

# Jovian Planets and Habitability

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Terrestrial Planet Finder (TPF)  
Pre-Formulation Phase Architecture Study  
Pre-Architecture Review (PAR)  
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# The occurrence of Jovian planets and the habitability of planetary systems

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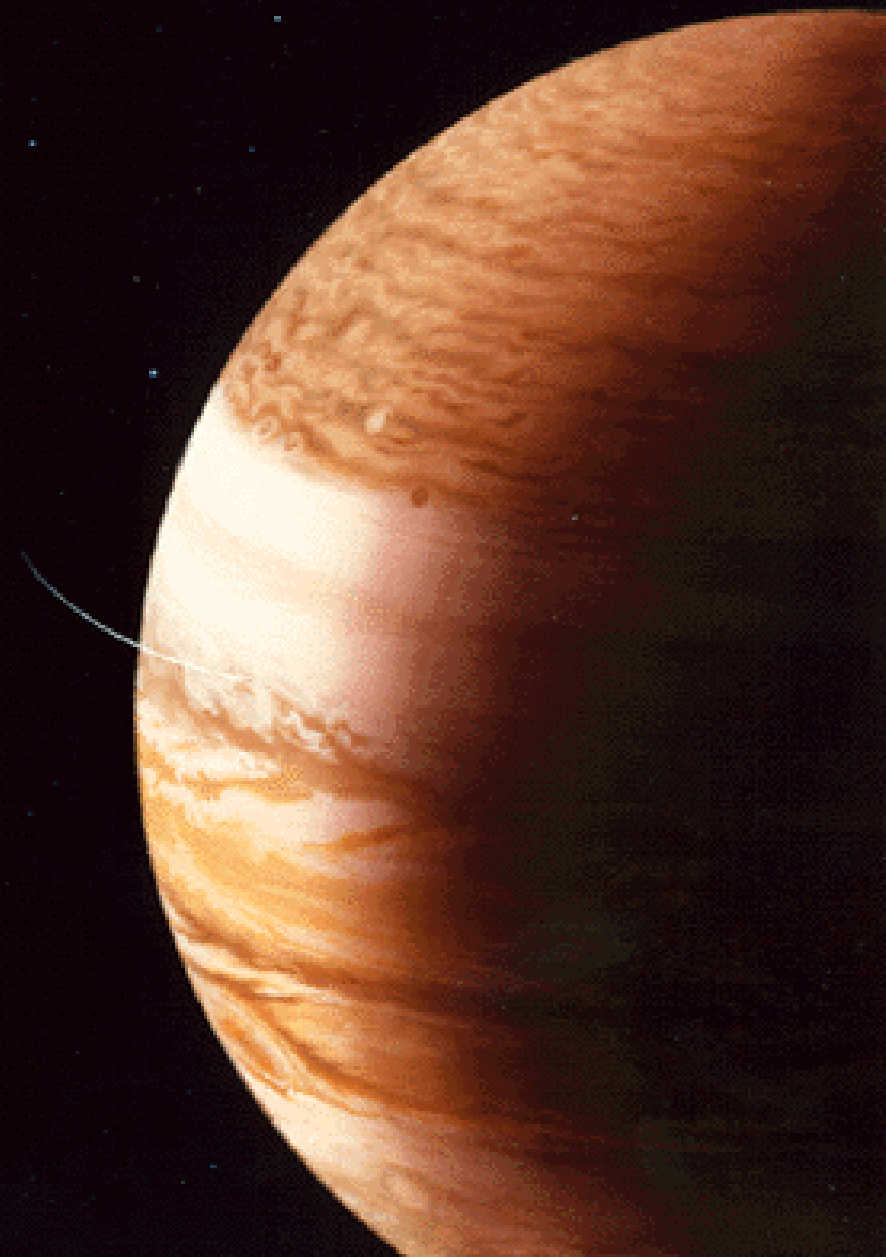
LPL, University of Arizona

