Completeness and astrometry

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Questions and Goals

Questions we're asking

1. Does knowledge of which stars have earthlike planets (from any source) help with an imaging mission?
2. Does information about the system architecture rapidly multiply value of orbital information from an imaging mission?
3. Does detailed knowledge of planetary orbits from astrometry help with an imaging mission?

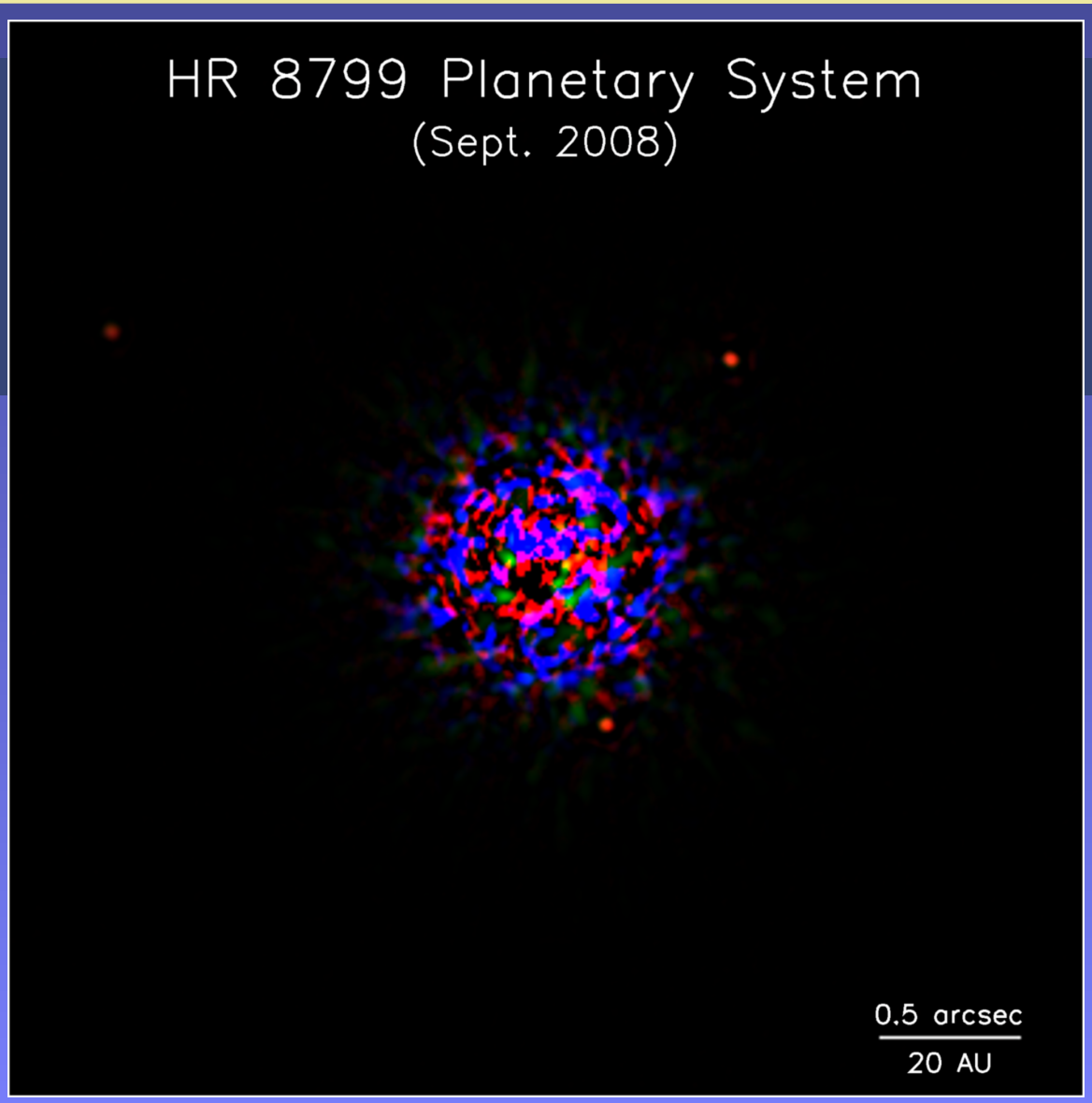
Questions we're not asking (but Lisa is)

