Earth Finding Direct Imaging Starshade Mission

Sagan 2014 Workshop

Flagship Starshade

of Earths

6.8

Mission Parameters

- Telescope size = 8m
- Mission lifetime = 5 yrs
- Exoplanet science fraction = 30%
- Bandwidth = 50%
- N_exozodis = 3
- Contrast = 10^-10
- IWA = 47 mas

Some Scalings

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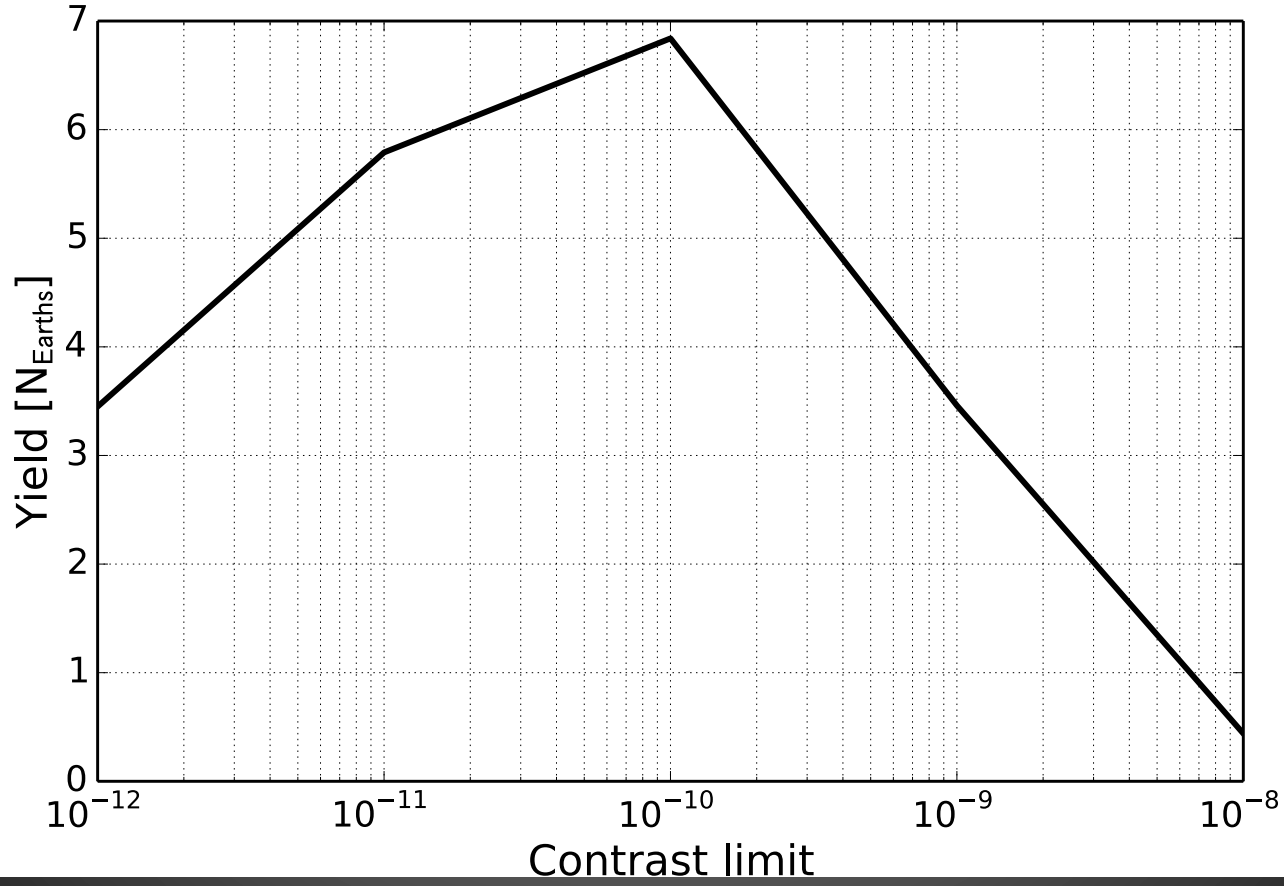

Mission Parameters

- Starshade size = 34 m
- Slew time per target/total = 13.7 days/3.75 yrs
- N_stars = 100
- Orbit = L2
- Launch Margin = 55000 kg (66%)
- **Cost = $11.944 Billion**

Other architectures

- 8 m
  - N_earths = 6.8
  - Cost = $11.9 Billion
- 3.5 m
  - N_earths = 4
  - Cost = $3.3 Billion
- 1 m
  - N_earths = 1.5
  - Cost = $1.4 Billion

Important lesson

- Simply decreasing IWA or increasing contrast will not find you more Earths!

- Extended slew times and longer integration times limit the number of stars you can visit in a limited mission.

Other planets

- Jupiters = 0.98
- Neptunes = 1.97
- Warm Mini Neptunes = 3.9

Alternate Acronyms

- FEARSOM
  - Five-year EARth-finding Starshade Occultor Mission
- FEARLESS
  - Finding EARths @ L2 with Extreme StarShade
- EREBOS (the Greek god of shadow)
  - Extremely Reasonable Earth-finding By Occulting Starshade

With the Extra Cash…

Maybe we can afford a sweet logo!