Heaven or hell? Giants and IMPs

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Jupiter-mass planets on ~0.1 AU orbits are presumed to have migrated to their present location by angular momentum exchange with a primordial gas disk or some other mechanism. The migrating planet will also shepherd, scatter, and/or accrete interior planetesimals, and numerical simulations predict that one or more Earth-mass or larger planets may form near mean-motion resonances. Such inner migrated planets (IMPs) can be detected by transit timing or space-based photometry, and are a test of planet formation models. The efficiency of sheperding depends on sheperd mass and migration rate, and the accretion rate in the planetesimal disk is governed by competition between surface density enhancement and excitation of planetesimals. The composition of IMPs is also a probe of chemistry and plantesimal formation in the outer disk. IMPs will enter synchronous rotation on short timescales and the least massive will lose their atmospheres. The dayside of IMPs within 0.1 AU of G stars have surface temperatures great than the silicate solidus and a magma ocean will form. Dissipation of giant planet tides will be an internal heat source powering Io-like volcanism, producing a Na/S-rich atmosphere. Loss of volatiles and silicon will slowly erode the planet. IMPs around M stars will have lower, even clement, surface temperatures but because migration occurs within a few Myr, the luminosity of the star on the Hyashi track was much larger and volatiles may have been efficiently removed from the system before they could be bound in sufficiently large bodies.