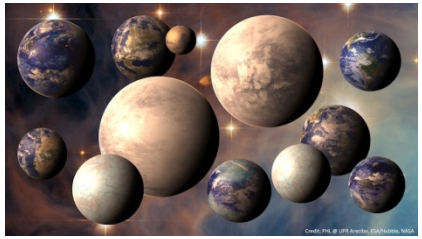
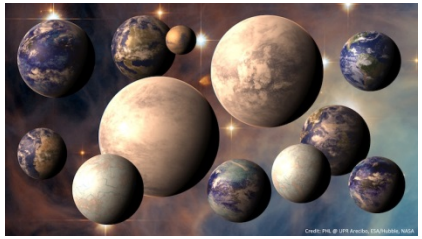
Exoplanet Space Missions: A European Perspective



- European Landscape
  - National programs
  - ESA (Science Program is mandatory for members)
  - EU (fellowship and grants programs)
- ESA Science Program
  - Astrophysics, Solar System, Fundamental Physics
  - Current LoR: 507.9M€/yr

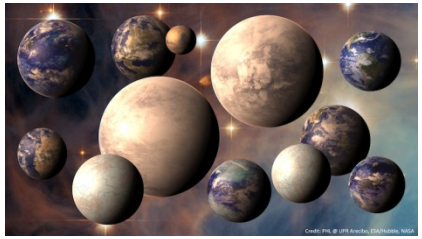
- Disclaimer: All statements are AQ's personal views

ESA Framework: Cosmic Vision



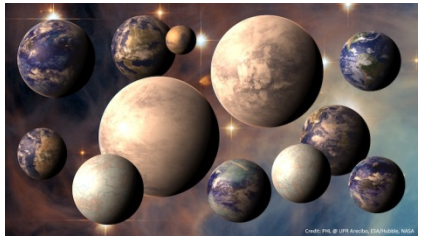
- Four themes
  - Planets and Life
  - The Solar System
  - Fundamental Laws
  - The Universe
- Three mission classes
  - S missions (50M€ + MS contributions)
  - M missions (500M€ + MS contributions)
  - L missions (1000M€ + MS contributions)

Cosmic Vision to 2035



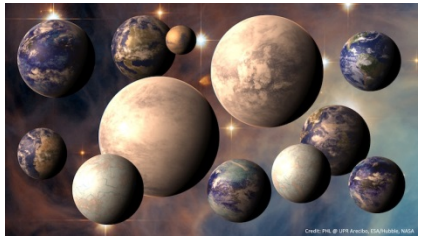
L3
Grav. Wav.
M7
M6
L2
X-Rays
M5
S-missions
& MoO
(currently Cheops
Astro-H
Microscope)
M4
M3
EUCLID
JUICE
Solar Orbiter
JWST
BEPI
COLOMBO

S Mission: CHEOPS



- 0.4 – 1.1 µm transit photometry
- Selected in Oct 2012
- Mission approval expected in 2014
- Launch late 2017