- How important are masses to scientific understanding of systems

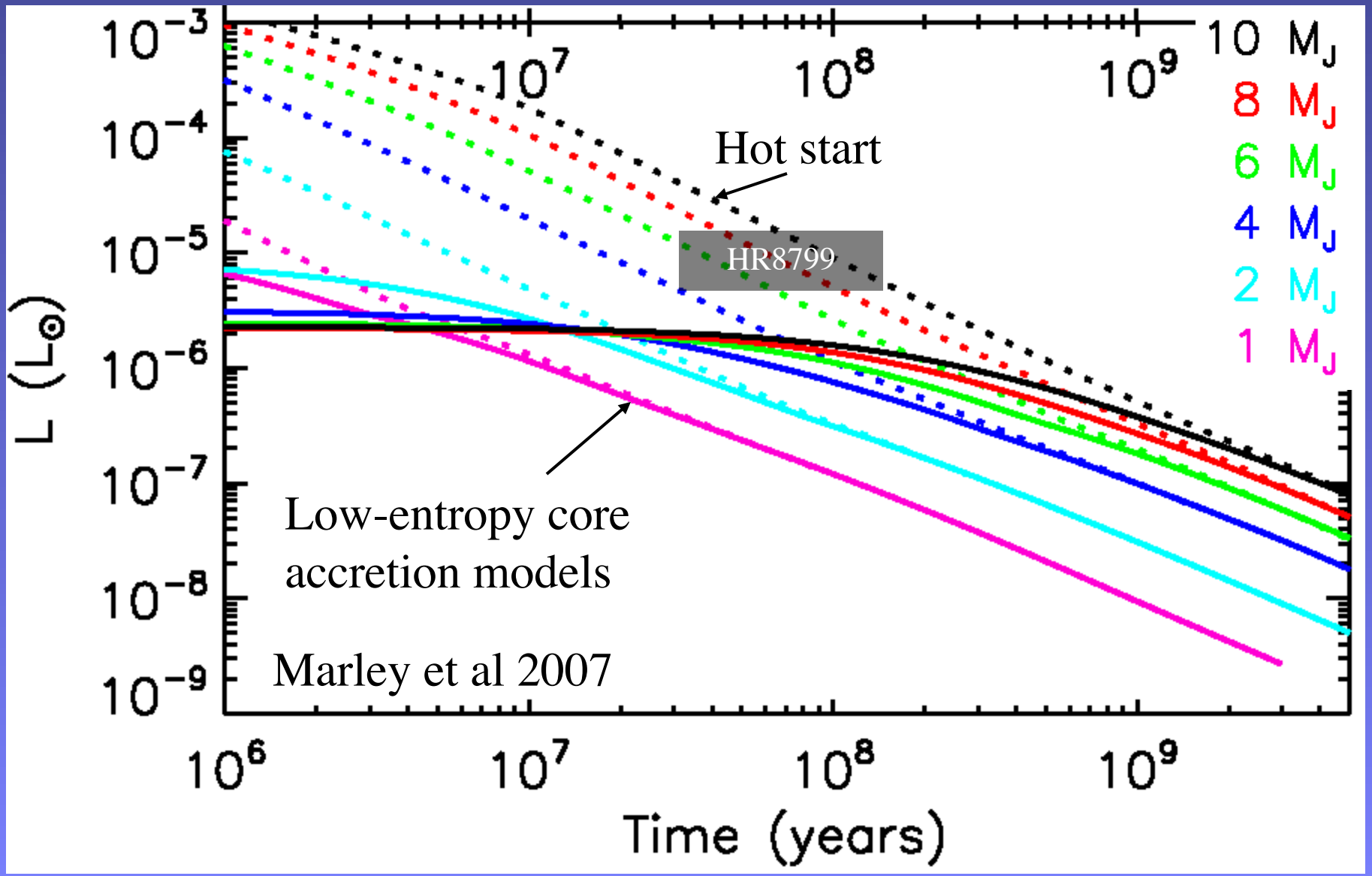
Goals

- Find general scaling laws rather than mission-specific facts
- Be clear and realistic about dependences (e.g. on eta_earth)
- Compare to other sources of information

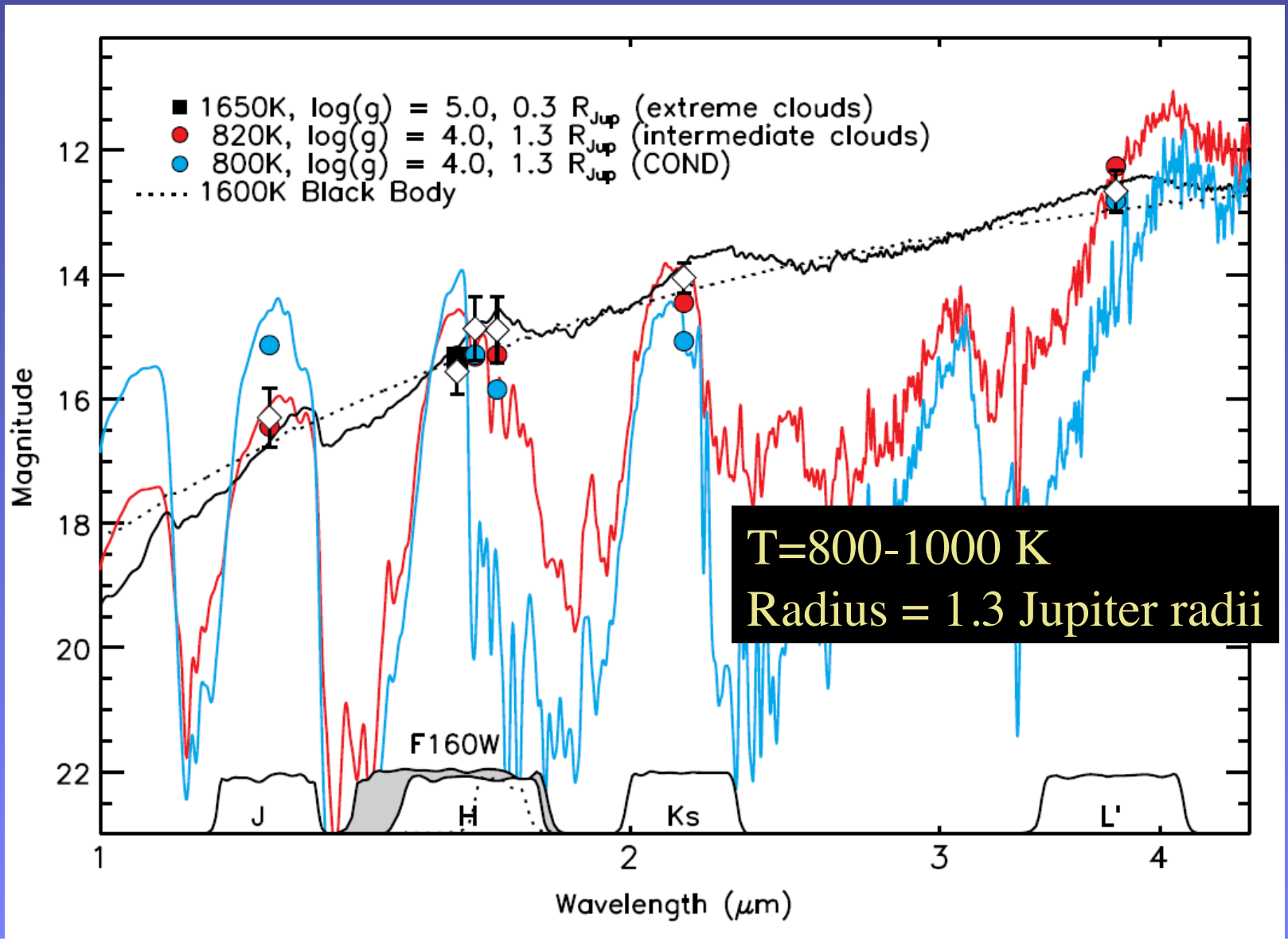
Mass?