Tucson AZ

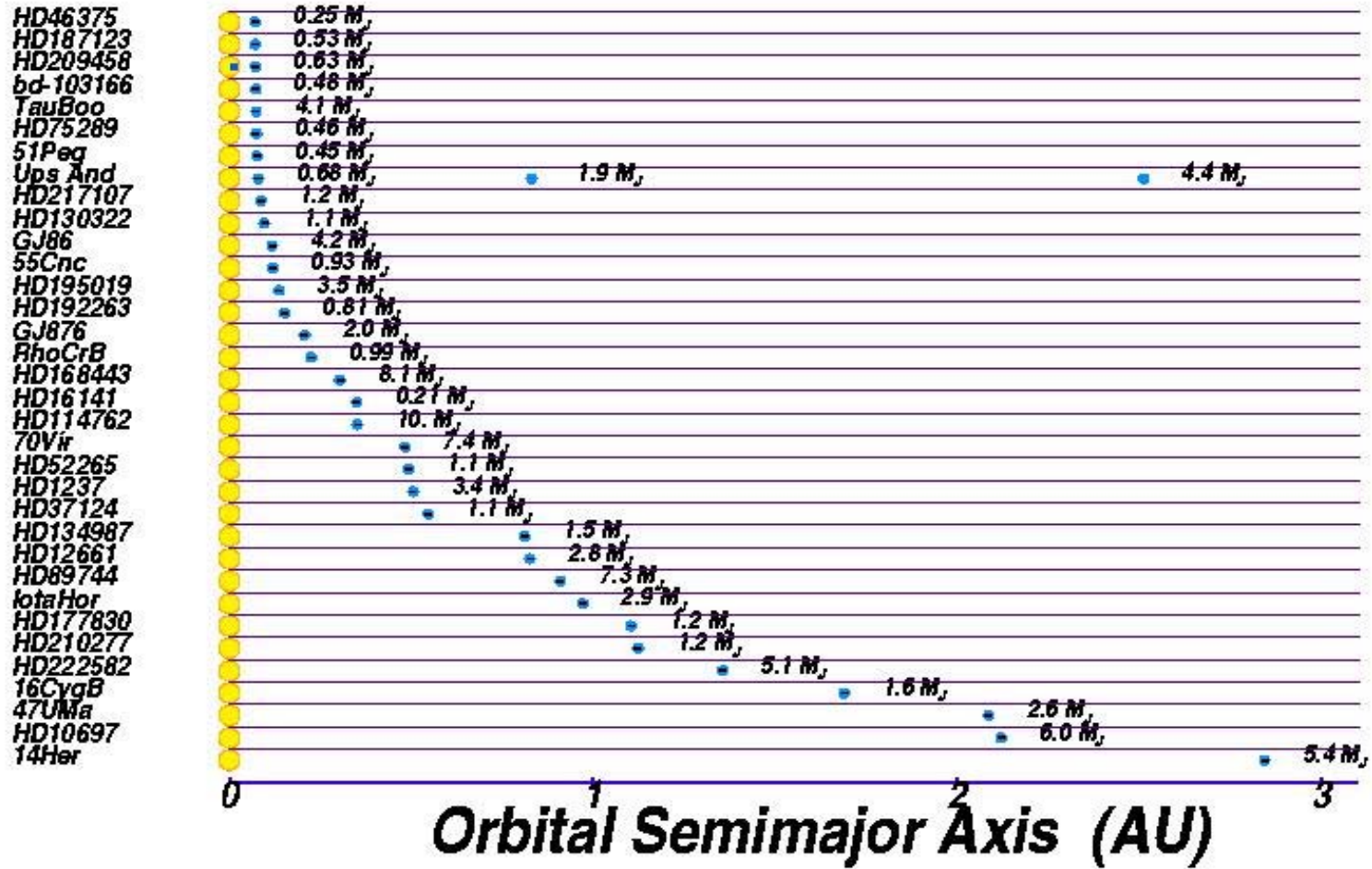
- Do extra-solar g.p.'s really exist?
- How many stars have/had g.p.?
- What do g.p. do to t.p. habitability?
- What should TPF do?

