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Title: *"Towards a chronology of the asteroid main belt collisional history"*

Abstract. A recent development in the field of proper elements and asteroid families has been the computation of very large datasets of proper elements, for more than 500 000 asteroids, and the derivation of correspondingly large asteroid families classifications. E.g., we have proposed 125 families with more than 123 000 members, and this classification is semiautomatically updated when new data are available.

An achievement made possible by these bigdata classifications has been the computation of ages for more than 50 families, with a consistent method based on the Yarkovsky effect signature in the family distribution.

Because the new families contain much smaller asteroids than the previous ones, many of the families turned out to be of the cratering type, that is leaving a substantial parent body and with many small fragments. The question is what characterizes the families of this type, for which we propose a quantitative definition. Among our findings, there are surprisingly many cratering families with two separate ages, thus resulting from two collisional events. We have also found many new cases of cratering families, previously ignored, and we list a number of dubious cases. We include results on cratering families obtained by using resonant proper elements, including the confirmation of the Astraea family and peculiar properties of some families in the Trojan swarms.

The ages have been computed with a rigorous procedure, allowing to give a formal uncertainty to the age estimations. However, these uncertainties are still quite large. We propose in this paper the procedures which can be used to improve these estimates. We also discuss the possibility of estimating the original dispersion of velocities immediately after the creation of the fragments and their escape from the gravitational well of the parent body.

Joint work with Federica Spoto and Zoran Knežević.