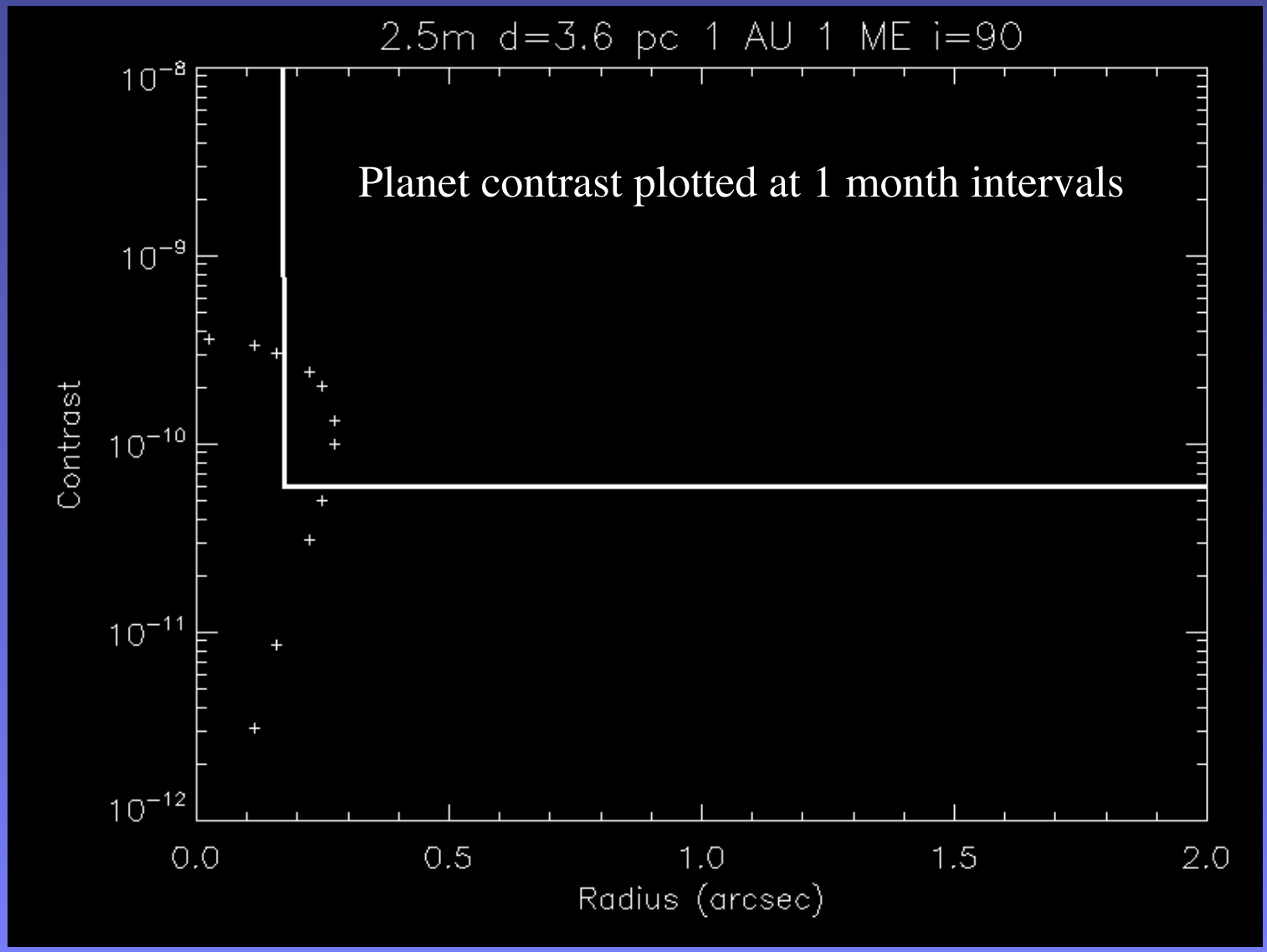
Model uncertainty in mass/luminosity



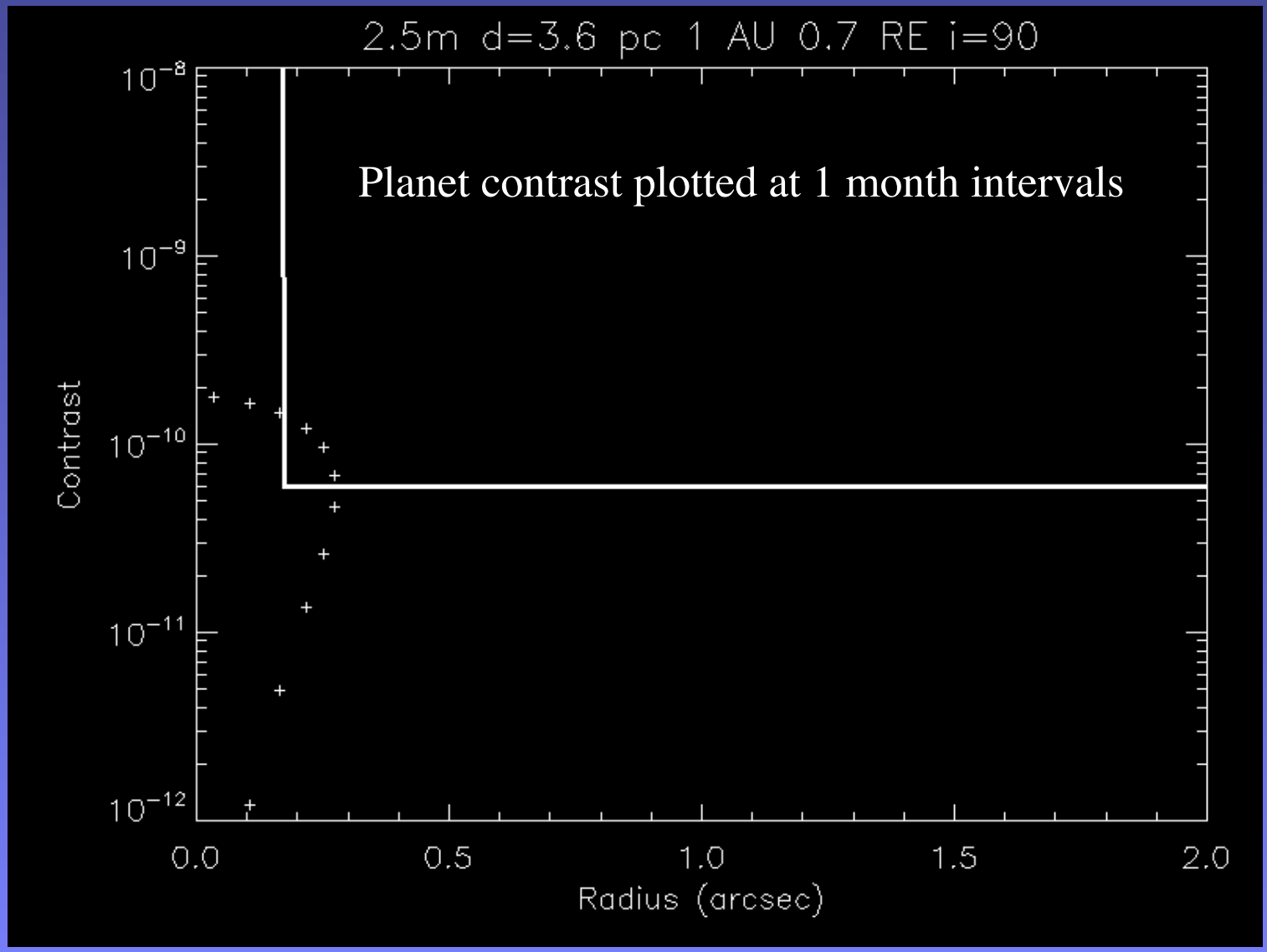
Spectraphotometry and model uncertainty



