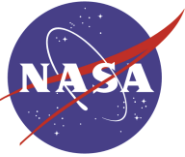


EXOPAG Meeting
8 January 2012
W. J. Borucki & the
Kepler Team

The word "Kepler" is written in a large, blue, 3D-style font with a white shadow. A yellow orbital path is drawn around the letters, with a small globe of Earth at one point on the orbit. The background features a dark starry sky with a constellation of yellow stars and a grey silhouette of a bird-like creature. The bottom of the image shows the curved horizon of the Earth from space.

Kepler



SYSTEM STATUS

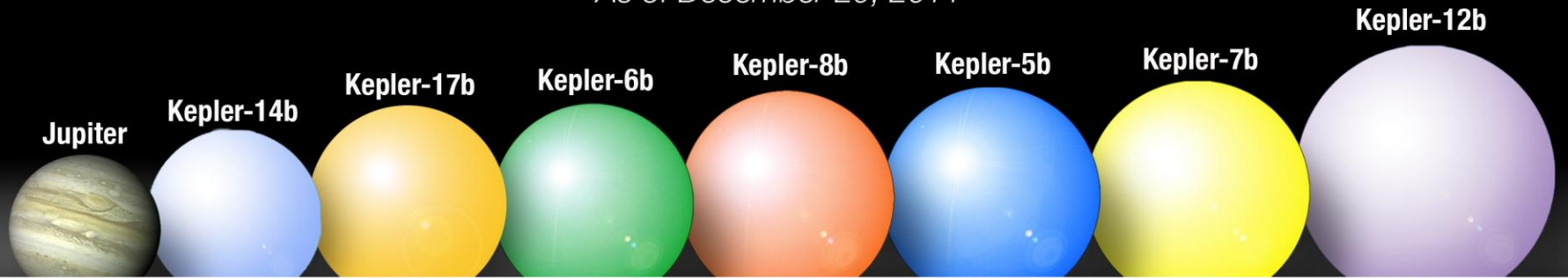


A Search for Earth-size Planets

- System is stable and obtaining data from 21 modules
- Safe-mode occurred on 8 Dec 2011 due energetic particle event. Back in science operations 56 hours later.
- First Kepler announcement of a planet (Kepler-22b) in the HZ of a solar-like star and the first circumbinary planet (Kepler-16b).
- Two Earth-size planets announced (Kepler-20e&f). Both are too hot to be in HZ.
- Senior Review proposal reviewed & revised & ready to sent to HQ on 18 February.
- Data analysis software upgrade (SOC 8.1) progressing well. It will go into operation on 20 March & will be used in the Q1-Q11 reprocessing in mid-June.
- Next data release (Q4,5, &6) scheduled for 7 January.
- Look for press conference announcements at AAS meeting on Wednesday

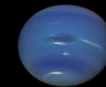
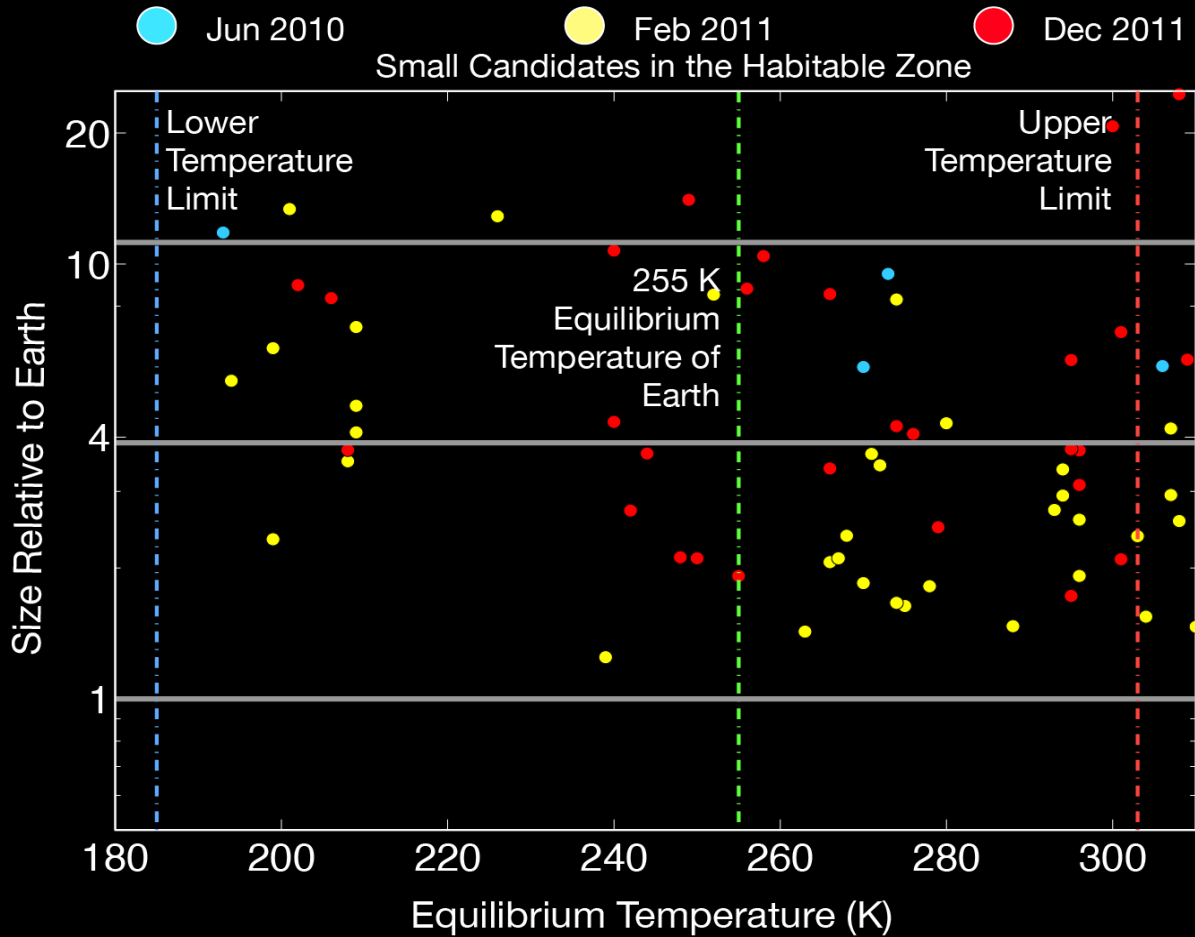
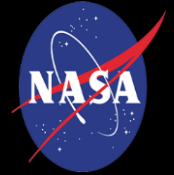
Kepler Planets

