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BRAMS: a Belgian Am-Pro collaboration to detect and characterize meteors with radio techniques

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Abstract

BRAMS (Belgian RAdio Meteor Stations) is a network of radio receiving stations located in Belgium dedicated to the detection and study of meteors. The project is led by the Belgian Institute for Space Aeronomy (BISA) but most of the receiving stations are hosted and managed by radioamateurs. We present the status and goals of BRAMS and emphasize on the importance of the collaboration between amateurs and professionals.

1. BRAMS in short

BRAMS is a Belgian network of radio receiving stations using forward scattering techniques to detect and study meteors. A dedicated beacon located in Dourbes, in the South-East of Belgium, emits a right-handed polarized purely sinusoidal wave at a frequency of 49.97 MHz and with a power of 150 watts. Currently 20 receiving stations are fully operational (see Figure 1). Typically a receiving station is made of a 3-element Yagi antenna, a commercial ICOM-R75 receiver, an external USB sound card (Beringher UCA222) and a Garmin GPS 18x LVC. Incoming radio signal is lowered down in frequency around 1 KHz then sampled by the sound card at 5512 Hz. The GPS allows a very good synchronization between the stations. One station located in Humain is an interferometer allowing to measure the direction of arrival of the meteor echo with an accuracy of ~ 1°.

2. A Pro-Am collaboration

Most receiving stations are hosted by radioamateurs or groups of amateur astronomers who play an active role in the network. The material is provided by BISA and is identical at each station. About 1 GB of data are generated every day and locally saved as audio files (WAV format). The users send the raw data each month on USB sticks to BISA where they are analyzed and archived. Later on BRAMS users have the possibility to download raw data or produce spectrograms.

3. Objectives of BRAMS

The main initial objectives of BRAMS are: a) determination of meteoroid trajectories from multi-station detections of meteor trail echoes, b) calculation of meteoroid fluxes for meteor showers, c) determination of physical parameters from profiles of meteor trail echoes. There are also a number of "secondary" objectives including radio polarization measurements of meteor trail echoes, study of head echoes, link with possible VLF emissions from meteors, etc… A summary of on-going activities will be provided.

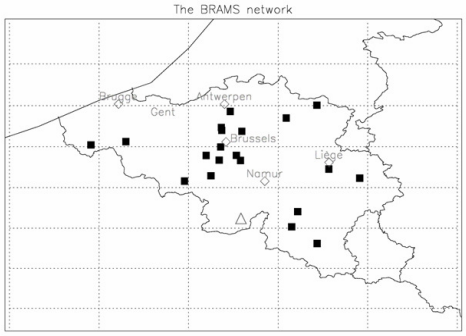

Figure 1: Geographical distribution of the stations of the BRAMS network. The black squares represent the receiving stations while the triangle represents the beacon located in Dourbes. The biggest cities, represented by rhombs, are added to facilitate identification of the stations.