Presentation to the TPF-Architecture Workshop

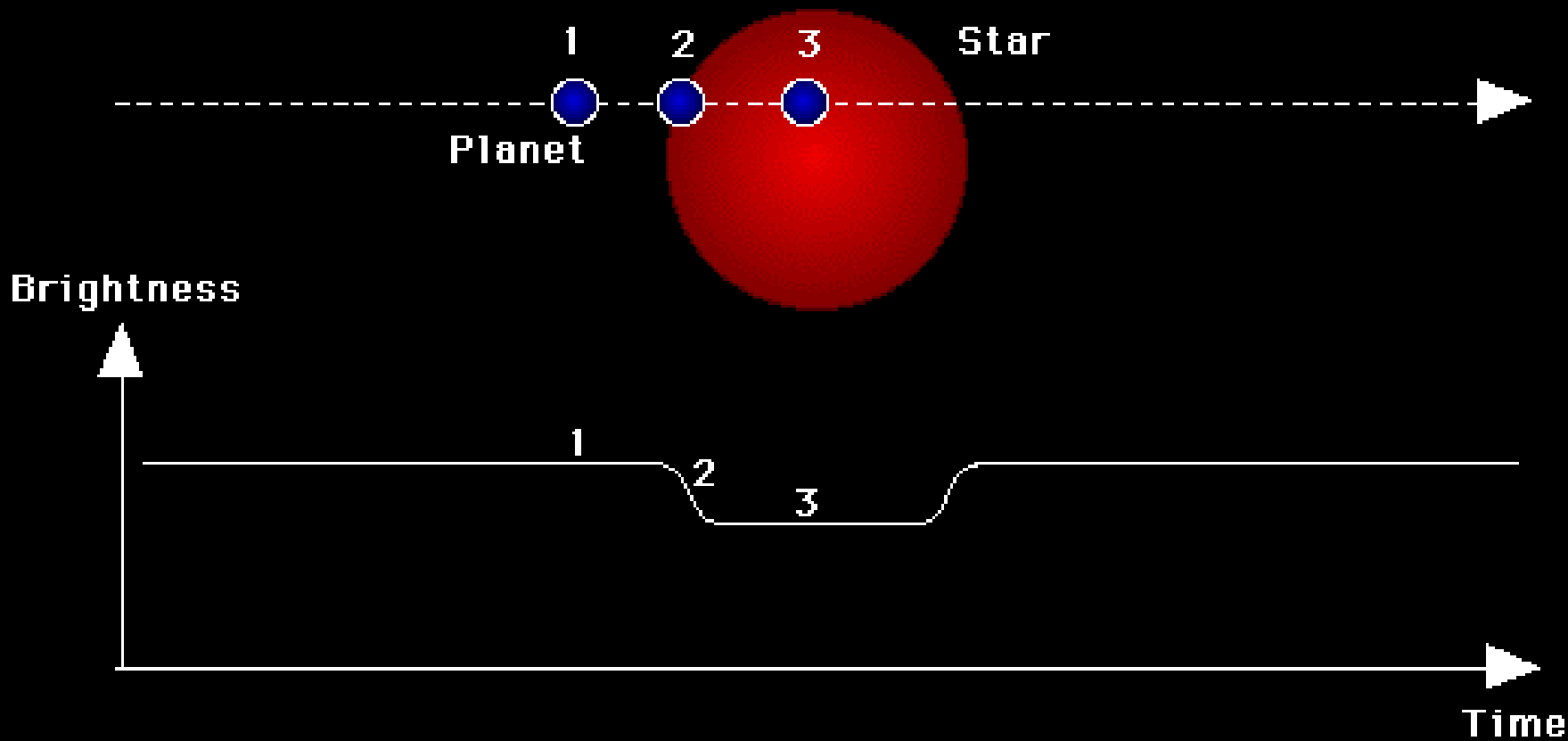
December 12, 2000



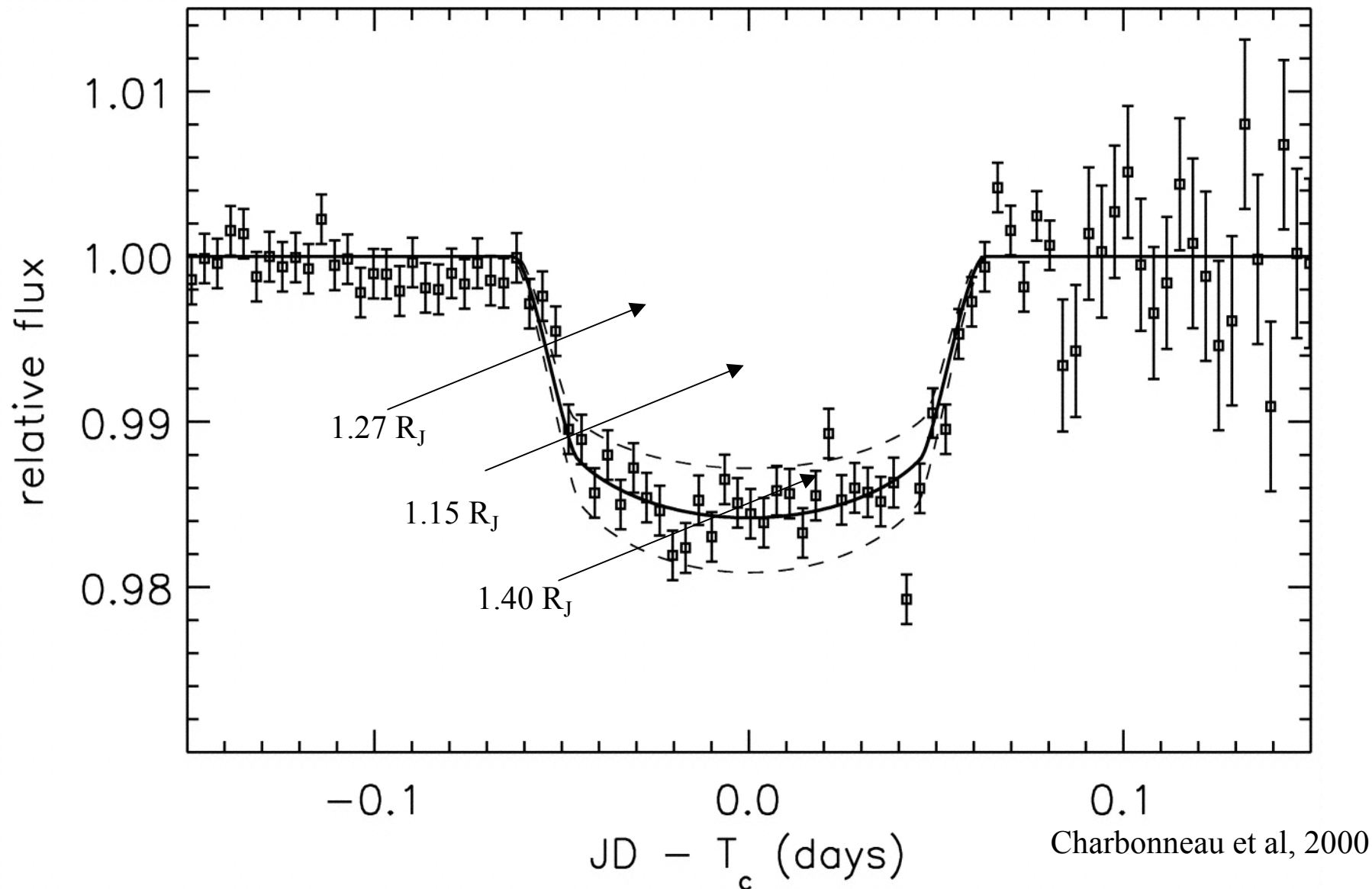
