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Current Date/Time : 8/31/2010 12:20:46 PM

Title:
Planetesimal Compositions around Other Stars

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Abstract:
In our solar system, the composition of planetesimals formed beyond the 'snow line' is believed to depend strongly on the abundances of C and O in the solar nebula and the redox state of C (i.e. CO rich vs CH4 rich regions). These factors largely determine the fraction of rock+metal, f(r-m), vs volatile ice in condensates. Host stars of exoplanet systems will have generally similar 'cosmic' composition due to nucleosynthesis and galactic chemical evolution, but may differ significantly from the Sun in their detailed composition. Assuming this reflects equivalent differences in the protoplanetary nebulae from which planets formed in these systems, we can estimate the range of possible f(r-m) in systems for which stellar composition data are available. We have calculated f(r-m) for 25 exoplanet host star systems using stellar data from Gonzales et. al. (AJ 121, 432, 2001) and Takeda et al. (PASJ, 53, 1211, 2001). For the Sun, f(r-m) ranges from ~0.47 to ~0.76 (Wong et al., in Oxygen in the Solar System, pp. 241-246). The results for the sample of stars used show a greater range of f(r-m), from ~0.3 to ~0.97, the value being strongly correlated with the C/O ratio. Thus it is possible that some exoplanet systems may start with planetesimal belts either richer in condensed ices than the solar system or, at the other extreme, containing essentially dry planetesimals with little or no water ice.

Category:
23. Extrasolar Planets and Systems

Facility Keywords:

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Did you give a contributed presentation in 2008 (Ithaca)?: No

Did you give a contributed presentation in 2009 (Puerto Rico)?: Yes - oral

Status: Complete

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