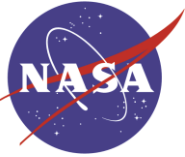
As of December 20, 2011





First Confirmed Kepler Planet In the Habitable Zone

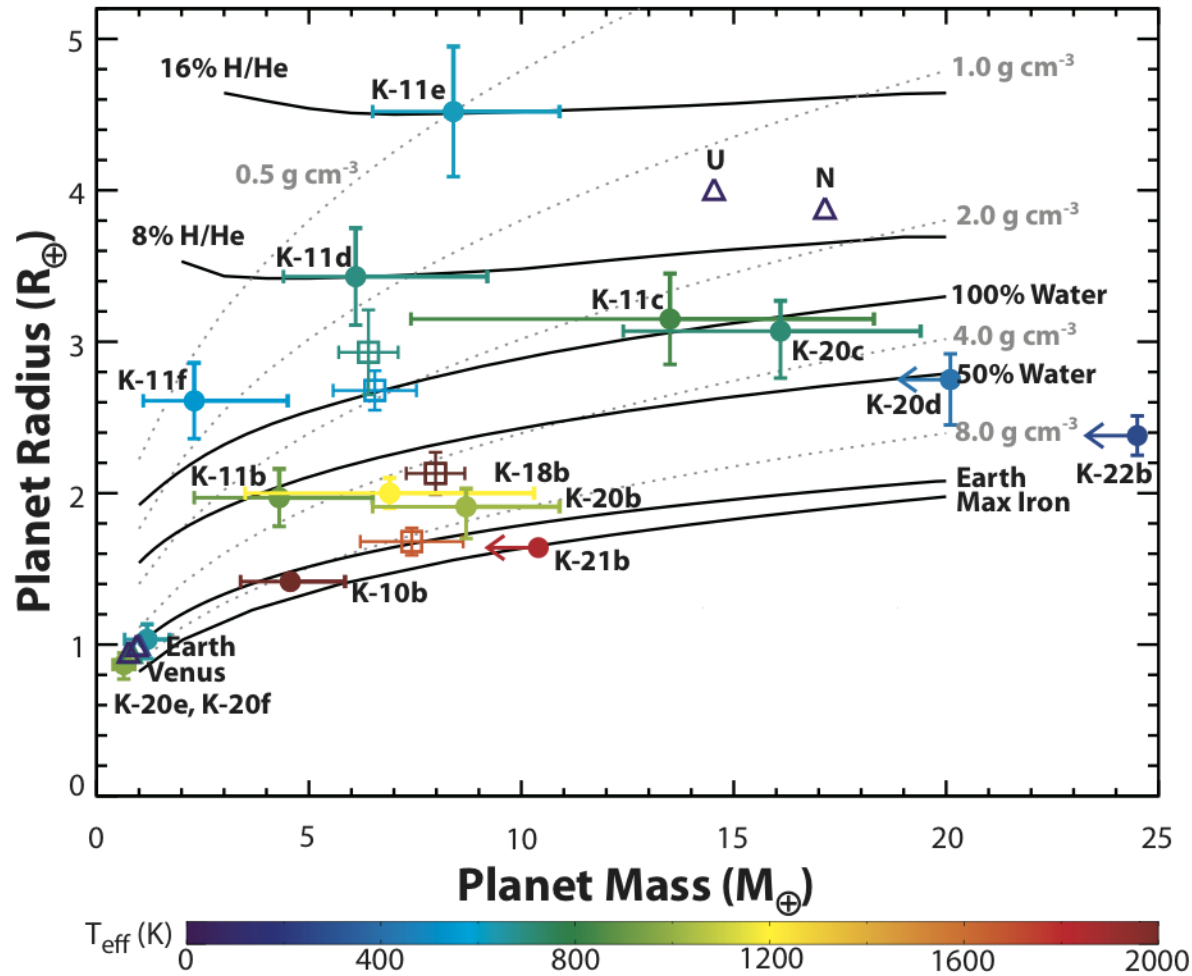




KEPLER IS EXPLORING THE PHASE SPACE BETWEEN EARTH AND NEPTUNE



A Search for Earth-size Planets



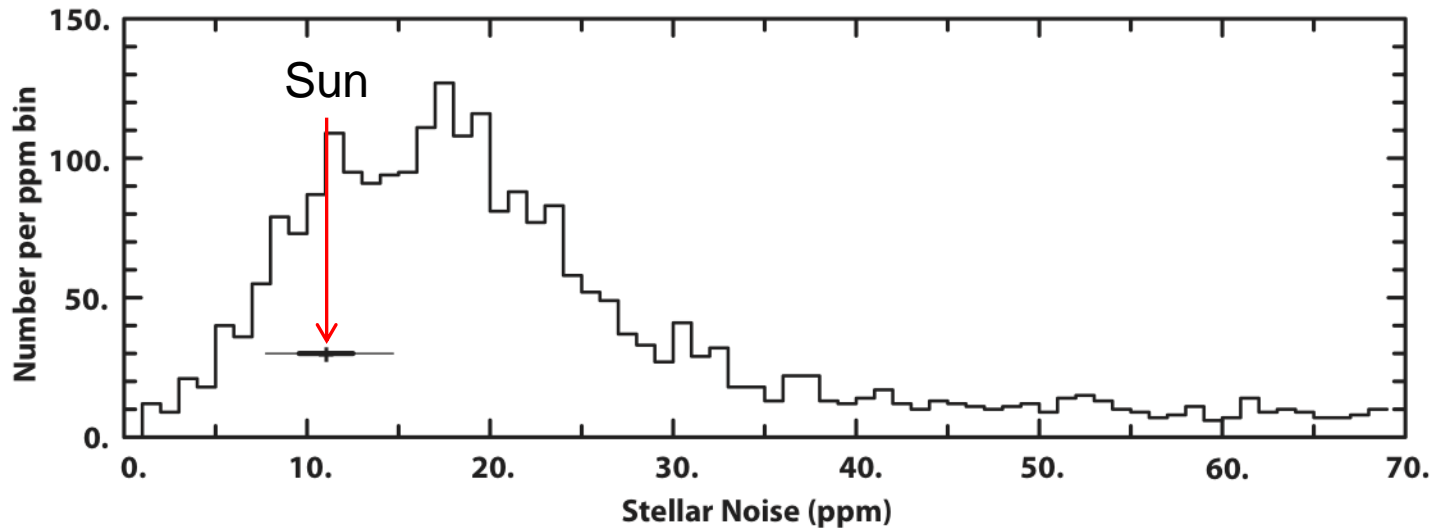


UNEXPECTED STELLAR VARIABILITY OF SOLAR-LIKE STARS INCREASES THE DIFFICULTY OF DETECTION OF EARTH-SIZE PLANETS



A Search for Earth-size Planets

Source	Original Noise [ppm]	Reality [ppm]
Poisson Noise	15.3	16.1
Instrument Noise	6.9	14.1
Stellar Variability	10	19.5
RSS Total	19.5	28.9

