THE NATURE OF THE ROCK TO GAS TRANSITION DETERMINED FROM PLANETS GOING INTO STARS. S. F. Taylor[1], [1]Participation Worldscope (astrostuart@gmail.com; Cottonwood, Arizona, U.S. and 2-4 Tai Ping Shan Street, Sheung Wan, Hong Kong).

Introduction: Knowing the relative composition of rock, liquid, and gas as a function of mass is essential to knowing the habitability of planets with masses larger than earth. Measurments of the radii and mass of planets do not uniquely determine the relative composition of rock, water, and gas of planets, especially if the resulting planetary mass-radius relation has significant scatter among planetary systems. Constructing composition functions of the planetary mass-radius relation will be greatly helped by additional handles constraining the composition. Evaporation will cause composition-dependent changes in planet radii as planets migrate into the star, providing an alternative window into studying general planet structure. We show that knowing the rate of planetary migration into the star is essential to linking the rate of evaporation to the total evaporation. We show that the rate of planets migrating into stars can be determined as a function of the strength of tidal dissipation in stars from the location of the falloff towards the star in the planet occurrence distribution[1,2,3]. It has been shown that it will soon be possible to place constraints on this strength of stellar tides using measuring time shifts from decreasing orbital period[4].

Heading Styles: The evolution of the fall-off as a function of time is shown in Figure 1., where an aggregate of system ages is used to model an observed population of star of a range of ages.

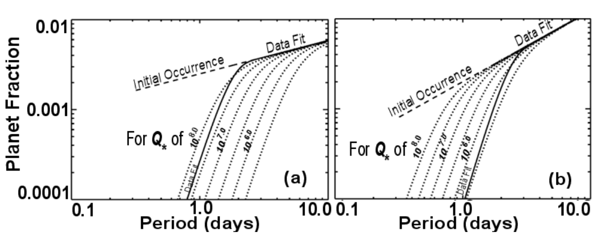

Figure 1. Observed falloff [5] versus simulated falloff for (a) giant planets (summed for masses from 10 to 100 earth masses and radii from 4 to 8 earth radii, and (b), medium large planets (often called "Neptunes"; summed for masses from 10 to 100 earth masses and radii from 4 to 8 earth radii).

References: [1] Taylor S. F. (2013) *arXive:astro-ph 1301.4229*. [2] S. F. (2013) *arXive:astro-ph 1301.5197*. [3] S. F. (2013) *arXive:astro-ph 1301.3283.* [4] Birkby et al.(2014) *MNRAS, 440*, 1470-1489. [5] Howard et al. (2012) *ApJS, 201*,15.