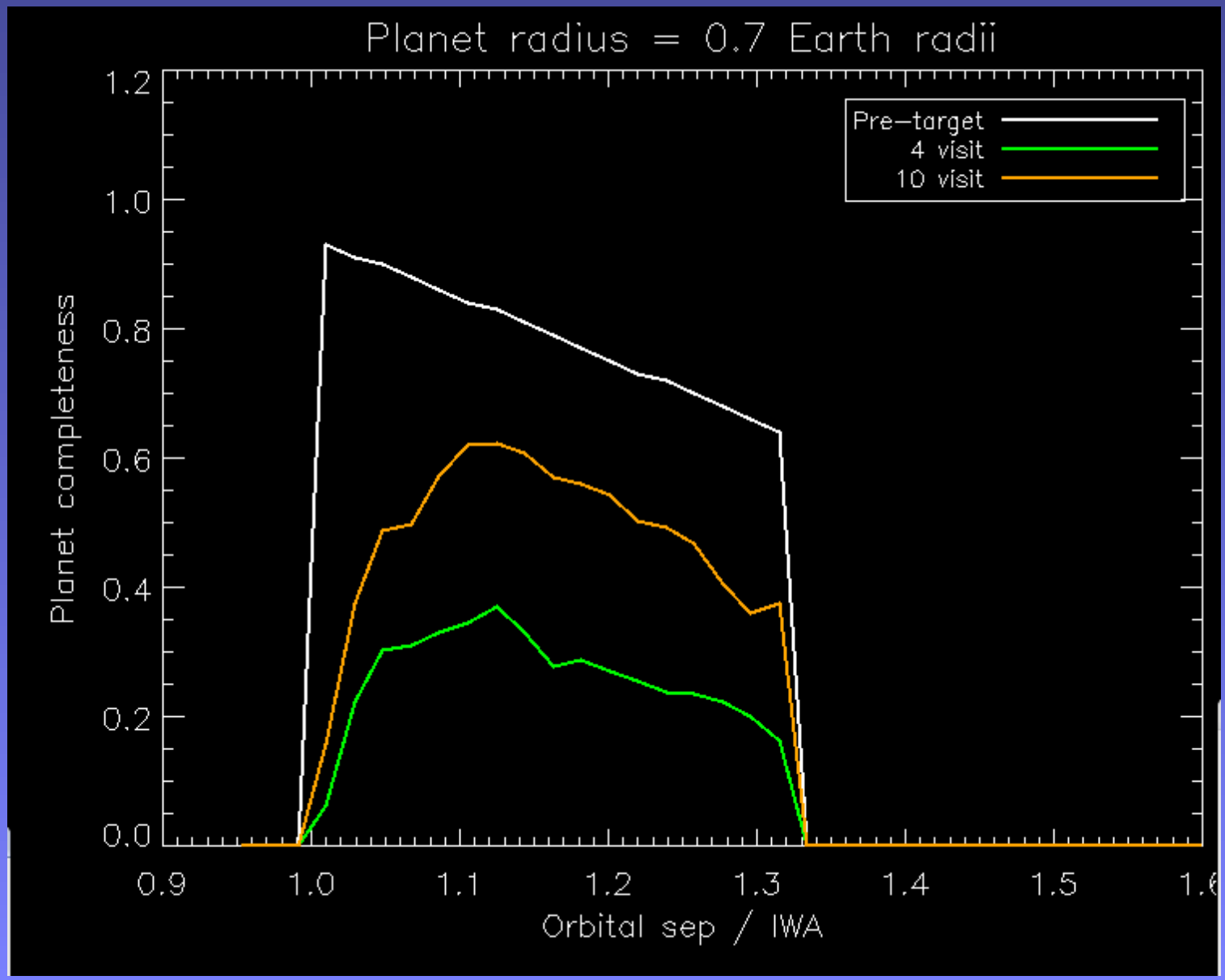
Coronagraph completeness



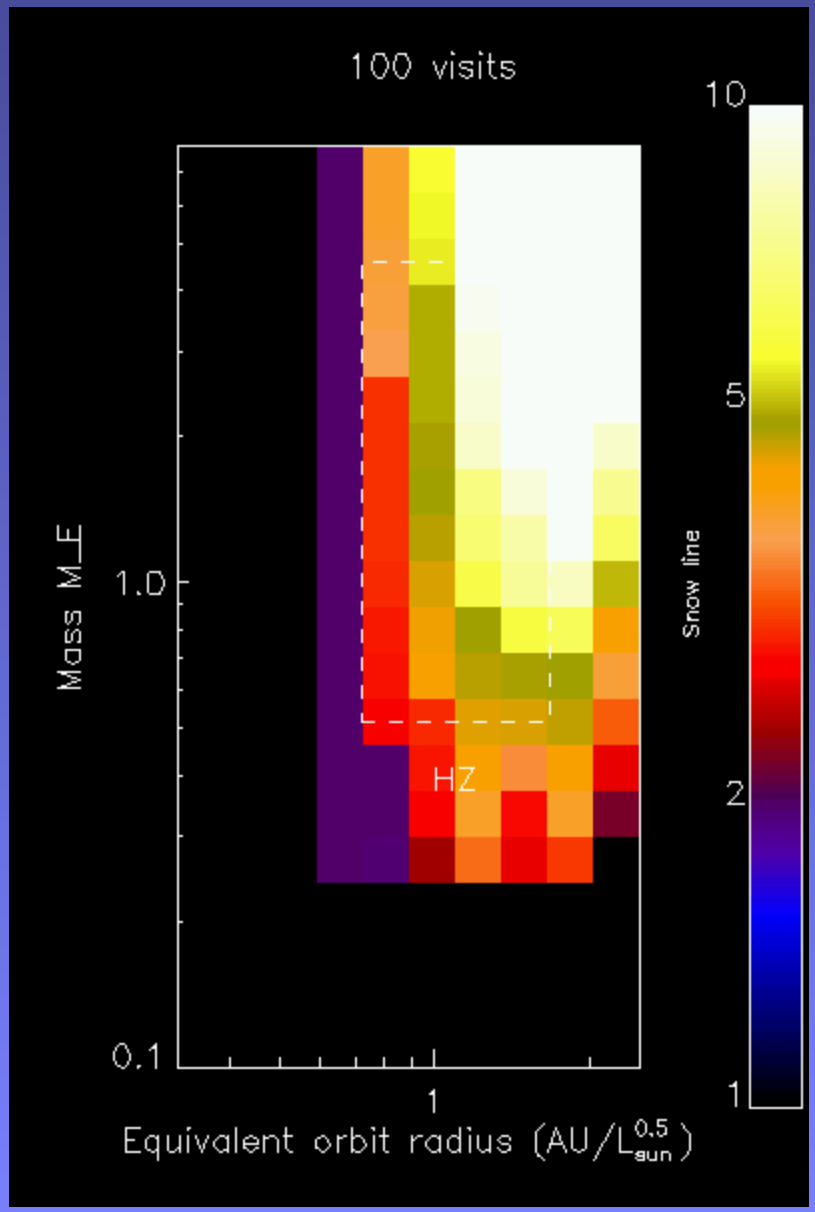
Coronagraph completeness

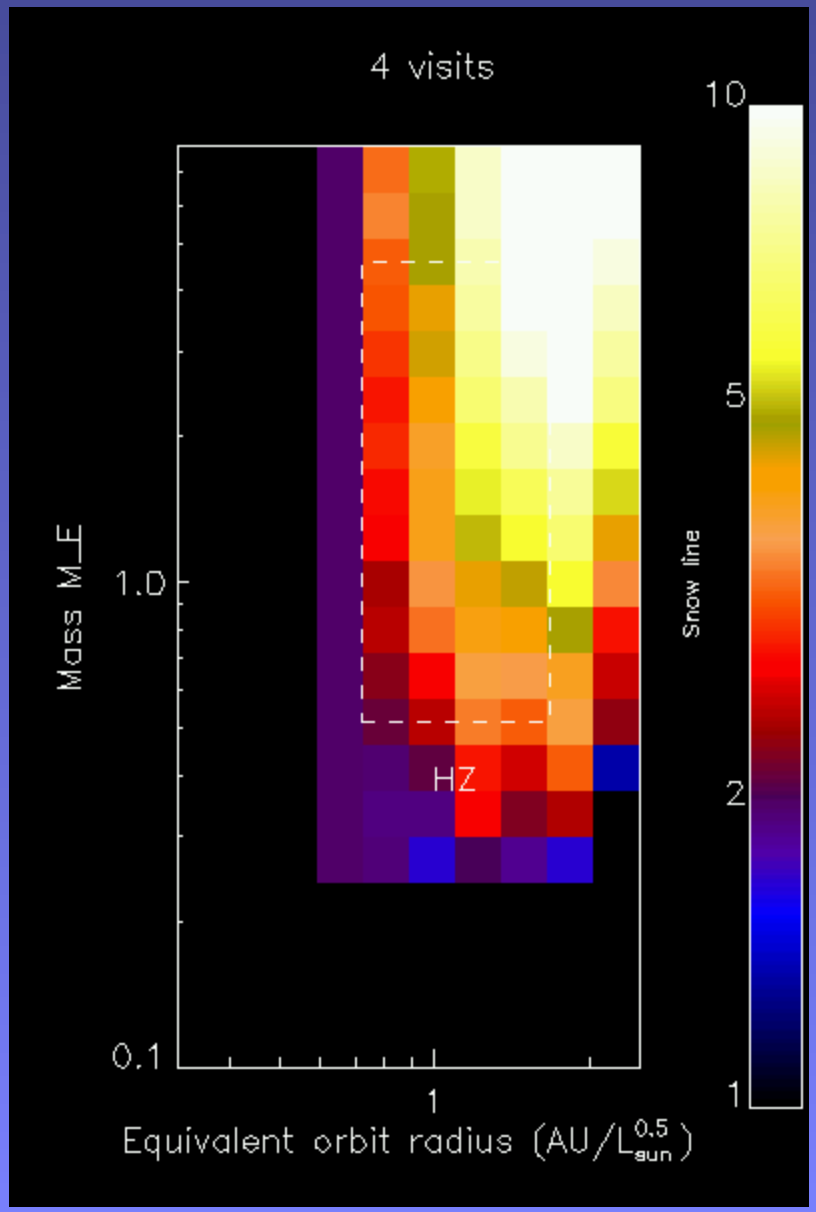


Completeness

