

METRO: reconstruction of meteor trajectories using the BRAMS network

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METRO is the acronym for MEteor TRajectories and Origins. It is an interdisciplinary project with a collaboration between several institutes. One of the main objective of this project is to determine the trajectories of meteors in the sky using the BRAMS network. This network relies on forward scattering of radio waves emitted by a beacon located in Dourbes off meteor ionization trails and received at 30 stations across Belgium. For some meteors, it will be possible to derive also the meteor speed. Thus, by combining trajectory and velocity, it is possible to trace back the orbit of the meteoroids.

We present here the results of a method developed by Jones et al (1998) [1] applied on the interferometric system based in Humain (Belgium). It consists in a 5 antennas configuration (two orthogonal sets of three aligned antennas with one common central antenna). It allows the retrieval of the direction of arrival of the received signal. Then, using additional stations, we are able to determine trajectories of meteors. A second part of this presentation concerned the method proposed by Nedeljkovic (2005) to derive meteor trajectory. It consists in finding a line (meteoroid trajectory) which is tangential to a set of ellipsoids whose foci are known. One of them is common and is the position of the transmitter (Dourbes) while the second one is given by the receiving station which detects the meteor. Several tests have been done to determine the right trajectory among about a million trajectories simulated. We will present also the criteria used to determine the right trajectory (altitude of the tangent point, time of appearance between different stations).

[1] Jones, J., Webster, A.R., Hocking, W.K., An improved interferometer design for use with meteor radars, Radio Science, Vol 33, 1998.

[2] Nedeljkovic, S., Meteor forward scattering at multiple frequencies. In Verbeek, C. Wislez, J.-M. (Eds.), Proceedings of the Radio Meteors School (2005). International Meteor Organization.