Searching for extinct comets using data from the Canadian Meteor Orbit Radar

Quan-Zhi Ye (1), Peter G. Brown (1)
(1) Department of Physics & Astronomy, The University of Western Ontario, London, Ontario, Canada (qye22@uwo.ca)

Extinct comets (ECs) are near Earth objects that appear asteroidal but may have a cometary origins. Earth-approaching ECs may also produce dust during their final active stages which potentially are detectable today as weak meteor showers at the Earth. Identifying ECs is difficult as they are observationally indistinguishable from asteroids. Past asteroid-stream searches have produced some possible linkages between asteroids and meteor showers, the most notable being the Geminids and (3200) Phaethon and the Quadrantids and (196256) 2003 EH1. However, a comprehensive contemporary survey to look for all possible weak streams from the large number of recently discovered ECs which may have displayed weak past activity, including dynamical formation and evolution of early dust trails has yet to be performed. Here we report on the progress of an EC meteoroid stream survey whereby we have identified all EC candidates whose orbits are such that recent (last several hundred years) dust release would be currently detectable at the Earth. We have simulated the evolution of dust trails for all candidate EC-stream objects and generate predictions for the characteristics of the associated EC shower at Earth. We then perform a cued survey for such streams among the 13 million meteoroid orbits measured by CMOR since 2002, using a wavelet-based search algorithm with probe sizes tuned to the expected shower characteristics. The search is focused on 408 Earth-approaching asteroids that have dynamical characteristics of comets (or asteroids in cometary orbits, ACOs). For some cases we will also discuss the connection between the meteor data and astrophysical observations of the parent body itself. The resulting possible EC-linked showers detectable by CMOR will be presented and a value for the total active fraction of ECs over the last several centuries estimated.