Formation of hot super-Earths, the most common terrestrial planets in the Galaxy

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Roughly half of all Sun-like stars host planets of 1-20 Earth masses with orbital periods shorter than 100 days. These "hot super-Earths" are preferentially found in multiple-planet systems with tightly-packed orbital configurations. There exist two currently-plausible models for the origin of these systems. The first proposes that they form by standard in-situ accretion in massive protoplanetary disks. The second invokes accretion during inward type 1 migration of a population of Mars-mass or larger planetary embryos. The bulk planetary compositions are expected to differ between the two models: planets that accrete in-situ should be dominated by refractory elements while migrated planets should contain a large fraction of volatiles. However, the planetary radii and masses are difficult to measure with sufficient precision to make a clear distinction between models. The planets' radii may also be inflated by thin gaseous envelopes. However, circumstantial evidence related to the hot super-Earths' masses and orbital spacings argues against the in-situ accretion model. Challenges remain for the inward migration model but it remains a viable hypothesis.