

History of the inner main asteroid belt - searching for origins of space mission targets and the oldest families

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Near-Earth asteroids (NEA), by their very nature, are simply passing through the neighborhood of the terrestrial planets. They typically originate in the Main Asteroid Belt and their final destinations are usually impacts with the Sun or planets. Due to the chaotic nature of their orbits it is impossible to exactly trace their history or predict their future. Hence, to find additional context about any specific NEA necessarily relies on probabilistic arguments about their orbital history and spectral comparisons to families of asteroids throughout the Main Belt.

Most NEAs on mission accessible orbits (low Delta-V) are thought to have escaped the Main Asteroid Belt via the ν_6 secular resonance, which would demand an inner Main Asteroid Belt origin (between the ν_6 at 2.1au and the 3:1 mean motion resonance with Jupiter at 2.5au). Within the inner Main Belt (IMB), there are a handful of asteroid families, which, if an NEA could be positively linked as a family member, could provide a significant amount of context for its properties and longer-term evolution in the Main Belt. We will discuss the continued search for, discovery of, and characterization of the families in this region of the Asteroid Belt and what it tells us about the NEAs scheduled to be visited by spacecraft.

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