EPSC Abstracts
Vol. 12, EPSC2018-976, 2018
European Planetary Science Congress 2018

Computing mass indices of meteor showers with BRAMS data

Lamy Hervé (1), Anciaux Michel (1), Verbeeck Cis (2), Tétard Cédric (1), Calders Stijn (1), and Martinez Picar Antonio (2)
(1) Royal Belgian Institute for Space Aeronomy, (2) Royal Observatory of Belgium (herve.lamy@aeronomie.be)

Abstract

We provide details about how to compute the mass index of the main meteor showers using data from the BRAMS network. We discuss the current limitations as well as the future solutions to overcome them. An example of application is provided with the Quadrantids 2016.

1. The BRAMS network

BRAMS (Belgian RAdio Meteor Stations) is a Belgian radio network using forward scatter reflections of radio waves on ionized meteor trails to detect and study meteoroids. BRAMS has been developed by the Royal Belgian Institute of Space Aeronomy since 2010 and consists of a dedicated transmitter and 26 identical receiving stations spread across Belgium. A short description of the BRAMS network and data will be provided.

2. Computing mass indices of meteor showers from BRAMS data

The mass index of a meteor shower can be obtained by fitting the slope of its cumulative mass distribution in a log-log plot. With radio observations, the maximum amplitude of meteor echoes is used as a proxy of the mass and the slope is fitted in the region of the graph dominated by underdense meteor echoes. The slope can be measured in a robust way using the Maximum Likelihood estimator. As an example of application of the method to BRAMS data, results for the Quadrantids 2016 will be presented for the period from 1st to 6th of January 2016.

A difficulty with the BRAMS data is that some meteor echoes can present an overlap in the frequency range with other signals coming either from the direct signal of the transmitter or from reflections on airplanes or both. In this case, it is harder to determine the maximum amplitude of meteor echoes. The strategies adopted to solve these issues will be presented.

The cumulative mass index will be estimated for the sporadic background using data from 1st and 2nd of January on one hand, and from 5th and 6th of January on the other hand. For the meteor shower, data from 3rd and 4th of January will be used.

Currently individual meteor trajectories are not yet available from BRAMS data. Hence, the position of the specular reflection points for underdense meteor echoes is not known and neither is the total distance traveled by the radio wave. We will discuss about this limitation and how this might affect the results.