

Atmospheric wave induced by the meteor fire ball detected by the airglow imager

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A wave-like structure which propagates with concentric form from a trail of a bright fire ball meteor was found by a CCD camera at Syowa Station on 7 June, 2008. The images were obtained through a narrow band filter designed to observe sodium airglow D-lines (D1: 589.0 nm and D2: 589.6nm) with 1minute exposure time per each acquisition. The concentric wave structure started to propagate from a center of a meteor trail and spread nearly isotropically in the horizontal directions. Though the image of the concentric structure was very faint, the structure could be recognized for 9 minutes starting from the fire ball meteor event.

A sensitive all-sky TV camera for aurora detection with a frame rate of 30 per second could observe the fire ball trajectory which is considered to be the source of the structure. The parameters of the fire ball trajectory such as geocentric speed, an angle of incident, and a length of the trajectory are estimated from the data with some assumptions. Comparison between these parameters and a data from the MF radar suggested that the structure was not formed by a distortion of a persistent meteor trail by a strong wind shear. Thus we consider that the concentric structure was formed by an atmospheric gravity wave induced by an impulsive disturbance, such as heating caused by the meteor fire ball.

In this presentation, observed morphologies and the possible mechanism of the event are discussed.

Keywords: Syowa Station, mesosphere, sodium airglow, meteor, atmospheric gravity wave