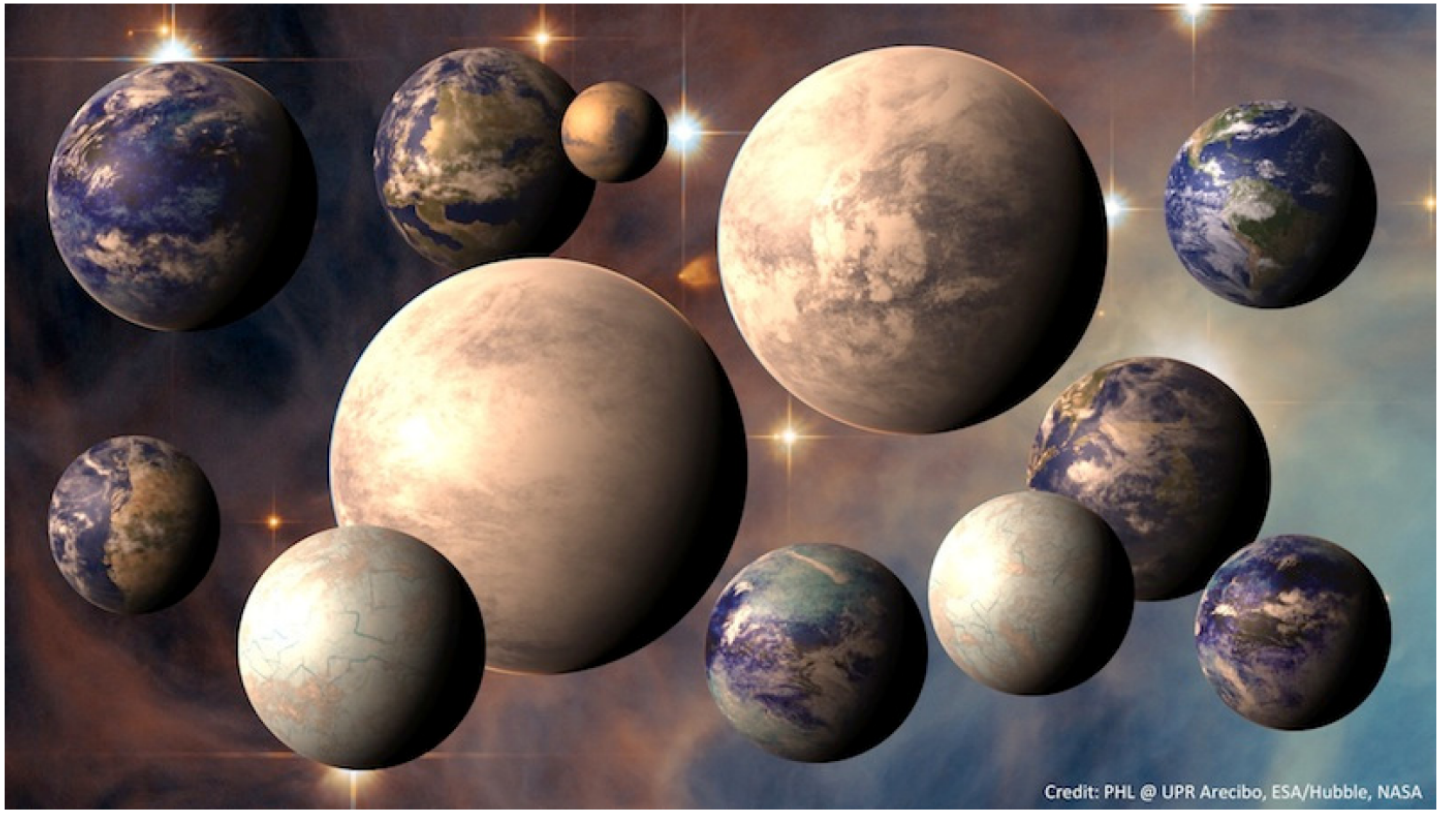
Candidate M Missions: Plato, EChO



- Plato: large area habitable zone transit survey and asteroseismology
- EChO: 0.4 – 11 (16) μm transit spectroscopy
- Assessment phase just completed
- Compete with each other and three other missions for M3 slot
- Selection in spring 2014
- Launch 2024

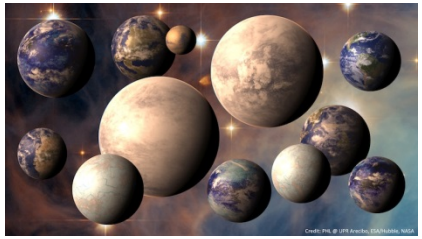
Exploring Habitable Worlds beyond our Solar System

White paper submitted in response to ESA's call for science themes for the L2/L3 missions of its Cosmic Vision program



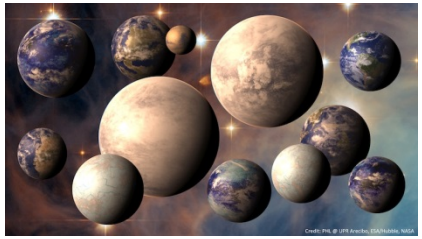
Coordinator / spokesperson: Andreas Quirrenbach

Statement by the Cesarsky Committee



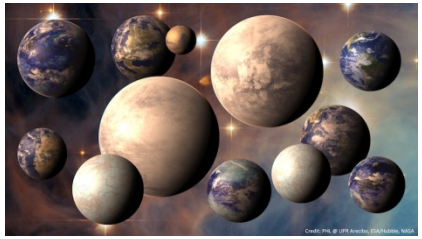
The SSC thus strongly encourages the exoplanet science community to take advantage of any possible ground-based and space opportunity in the near and mid-term future, in the Cosmic Vision frame with M missions and/or within international partnership.

ESA Technology Assessment



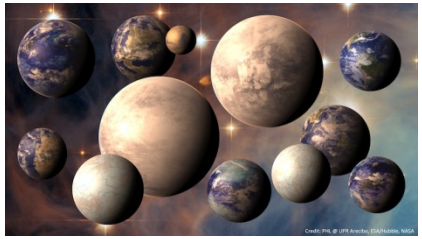
- Very superficial technical assessment by ESA in context of White Papers
- Skepticism regarding (mostly financial) viability of multi-S/C concepts
  - IR interferometry not a programmatic priority
  - No current European involvement in external occulters
- Internal coronographs viewed more favorably

“Junior” Partnership Opportunities



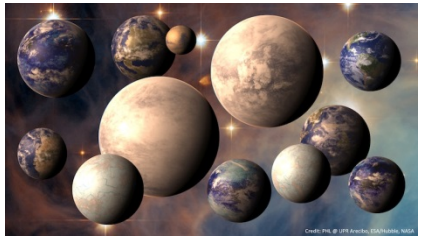
- Mission of Opportunity (≈ 100 M€)
- M class budget (≈ 500 M€)
  - Highly competitive
  - Similar to HST / JWST
  - Currently envisaged for SPICA
- Both can be proposed to M calls
  - M4 call expected in Q2(?) 2014
  - M5/M6/M7 in ≈ 3-year intervals

Points for Consideration



- Coordination of technology development
  - Within Europe, internationally
- Modest (national or MoO-level) participation in US-led mission?
- Working towards larger (M-level) participation in future mission (e.g. ≈ 4m coronograph) on ≈ 2030 time scale?

ESA Mission Types



	one every	cost	dev. time	techno	intern. coop.
L	7 y	≈ 2 LoR ≈ 900 M	15 y	challenging	≤ 20%
M	3 y	≈ 1 LoR ≈ 500 M	11 y	limited	any
S	4 y	≤ 50 M ESA 150 M total	4 y	no risks	national agencies
MoO (no call)	5 y	≈ 100 M			any