# Planets found to date

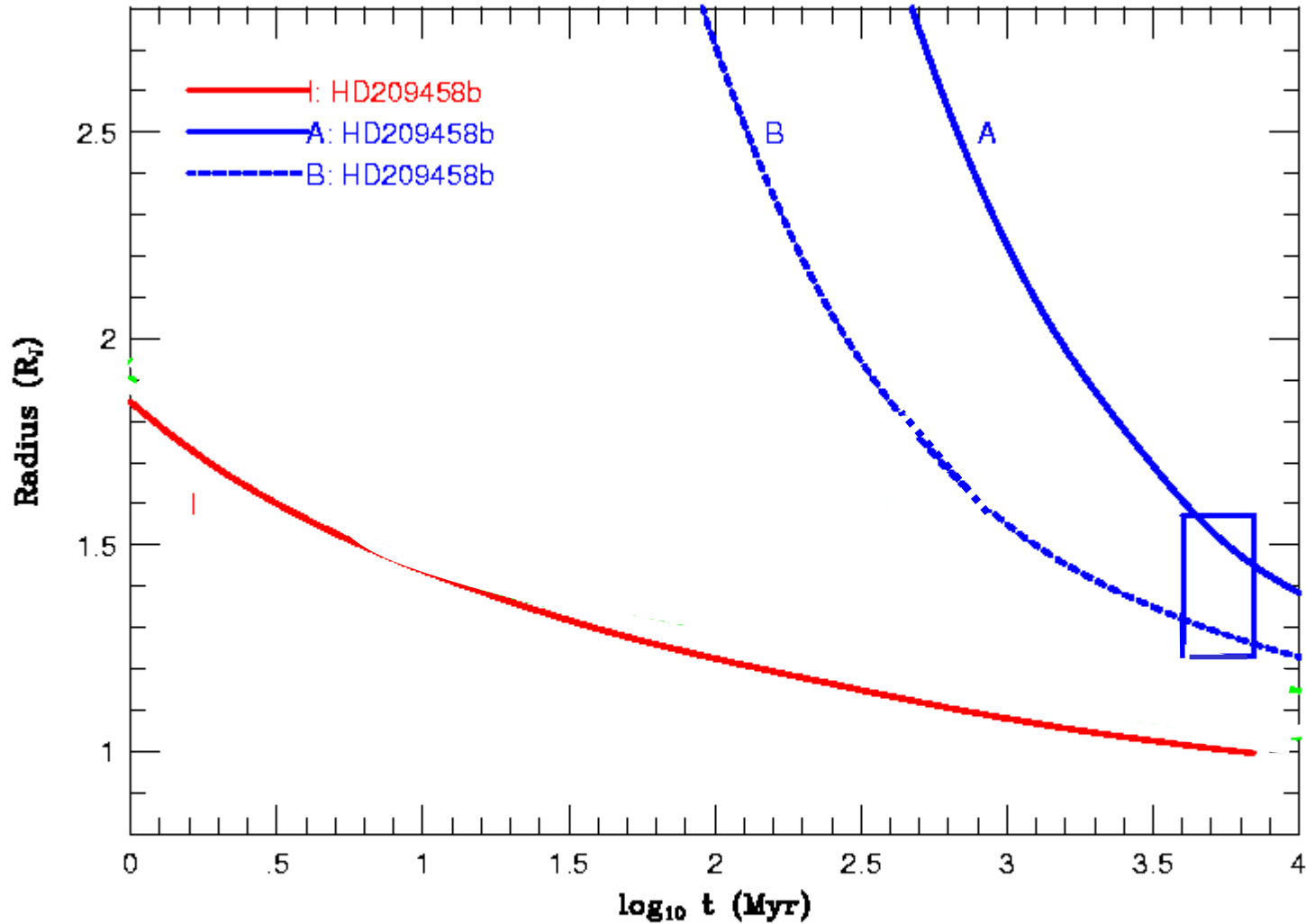


# Planet Occulting a Star



## HD209458: First detected