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Study of the Quadrantids 2016 using BRAMS data

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BRAMS (Belgian RAdio Meteor Stations) is a Belgian radio forward scatter system with one dedicated transmitter located in Dourbes, and about 25 receiving stations spread out over the Belgian territory. The transmitter emits towards the zenith a circularly polarized continuous wave at 49.97 MHz with a power of 150 watts. At each receiving station, data are recorded continuously as audio WAV files of 5 minutes duration. WAV files and corresponding spectrograms can be accessed via the "BRAMS viewer" at http://brams.aeronomie.be/brams_viewer.

We present here the analysis of the Quadrantids 2016 using BRAMS data. A careful manual count of meteor echoes was done using an online tool which allows the user to draw rectangles around meteor echoes in spectrograms. Manual counts were performed between 1st January at 0:00 UT and 7th January at 23:59 UT for a total of 2016 spectrograms. This period covers the Quadrantids as well as enough "quiet" periods before and after the peak in order to estimate statistically the values of the background.

First we test one automatic detection algorithm of meteor echoes applying a moving median filter throughout the spectrogram. Advantages and weaknesses of the method are highlighted. Detection rates as well as false positive and false negative rates are provided with also a distinction between underdense and overdense meteor echoes.

Then we attempt to compute the mass index of the Quadrantids 2016 meteor shower by plotting the cumulative number of meteor echoes vs the maximum amplitude of the meteor echoes. On this graph the two slopes related to underdense and overdense meteor echoes depend on the mass index s. The mass index is estimated in a robust way using the Maximum Likelihood Estimator. We discuss the strategy to adopt when the meteor echoes overlap with bright plane echoes or the direct signal coming from the beacon as this can modify the maximum amplitude of the meteor echo.