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Mean motion resonances and gravitational captures within the context of planetary migration – the solar system small bodies' allocation mechanisms

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The solar system current configuration is different than that of the final stage of planets formation. Many solar system features evinces that the planets past a period of migration which resulted the current orbits. Planetary migration is mainly due the angular momentum exchange. When two astronomical bodies undergo a close encounter, one of them experiences an orbital rising whilst the other suffers an orbital shrinkage. Close encounters between a planet and a planetesimal causes the planet a negligible variation of angular momentum in comparison to the small body. However, when a planet undergoes some billions of such encounters, the net result is remarkable. Lunar craters, for instance, are evidences of a late heavy bombardment (LHB) by small bodies thrown toward the terrestrial region during the planetary migration phase. Another strong evidence, are the existence of dozens of irregular satellites around the giant planets. They are satellites that did not form around their planets. Instead, they were gravitationally captured. Spectral analysis shows that the composition of many irregular satellites are similar both to the compositions of asteroids found within the main belt and the Kuiper belt. In special, there are two groups of small bodies with similar spectra: the resonant group of asteroids Hilda in the asteroid belt, and the Himalias, a dynamical family of Jovian irregular satellites. This work intends to assess whether the mean motion resonances are capable of connecting the origins of Hilda's and Himalia's and other small bodies that once orbited the region beyond Jupiter's orbit.

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