

## The Comet-Asteroid Continuum

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### Abstract

This is an overview talk to discuss solar system objects having properties intermediate between those classically associated with comets and asteroids.

### 1. Outline

In the minds of many, comets and asteroids are physically, observationally and dynamically distinct, and further separated by their presumed sites of formation in the protoplanetary disk of the Sun. But in fact, a growing number of objects are known which cannot be simply categorized as either comets or asteroids. As is usual in science, such freak objects are especially illuminating and worthy of detailed consideration.

We divide these objects into two main classes: 1) dynamically comet-like objects with the physical appearances of asteroids (Hartmann et al. 1987) and 2) dynamically asteroid-like objects with the physical appearances of comets (Hsieh and Jewitt 2006). The former, sometimes called “transition objects”, are best interpreted as dead or dormant comets in which the driving volatiles have been depleted from the upper layers by past exposure to the Sun. Their study informs us about the evolution and decay of objects scattered to the inner solar system from the Kuiper belt and Oort cloud reservoirs. The latter are called variously “main-belt comets” or “active asteroids”. These objects appear to be driven by a range of physical processes ranging from kinetic to thermal, as we will discuss. Their study is beginning to tell us about impact and rotational destruction of asteroids, the production of dust and the role of ice in the asteroid belt.

This talk, based on the latest observations and the work described in Jewitt (2012), will critically discuss both the evidence and the key physical processes

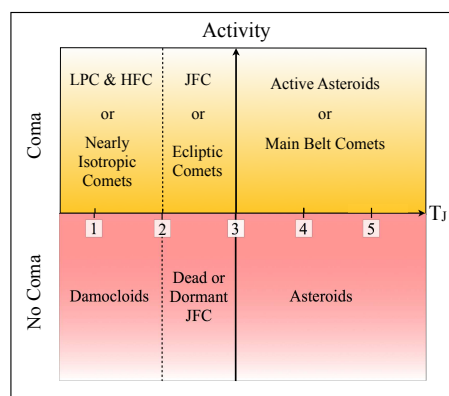


Figure 1: Classification of comets and asteroids based on their orbits and physical appearances. This talk will discuss primarily bodies falling in the lower left and upper right quadrants of the plot. From Jewitt (2012).

### References

- [1] Hartmann, W., Cruikshank, D. and Tholen, D.: The relationship of active comets, 'extinct' comets, and dark asteroids, *Icarus*, 69, 33, 1987.
- [2] Hsieh, H. and Jewitt, D.: A Population of Comets in the Main Asteroid Belt. *Science*, 312, 561, 2006.
- [3] Jewitt, D.: The Active Asteroids, *The Astronomical Journal*, 143, 66, 2012.