Meteor Shower Activity as a New Tool for studying Past Activity of Parent Comets

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The activity of a meteor shower is thought to be proportional to the activities through time of the parent comet. Recent applications of the dust trail theory provide us not only with a new method to forecast the occurrences and intensities of shower activities, but it is also offers a new approach to explore the history of past activities of the parent comet by retro-tracking its associated meteor showers.

We present two examples of the application to actual meteor showers. One is the October Draconids and comet 21P/Giacobini-Zinner, and another is the Phoenicids and comet 289P/Blanpain. In the former case, we can examine how this approach is effective because the parent comet has been observed in a century. The observed meteor shower activities are generally consistent with the absolute magnitude of the 21P/Giacobini-Zinner at the period of producing corresponding dust trails. In the latter case, by comparing the 1956 outburst and 2014 apparition of the Phoenicid meteor shower, we concluded that the activity of comet 289P/Blanpain in the early 20th century was at most about one fifth or one eighth as high as its activity in the late 18th and early 19th century. Accordingly, it seems to be the case that 289P/Blanpain is gradually transforming from a comet to a dormant object.

This approach is effective under the conditions that the orbit of the parent comet is well known for meteor showers which are relatively young such that each dust trail can be estimated by the calculation. We also present some consideration on these conditions of this approach for future applications.

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