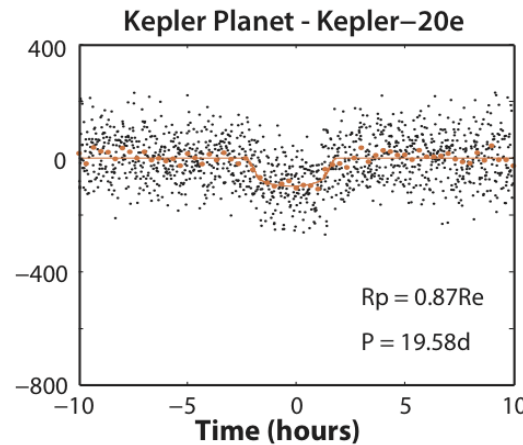
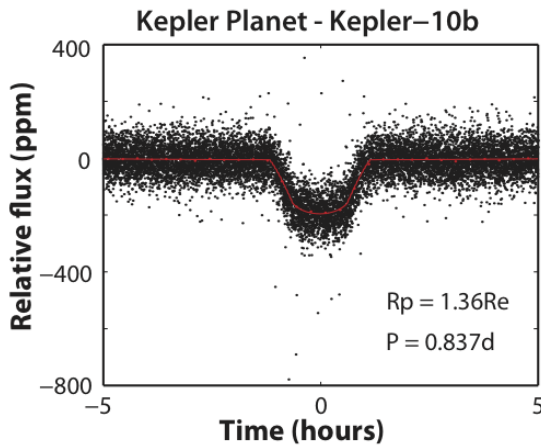
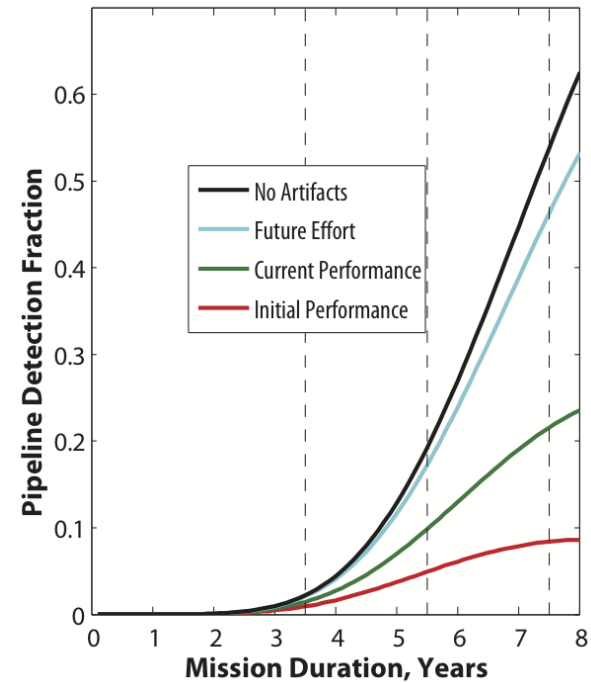
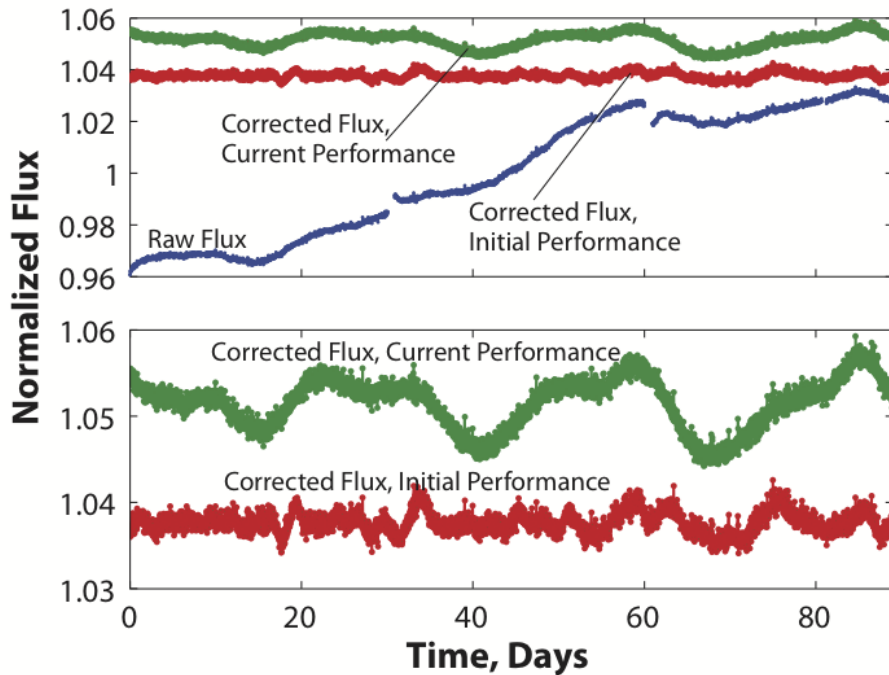