planetary transit



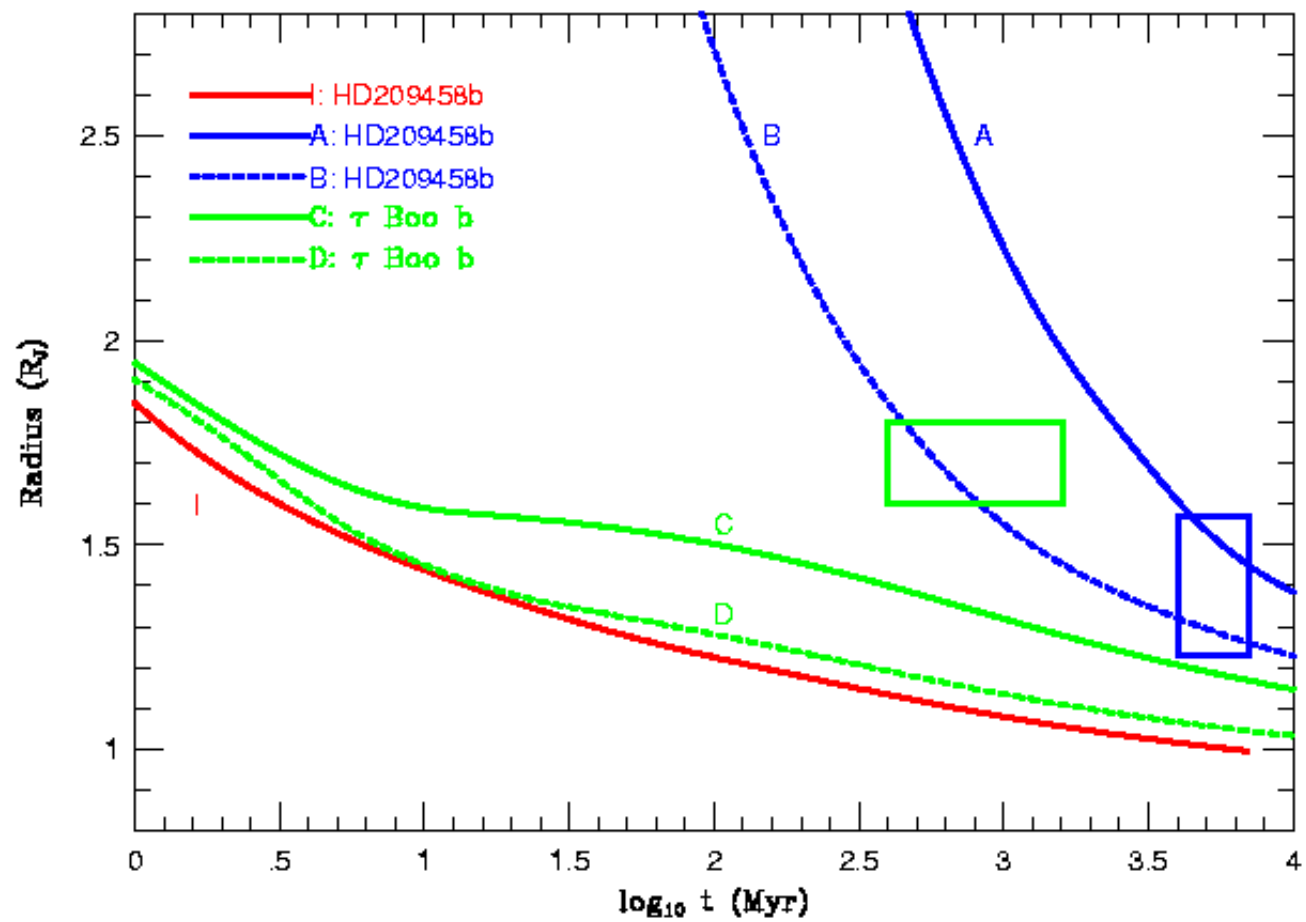


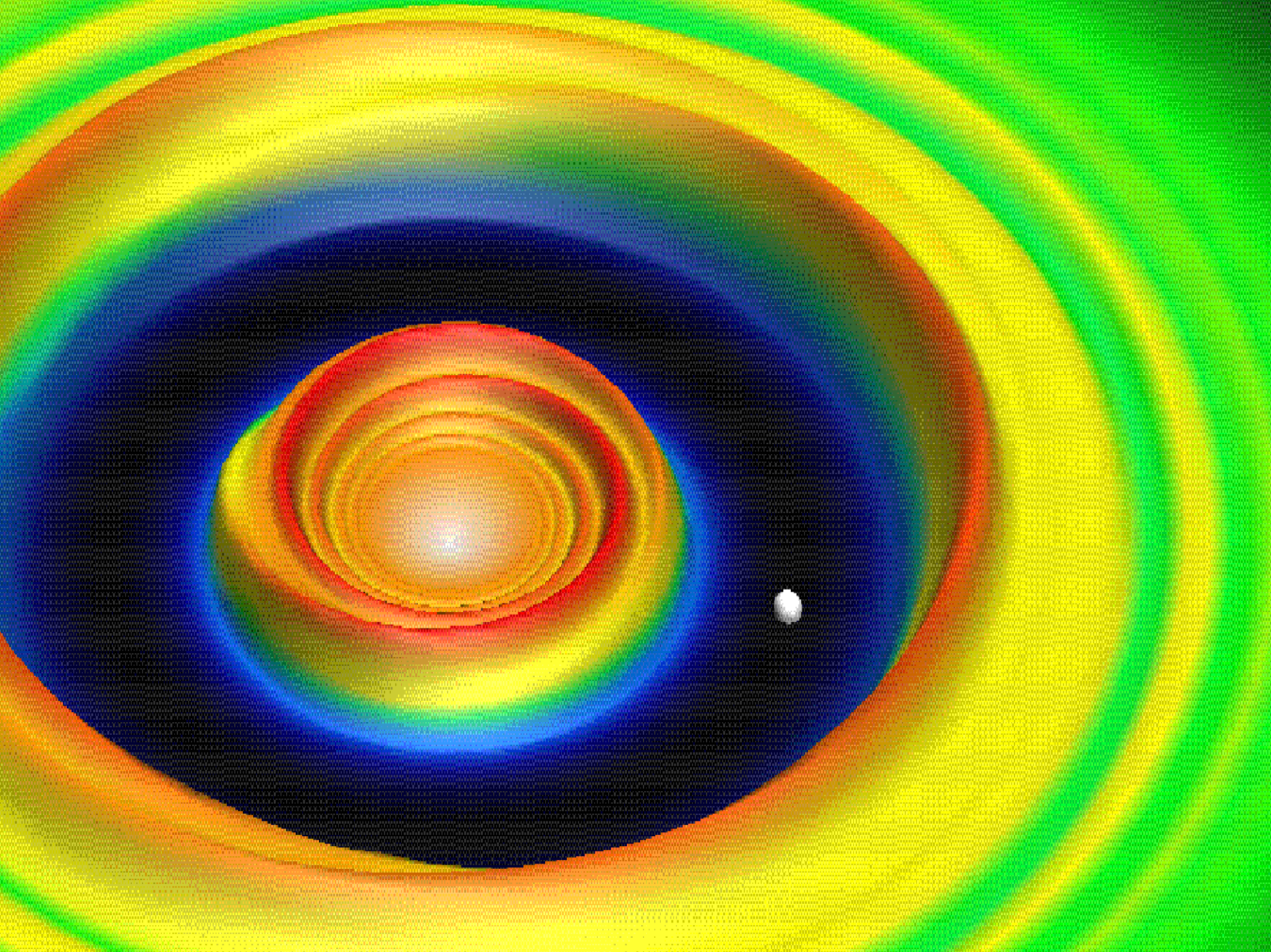
Model I: Isolation, mass=0.69  $M_J$

Burrows et al., 2000

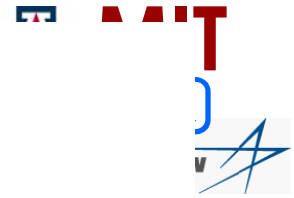
Model A: HD209458 b; albedo=0.0,  $T_{\text{eff}}=1600$  K, mass=0.69  $M_J$

