

Title: Asteroid Collisions as Recorded in Meteorites: Probing the Dynamics of Planetary Assembly

Abstract:

Meteorites are samples of asteroids, the leftover-building blocks of our planets. As such, they contain important records of the conditions that were present and processes that operated during the formation of our Solar System. Collisions between these bodies would have been frequent and energetic events during the first ~100 Myr of Solar System history. While previous work had dismissed the role that collisions played in shaping the early evolution of meteorite parent bodies, recent advances in hydrocode models has led us to revisit this issue and re-evaluate the effects that these events would have had on primitive bodies. Counter to previously believed, we find that individual events can have global consequences on the thermal evolution of a given parent body. Further, such collisions can mask or erase any other drivers of thermal evolution, such as the decay of short-lived radionuclides. By quantitatively evaluating the collateral effects of these events, we are working to identify the types of collisions that must have occurred to produce the meteorites we have in our collections. This information can be used to constrain the dynamical evolution of the early Solar System.