STRUCTURAL MODELING FOR THE LOW-MASS TRANSITING EXOPLANETS:KEPLER-70B AND KEPLER-70C. P. Futó[1] [1] Department of Physical Geography, University of West Hungary, Szombathely, Károlyi Gáspár tér, H-9700, Hungary (dvision@citromail.hu)

Introduction:NASA's Kepler Space Telescope has discovered two interesting small sized exoplanets,named Kepler-70b and 70c.Their host star is a post-red-giant,hot B subdwarf (sdB) [1] wich can be observed in the direction of Cygnus constellation.

Kepler-70b is a less massive planet than the c with a mass of 0.44 $M_\oplus$,a radius of 0.759 $R_\oplus$ and an orbital period of 0.240104 days [2].The Kepler-70c is a 0.66 Earth-mass sub-Earth sized planet 0.867 times the radius of Earth orbiting in a 0.342887 day orbit.

According to a plausible scenario,both planets were originally giant planets which were orbited in the extended envelope of the central star during the red giant phase. Vaporizing their gaseous envelope,this planet was stripped down,remaining the solid rocky/iron cores,they became terrestrial-type objects. This objects can be categorized into a new hipothetical class of planets nominated “Chthonian planets” [3].During their formation,planetary cores of the one-time gas giants or Neptune-like planets had been differentiated within a relatively short time.

The main purpose of this study is to obtain plausible interpretation for the measured data concerning the composition of the planets Kepler-70 b and c.Moreover,I attempt to characterize several key physical properties of these planets including their surface gravities,average densities and the central pressures,respectively.

Internal structure models for Kepler-70b and c: In both cases,the upper mantle composed of olivine [(Mg, Fe)2 SiO_4],wadsleyite and ringwoodite. The thin lower mantle mostly consists of silicate-perovskite plus wustite [(Mg,Fe) SiO_3 +(Mg, Fe) O].Planetary cores have $Fe_{0.8}$ $Ni_{0.2}$ composition. Vinet equations of state [4,5] have been used to derive approximate structure models for both low-mass transiting planets.

Results: Interpreting the observational data,the average density and surface gravity are 5.55 g cm^{-3} and 7.5 ms^{-2} for the Kepler-70b and are 5.584 g cm^{-3} and 8.623 ms^{-2} for the Kepler-70c.

The internal structures of planets to present are shown in Figure 1.The yielded core radii are 0.497 $R_\oplus$ and 0.528 $R_\oplus$ for Kepler-70b and c. Both planets have relatively great core mass fraction (CMF) compared to the total mass. As shown in Figure 1,Kepler-70b contains core mass fraction with a radius (65.48 %) that is 4,58% larger compared to the total radius than that of Kepler-70c (60.9%).Comparing their composition,it is also ascertainable that both transiting objects are relatively high-density planets with core mass fractions which are greater than the half of the total mass.

Central pressures have also been theoretically calculated: 99.76 GPa (70b) and 133 GPa (70c).

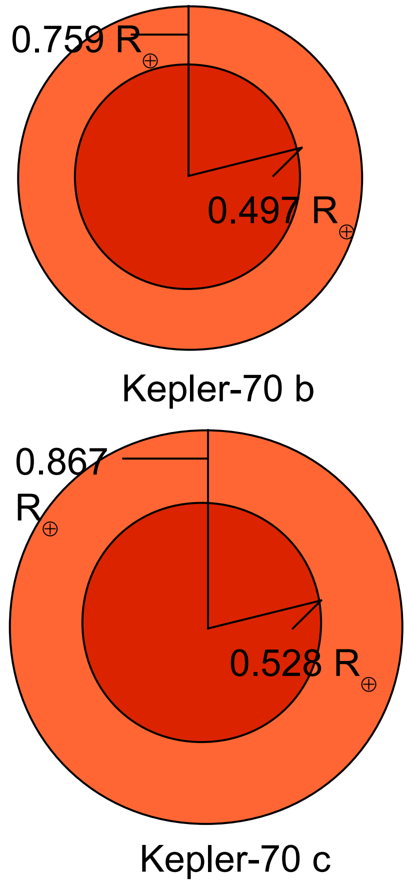

Figure 1. Interior structures for Kepler-70b and -70 c are shown with relatively great fractions of their metallic cores.

Summary: Dozens of low-mass exoplanets are expected to confirm inside of a decade including similar and smaller sized planets than Earth.

References: [1] S.Charpinet et al. (2011) *Nature* **480,** 496-499.[2]:http://kepler.nasa.gov/Mission/discoveries [3] Hébrard G. et al. 2003, arxiv: 0312384[4] Vinet P. et al.1987.*J.Geophysical Research*,**92,**9319 [5] Vinet P.et al.1989.*J.Phys.Cond.Matter*,**1,**1941