged ones.

Anticipate problems with receivers

- ICOM-R75 receivers are not produced anymore. Problems for network extension + probable future other problems
- Solution currently tested : FunCube Dongle Pro + Raspberry Pi
- Challenge : being able to record accurately the timestamps from the GPS (as we currently do) to keep synchronize all the BRAMS stations
- Michel Anciaux has developed a code that works well in lab and will be tested next week in Uccle with real conditions (in a box with relatively important changes of temperature).
- Advantage of the Raspberry Pi : we get rid of Windows, we have our own acquisition code (not using SL anymore), we can prepare everything at the institute and send it as a « black box ». Currently PCs are different from one station to the other, which also means different OS, different ways of solving problems, etc...
- Possibility to inject the recorded signal into Spectrum Lab for those stations which still want to see / show the « live » signal

Anticipate problems with the beacon

- Our beacon has transmitted nearly continuously since 2010.
- We are now considering the possibility that the power amplifier might fail at some point.
- Short-term solution : at the end of June, we will test the power amplifier that is planned to be used for the BRAMS radar in Dourbes (to check e.g. the compatibility)
- Mid-term solution : we will procure a new power-amplifier for back-up in 2019.

Budget for BRAMS

- Most of the budget comes from the STCE (Solar-Terrestrial Center of Excellence). It becomes more and more limited every year....
- This year, we should buy enough FunCube + Raspberry Pi if tests in Uccle are conclusive.
- Next year, the procurement of a new power amplifier will come from the internal funding of the institute (« investment »).
- We pay every year
 - ✓ IT for archiving BRAMS data
 - ✓ electronic/mechanical workshops for technical support
 - ✓ IBPT (Institut Belge des Postes et Télécommunications) for permission to emit
- One IT is hired in July to replace Emmanuel Gamby who left in September 2017. He will work 50% of his time for BRAMS.