Meteoroid-stream complex originating from comet 2P/Encke

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We study the meteor complex of the short-period comet 2P/Encke. This comet was suggested as the parent body of the Taurid complex.

For five perihelion passages of the parent comet in the past, we model associated theoretical stream. In more detail, each of our models corresponds to a part of the stream, which is characterized with a single value of the evolutionary time and a single value of the strength of Poynting-Robertson effect. In each model, we follow the dynamical evolution of 10,000 test particles via a numerical integration.

The integration is performed from the time for which the set of test particles was assumed to be ejected from the comet's nucleus up to the present. At the end of the integration, we analyze the mean orbital characteristics of those particles that approach the Earth's orbit and, thus, create a shower or showers. The predicted showers are then compared with their observed counterparts separated from one photographic, three video, and one radio-meteor databases, if the observed showers are actually found in the data.

The modeled stream of 2P approaches the Earth's orbit in several filaments with the radiant areas grouped in four cardinal directions of ecliptical showers. These groups of radiant areas are situated symmetrically in respect to the apex of the Earth's motion around the Sun. Specifically, we found that showers #2, #17, #156, #172, #173, #215, #485, #624, #626, #628, #629, #632, #634, #635, #636, and #726 in the IAU-MDC list of all showers are dynamically related to 2P. In addition, we found five new 2P-related showers in the meteor databases considered.