Model B: albedo= 0.5,  $T_{\text{eff}}=1200$  K, mass=0.69  $M_J$

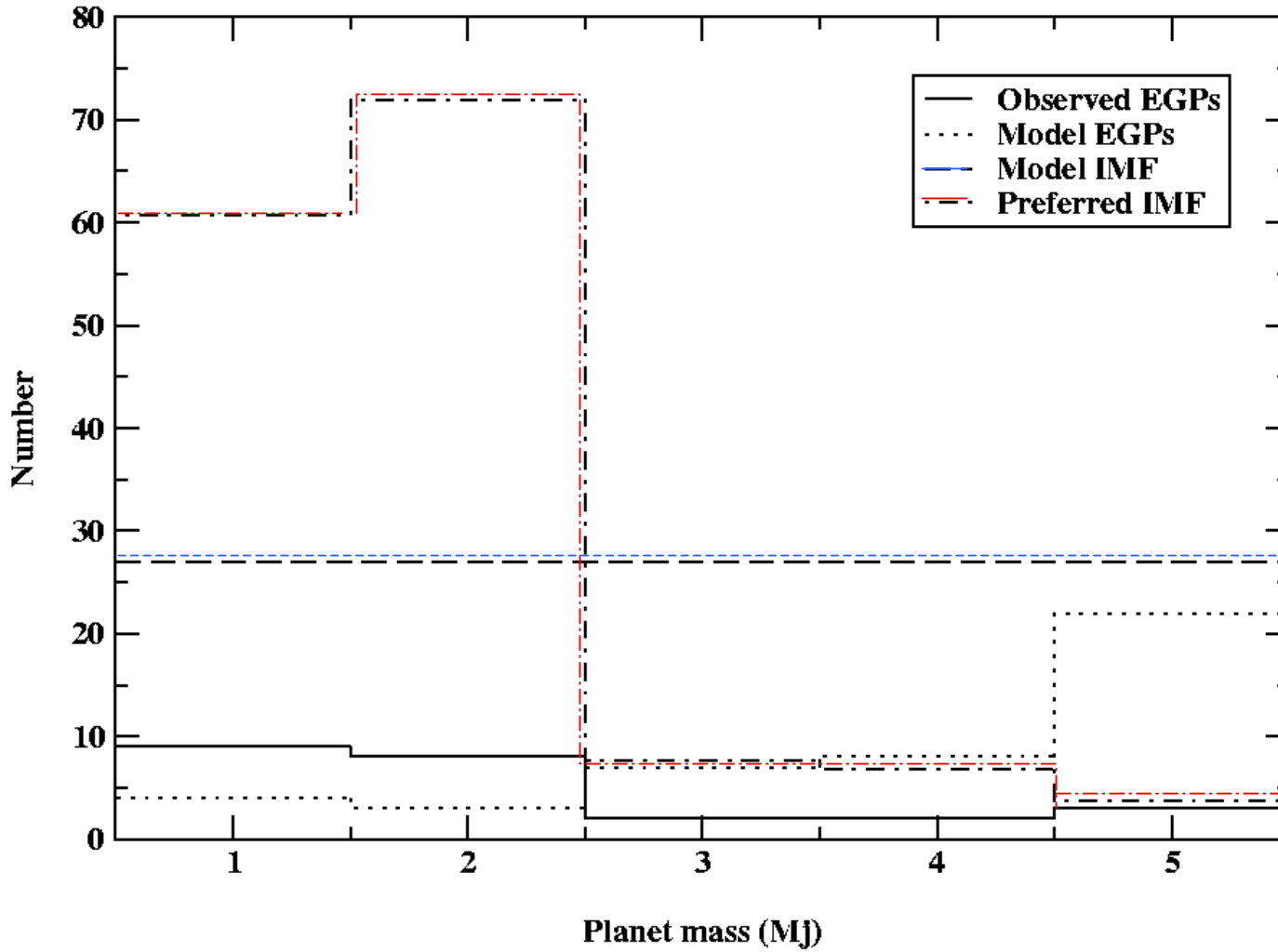




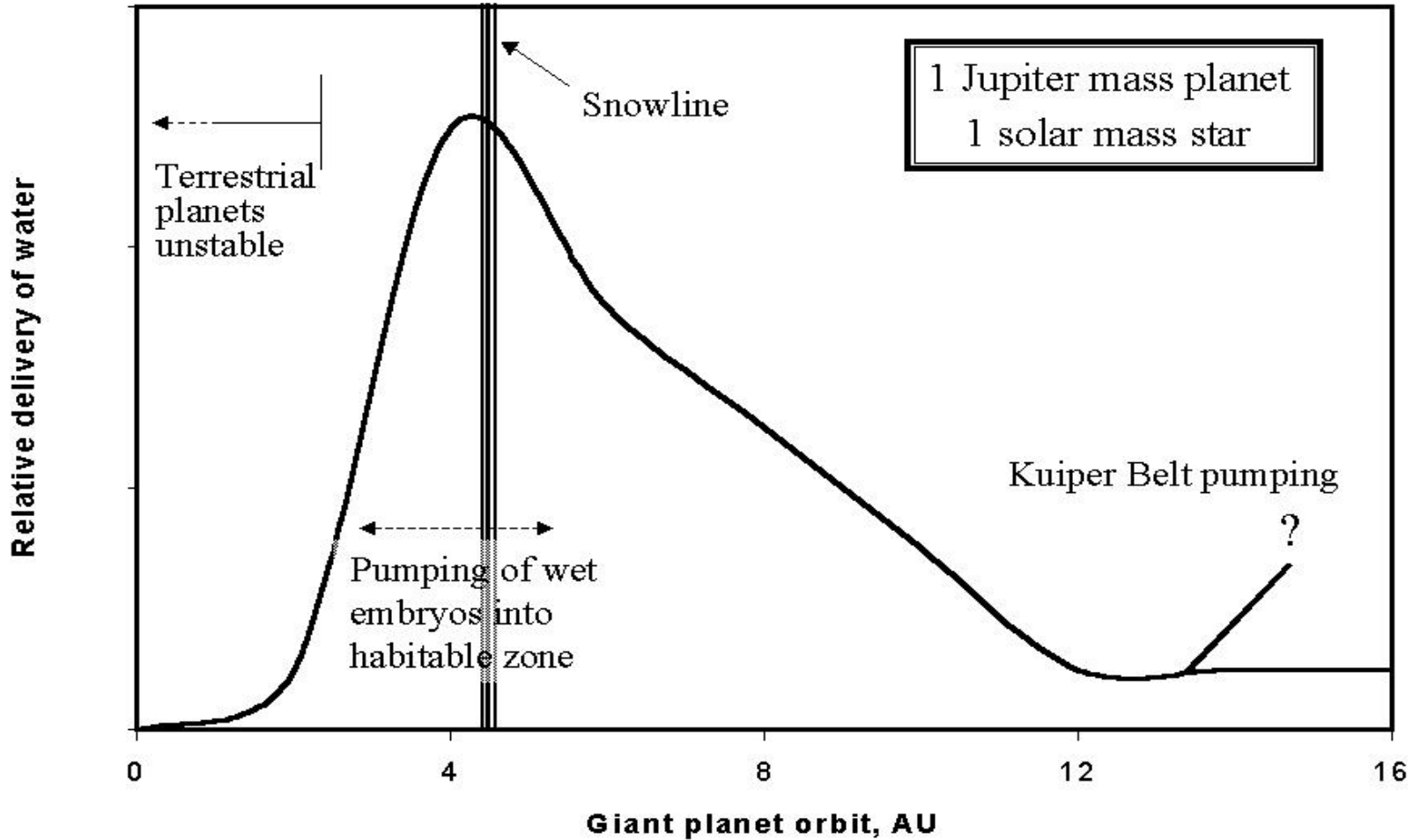




# Initial Mass Function



# Delivery of Water



## Conclusions

- HD209458b is a bona fide giant planet--they do exist round other stars
- For every detected planet, our results imply 10 extant planets
- Behind every extant planet is 2 ghosts, destroyed by migration
- Giant planets stability of t.p. orbits *and* delivery of volatiles to them
- A search for habitable planets must be a search for habitable systems
- *TPF or a precursor should map giant planet orbits, masses, properties*