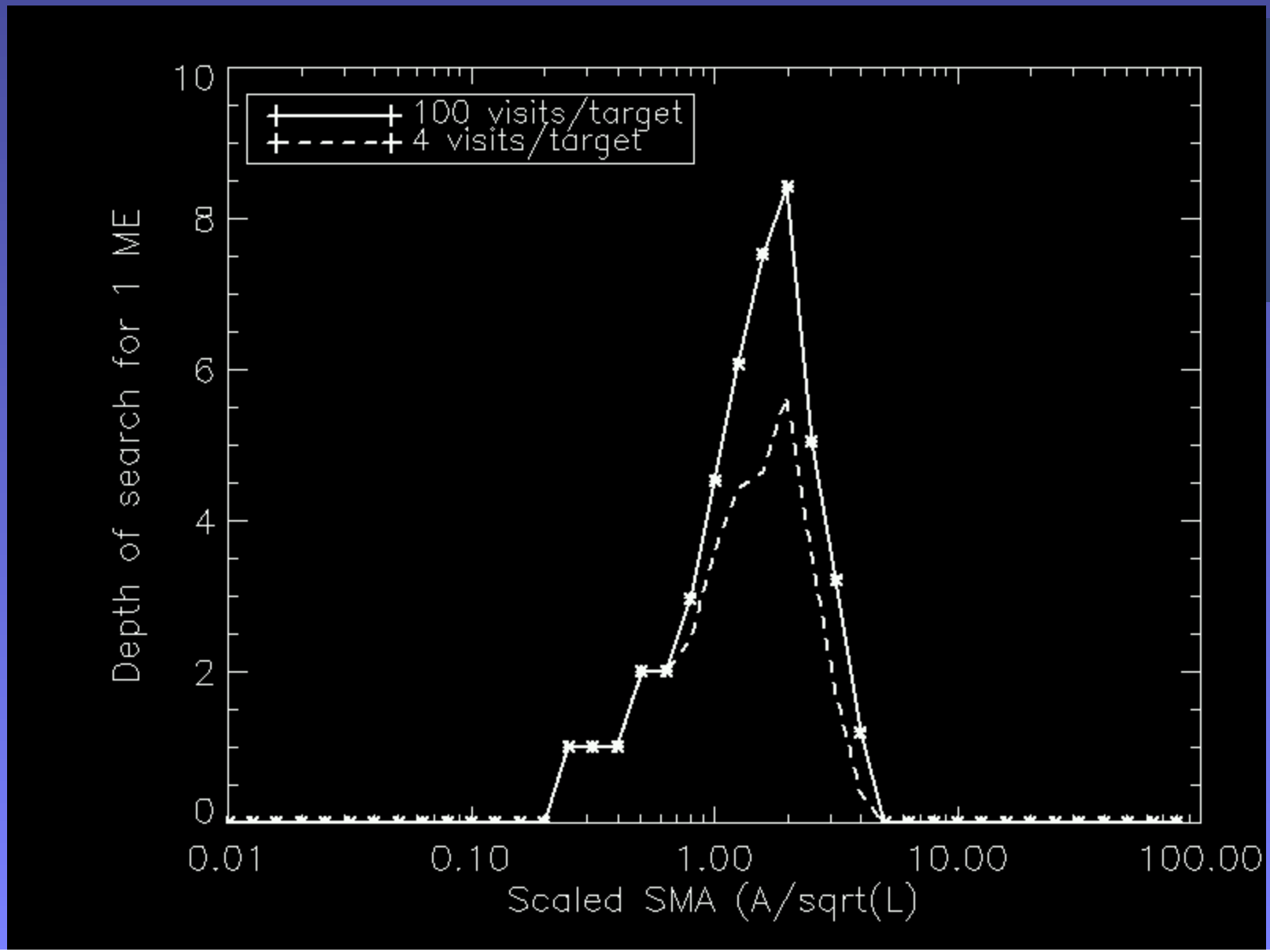


Effects of target selection for 0.16” IWA
Depth of search (completeness * stars)





Effects of target selection for 0.16” IWA



