



Contribution ID: 12

Type: **Plenary talk**

Very first observation data from a giant loop antenna at the LSBB

Tuesday 7 June 2022 16:30 (20 minutes)

A giant magnetic antenna has been installed at the mountain top surface of the LSBB site since 2010, initially dedicated to excite a SQUID magnetometer situated 520 meter underground. The antenna is a 300 meter long domestic cable laying on the ground and covering an area of 5600 m². Its unusual size and its location on a pluri-disciplinary instrumented site allows to make it an original and unique instrument dedicated to environmental observations. For two years, we have worked on modifying this device into a giant standalone magnetic sensor, based on appropriated technologies which ensure remote control, versatility of use and flexibility for adding new features. Today, this design offers two operating modes.

The first one consists in monitoring the time evolution of its internal electrical impedance. Basically, we can continuously measure the electrical impedance over a wide range of frequencies (from 20Hz to 10kHz) corresponding to the quasi-static regime and covering the electrical resonance of the loop. The second mode consists in measuring the weak spontaneous electrical voltage induced at the loop endpoints. The monitoring can be performed by time-resolved spectral analysis in this case. On another note, qualitative comparisons with measurements made on a mock-up installed in the galleries of the LSBB tends to show that the time variations observed on electrical impedance characteristics are linked to external disturbances.

In this presentation, we first address the up-to-date available data to discuss the experimental protocols we used and the instrument sensitivity. Then we present significant information extracted from these data. It is the starting point for discussions in view to correlate them with other signals available at the LSBB such as SQUID measurements, gravimeters data, hydric data of the mountain, etc...

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Session Classification: #1 Session chaired by S. Gaffet