DATA ANALYSIS PIPELINE IMPROVEMENTS ARE CRUCIAL TO DETERMINATION OF ETA-EARTH



A Search for Earth-size Planets

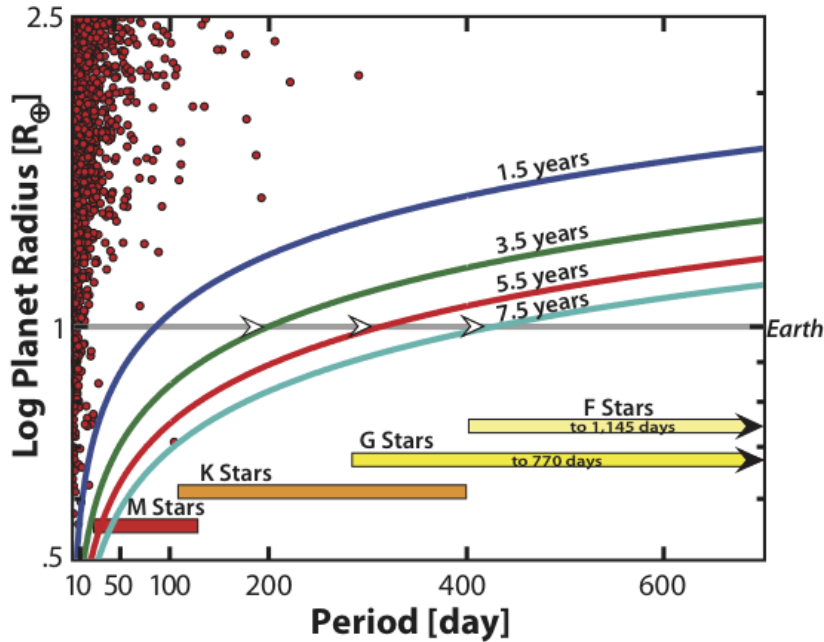




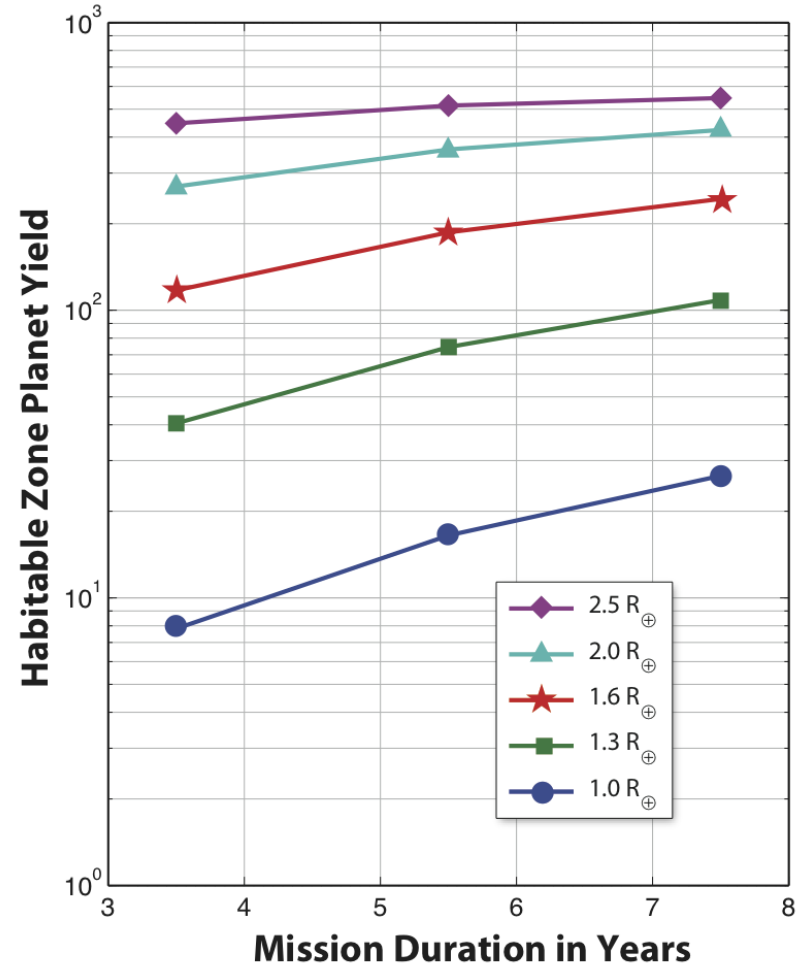
INCREASED STELLAR VARIABILITY REQUIRES A MISSION EXTENSION TO SEARCH THE HZ OF SOLAR-LIKE STARS

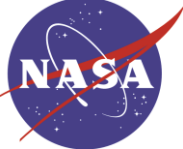


A Search for Earth-size Planets



Mission Length	3.5 yrs	5.5 yrs	7.5 yrs
Number $1-R_{\oplus}$ Planets ($\eta_{\oplus}=1$)	7.8	16.5	26.6
Upper limit to η_{\oplus}	0.29	0.14	0.09