Steps

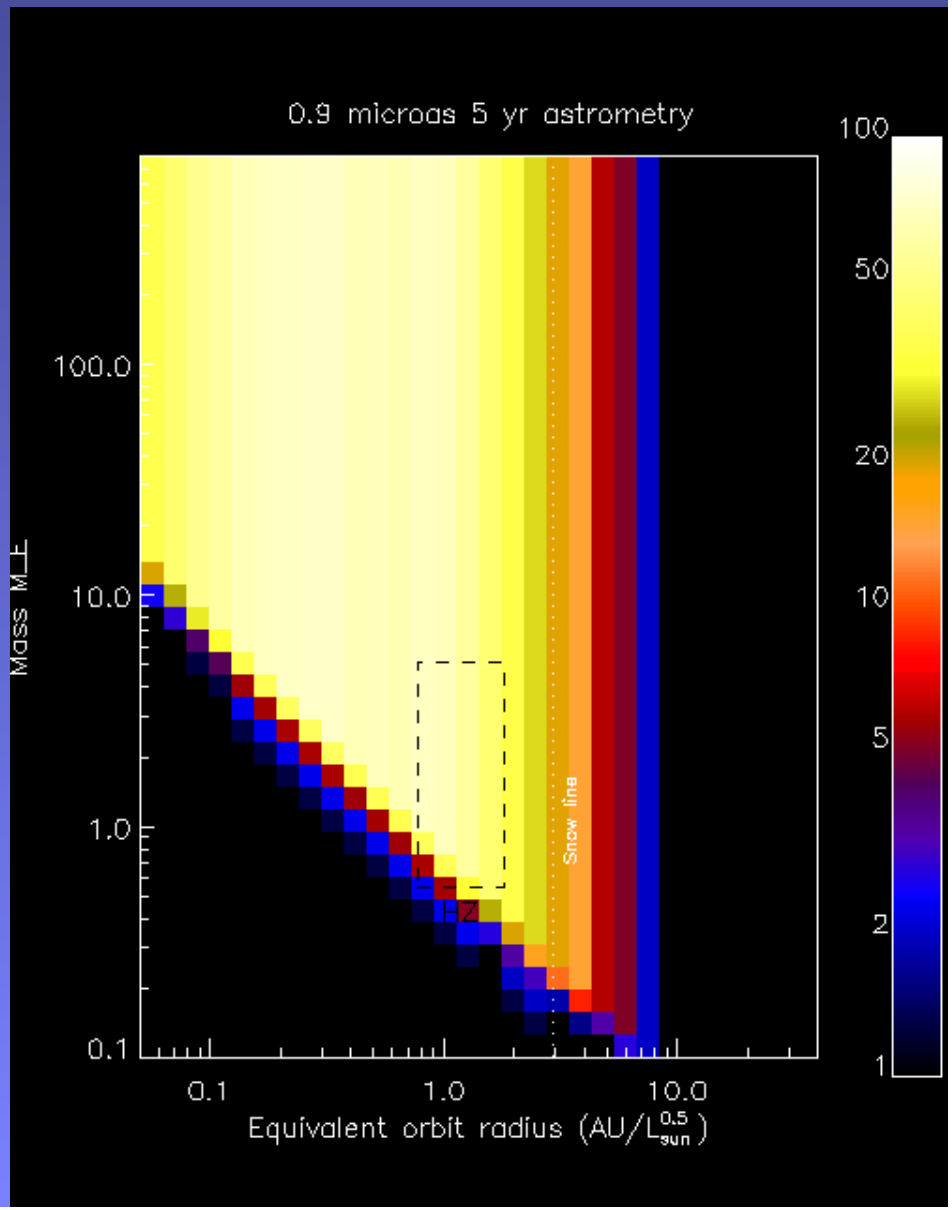
- Agree on figures of merit
- Calculate using existing tools and uniform assumptions
- Come up with basic scaling laws

Long term:

