

Formation and dynamical evolution of close-in terrestrial planets

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According to theories of disk-planet interaction, planets would have experienced significant orbital migration during their formation. We have investigated formation of the terrestrial planets from protoplanets/planetesimals using gravitational N -body simulations that include tidal interactions between planets and a gas disk (i.e., type I migration). We found that protoplanets undergo inward migration and several planets form near a disk inner edge. Final orbital configurations of the planets depend on migration speed; if we assume type I migration speed is reduced by a factor of about 100 from that predicted by the linear theory, planets formed in widely separated non-resonant orbits. We also observed that a large amount of icy materials migrate to the vicinity of the disk inner edge. In this presentation, we also consider further orbital evolution of close-in planets and discuss whether the planets can undergo further orbital migration to outer orbits. In addition, as an example of how volatile materials evaporate during accretion, we present an investigation of the accretion and compositional evolution of the Galilean satellites (Dwyer et al. 2013).