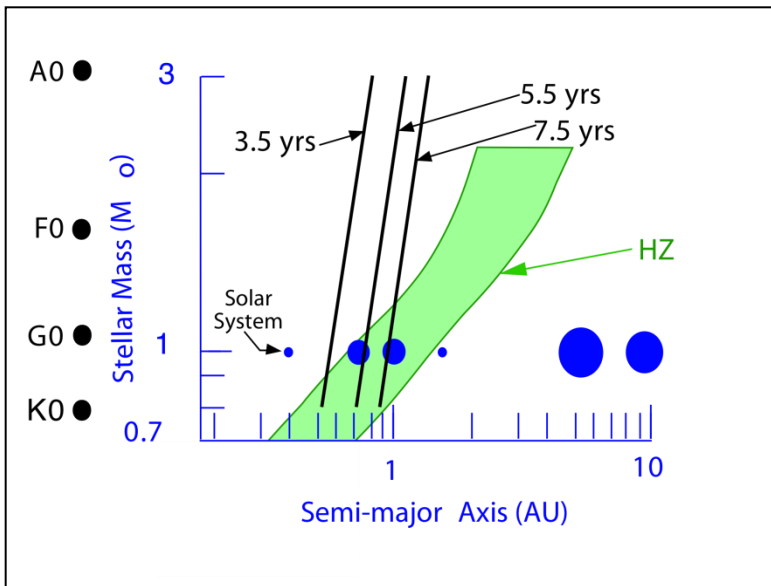




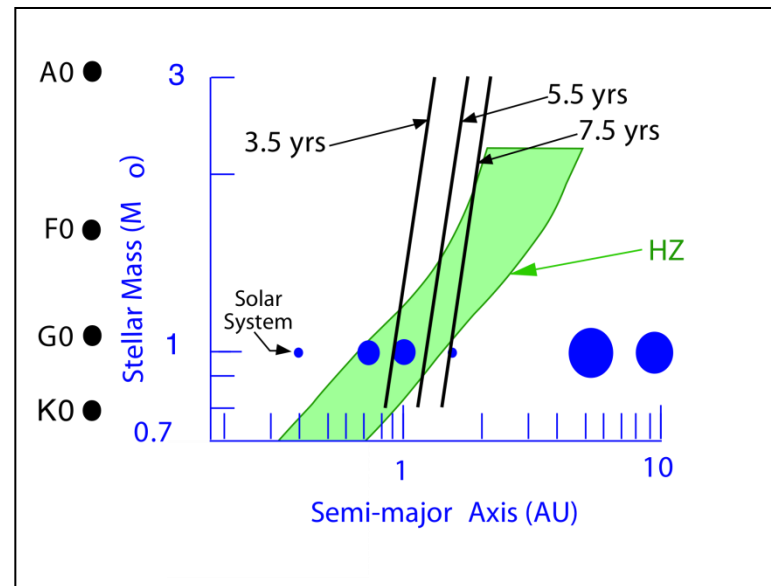
COVERAGE OF HZ FOR 1.0 AND 1.4 EARTH-RADIUS PLANETS



A Search for Earth-size Planets



Search coverage for 1.0 Earth-radius planets when 8 transits are observed.



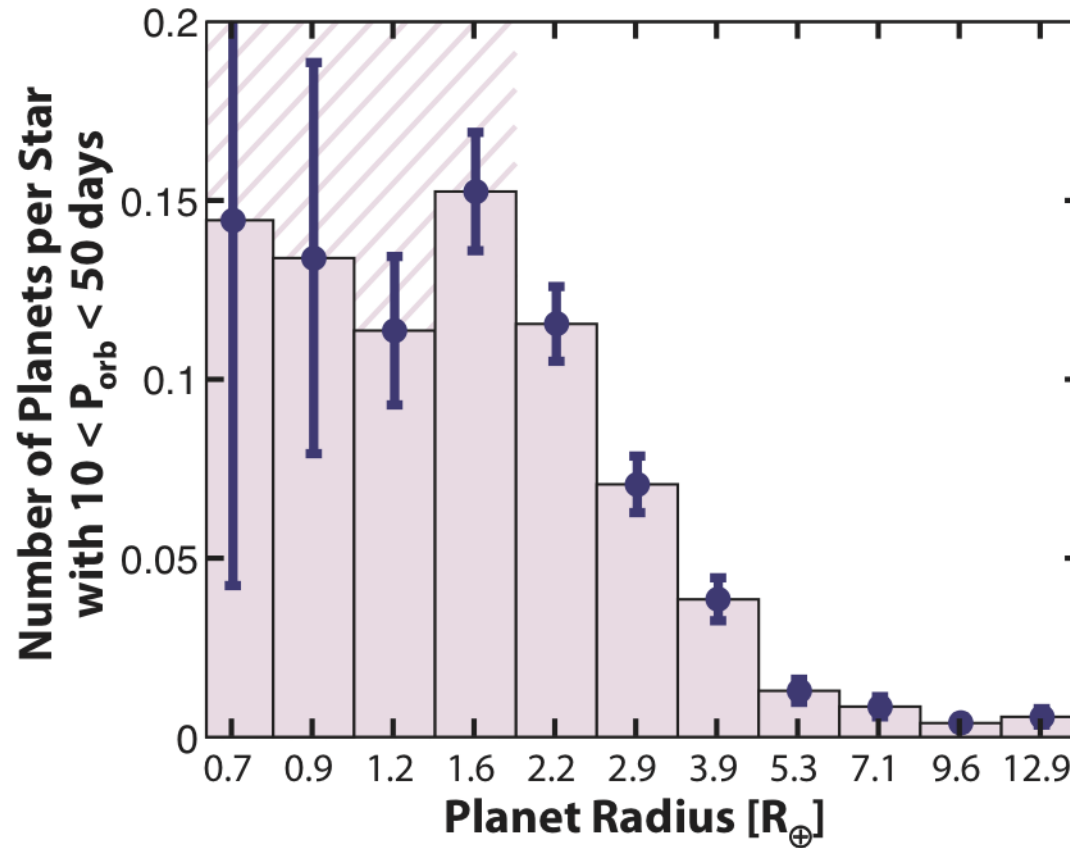
Search coverage for 1.4 Earth-radius planets when 4 transits are observed