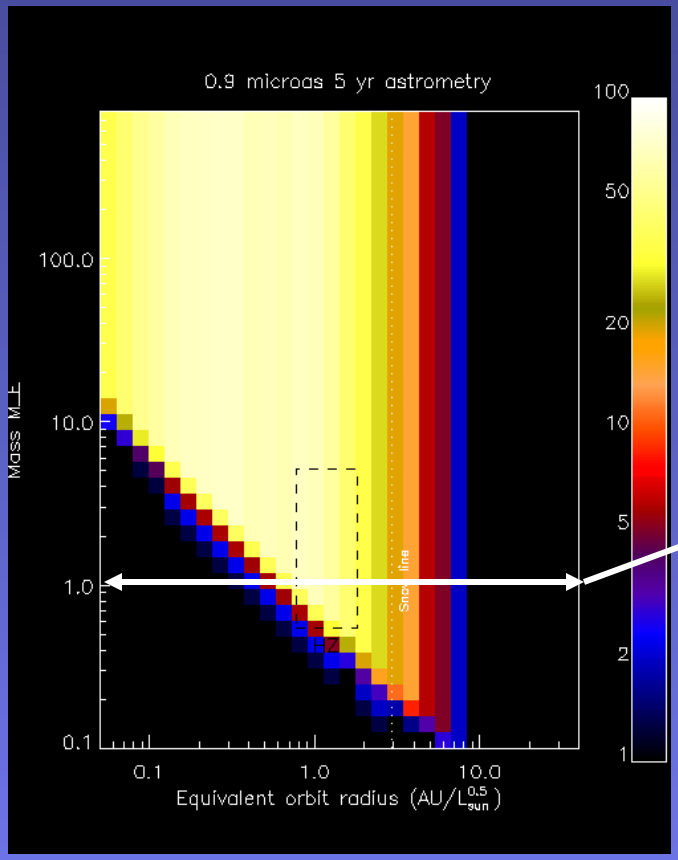
- Incorporate astrometry into one channel of a double-blind study?

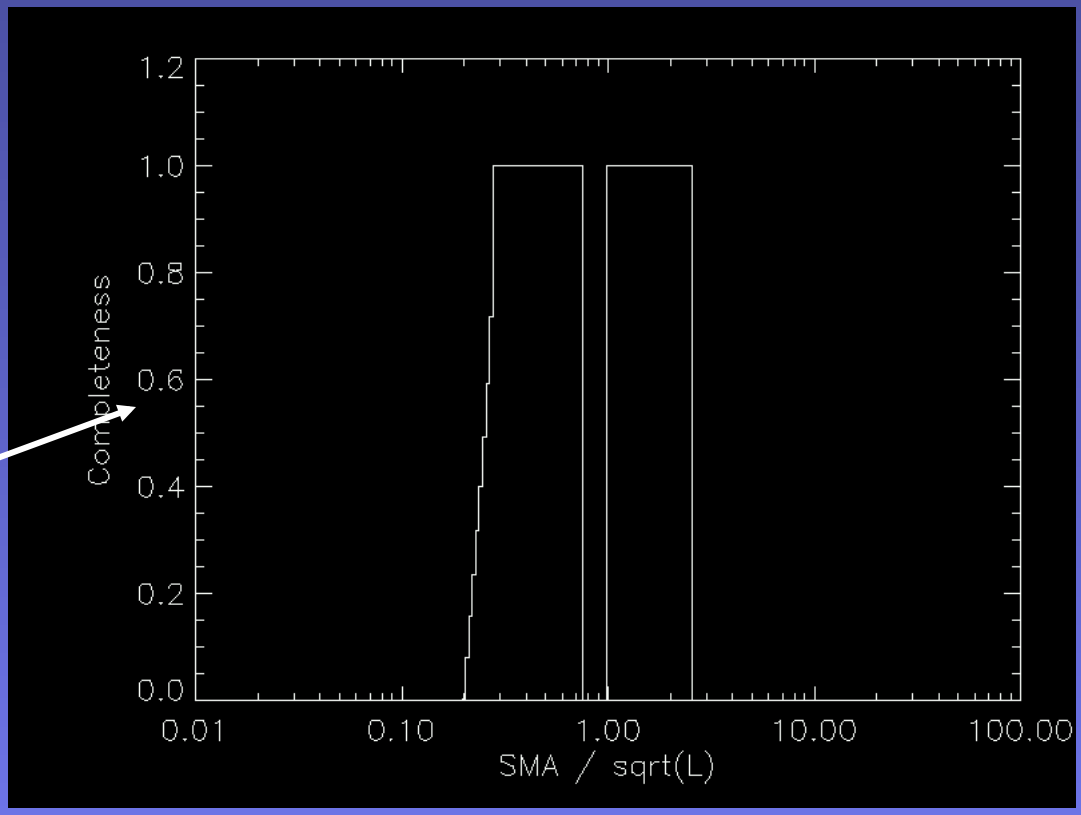
Space astrometry

- **0.9 μas per measurement**
- **5 year baseline**
- **N=100 to 1285 visits per star**
- **No stellar activity noise**
  - JPL models indicate this is small
- **No systematic threshold**
- **Blind spot from 0.9-1.1 years**



Blind spot effects





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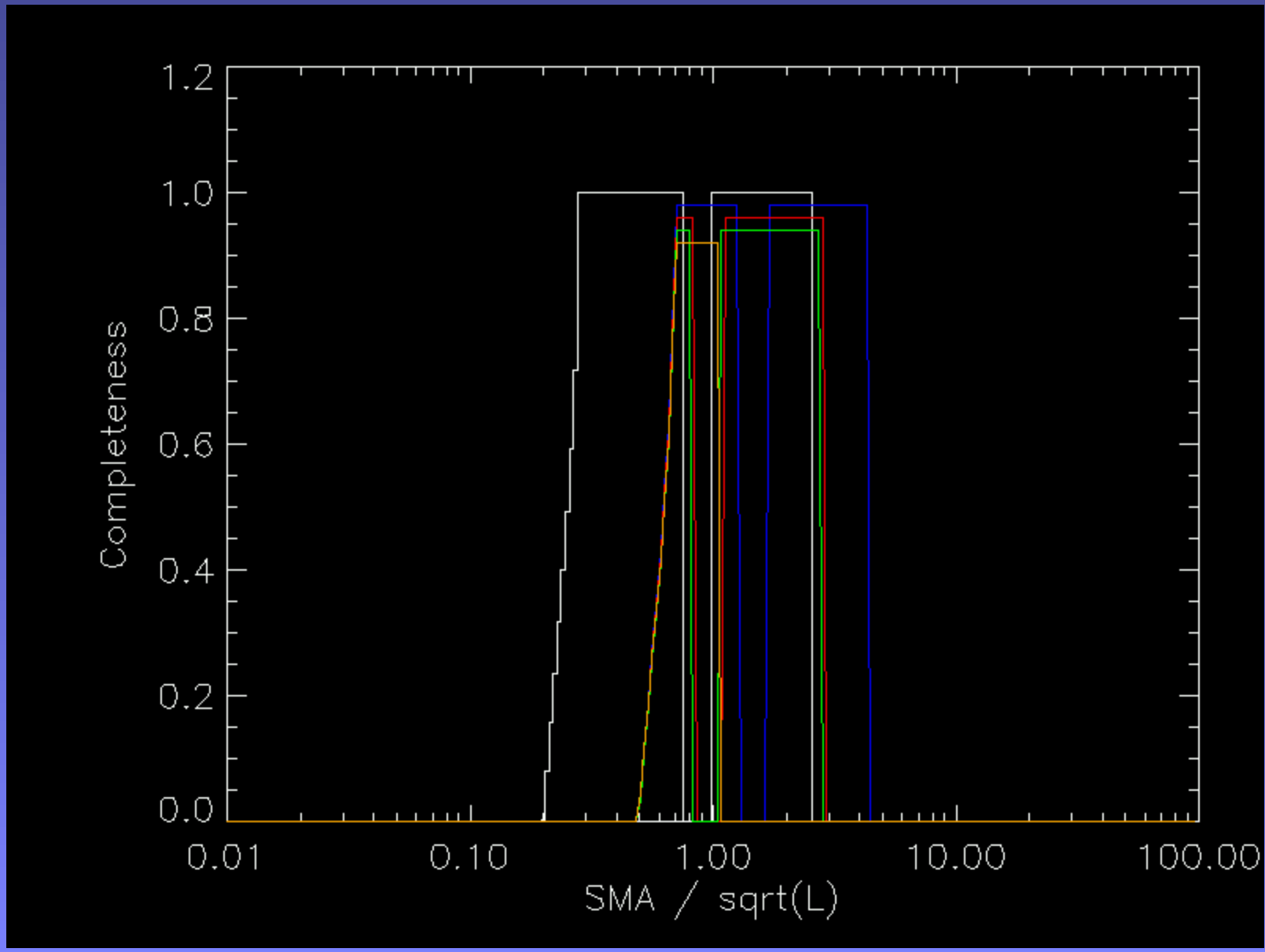
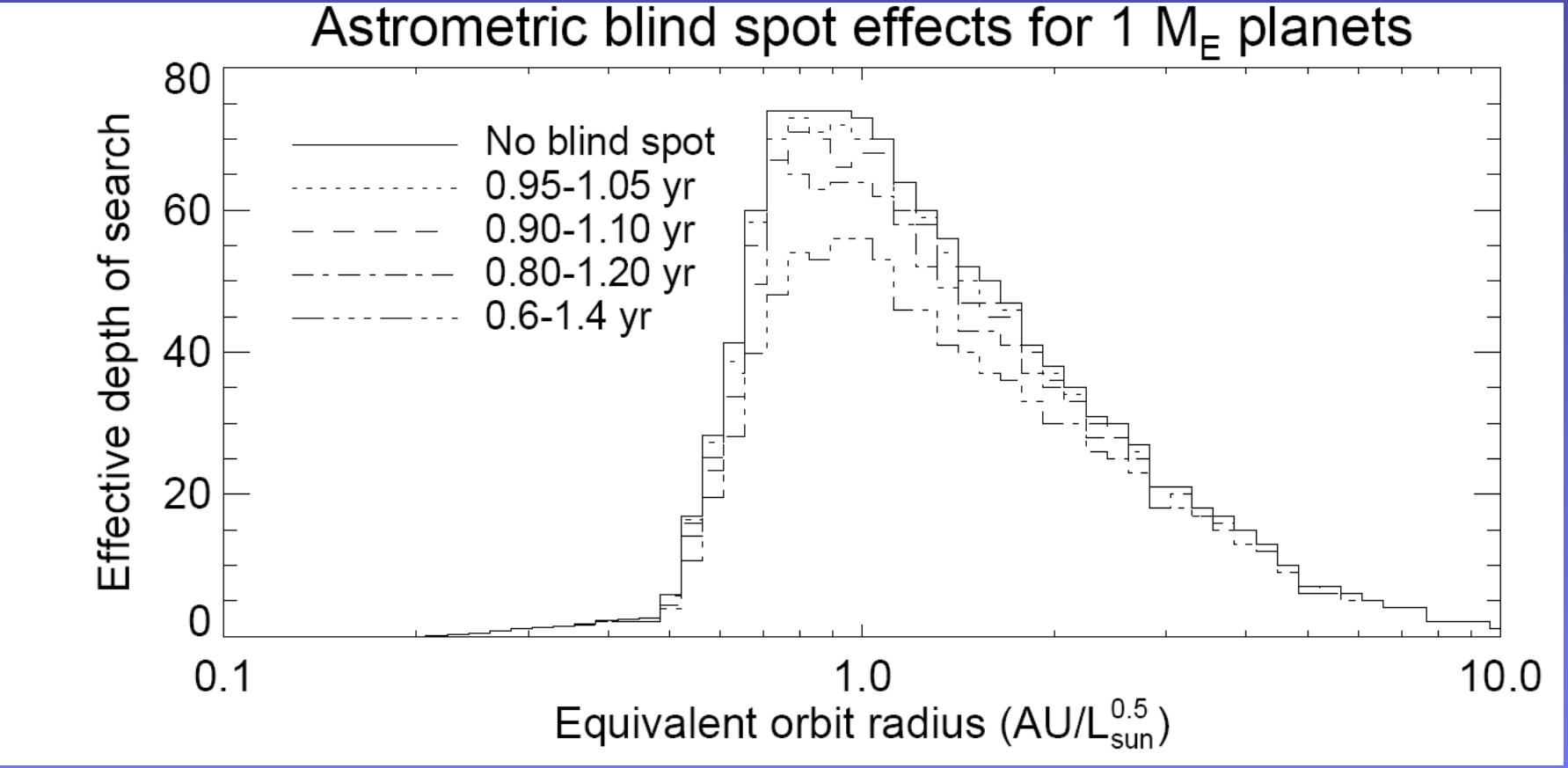


Blind spot effects



Astrometry comparison to Doppler searches