ANALYSIS OF LATEST KEPLER DATA SUGGESTS DIFFERENT SIZE DISTRIBUTIONS BETWEEN ROCKY & GIANT PLANETS



A Search for Earth-size Planets

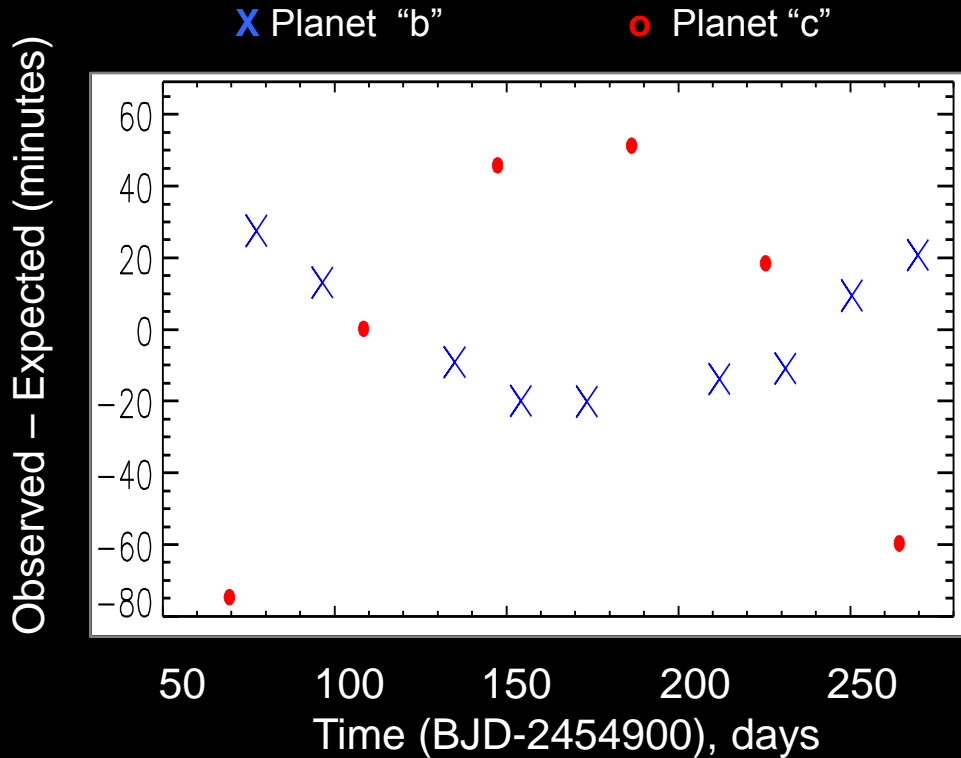




KEPLER-9; A STAR WITH AT LEAST TWO TRANSITING PLANETS



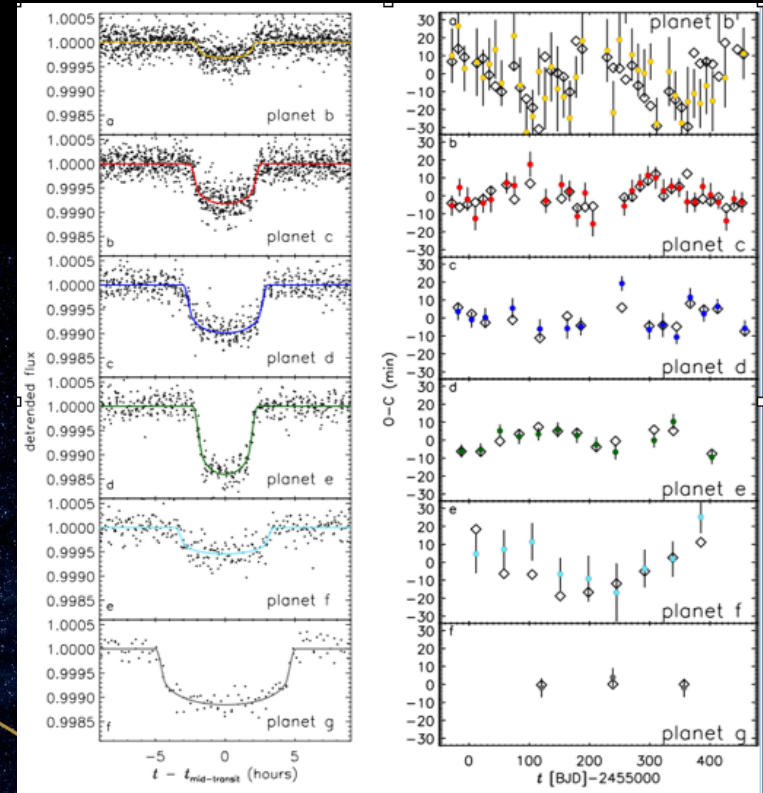
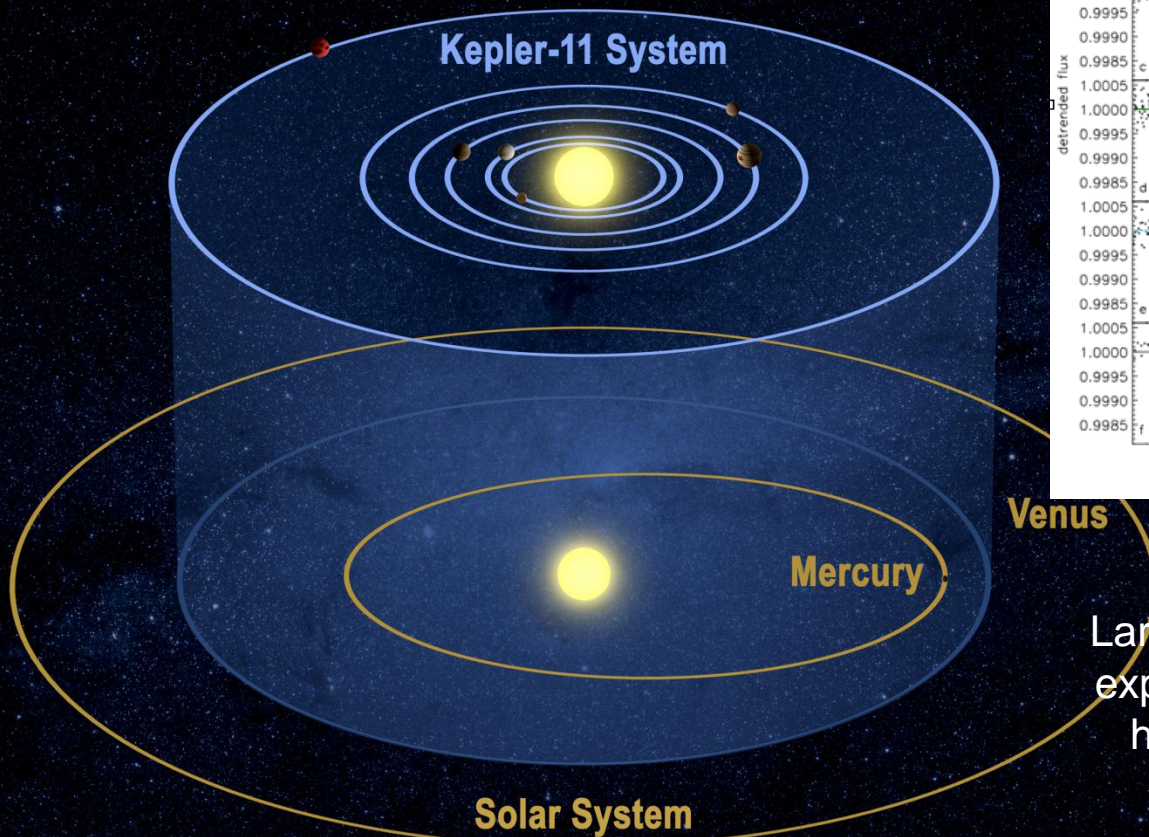
A Search for Earth-size Planets



	<i>Kepler 9b</i>	<i>Kepler 9c</i>
Orbital Period (d)	19.24	38.91
Semi-major axis (AU)	0.14	0.225
Radius (Rearth)	9.4	9.2
Mass (Mearth)	80.1	54.7
Density (gr/cc)	0.52	0.38

The gravitational interaction between the two planets cause the transit times of each planet to vary. These variations allow the masses of the planets to be derived. The photometric and transit timing results allow the density to be estimated and provide information on the composition of the planets.

SEVERAL HUNDRED MULTI-CANDIDATE SYSTEMS ARE FOUND IN THE KEPLER DATA



Large numbers of exoplanets are expected to be validated with the help of transit timing variations.



CIRCUMBINARY PLANETS ARE NOW BEING RECOGNIZED BY A NEW ALGORITHM



Corrected view from Tatooine