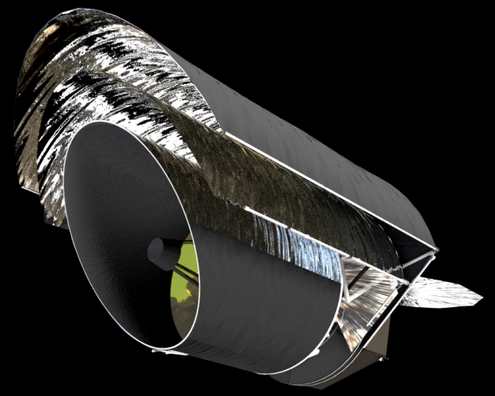
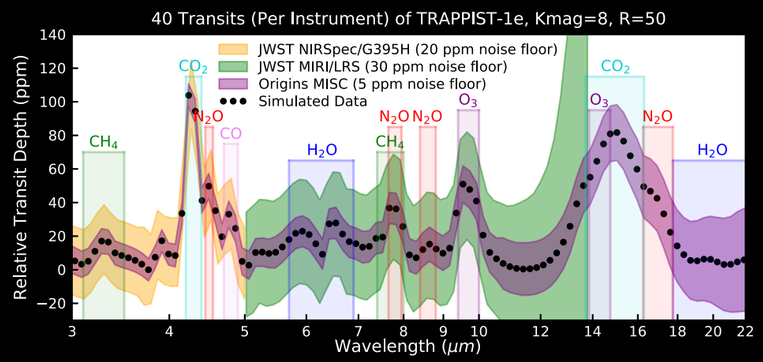
Origin Space Telescope Mission Concept



- JWST sized telescope (~25 m², 5.9 m), diffraction limited @ 30 μm
- Launch 2035 on large rocket (SLS or BF3)
- Spitzer-like architecture with minimal deployments
- Wavelength Coverage 3-600 μm
- Cold (~4.5 K) telescope with long-life cryo-coolers
- Three cold (~4.5 K) modular instruments for easy serviceability
- Follows NASA standard test-as-you-fly philosophy
- Efficient mapping: up to 60” per second
- Technology development: detectors
- Mission operations at Sun-Earth L2 orbit
- 5 year lifetime, 10 year goal

Origin Space Telescope Instruments

Instrument	Wavelengths (μm)	Instantaneous Field of View	Observing Modes
MISC Mid-Infrared Spectrometer	2.8 - 20	5" (2.8 - 10.5 μm) 3."4 (10.5 - 20 μm) set by field stop	Transiting exoplanet spectrometer
OSS Origins Survey Spectrometer	25 - 590	14' slit (grating mode); single beam (high-resolution modes)	R = 300 grating spectroscopy with wide-field survey capability R = 43,000(112 μm/λ) FTS R = 325,000(112 μm/λ) Etalon
FIP Far-Infrared Imager and Polarimeter	50 and 250	3.'6 x 2.'5 (50 μm) 13.'5 x 9' (250 μm)	Broadband imaging, pointed observations or wide-field survey; polarimetry.



Origins' mid-IR spectrometer, MISC, is designed with the wavelength coverage and precision necessary to detect biosignatures (O_3+N_2O, O_3+CH_4) in nearby terrestrial exoplanets. JWST's anticipated noise floor is significantly higher, and will require twice as many transits, than Origins'.

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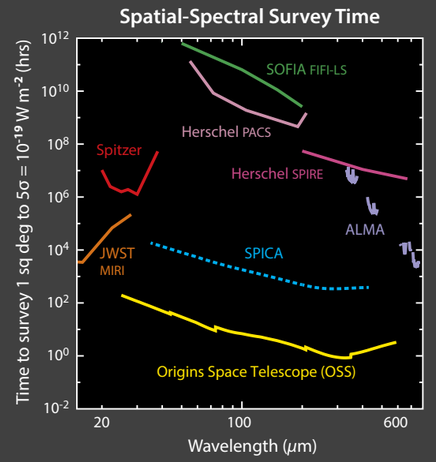
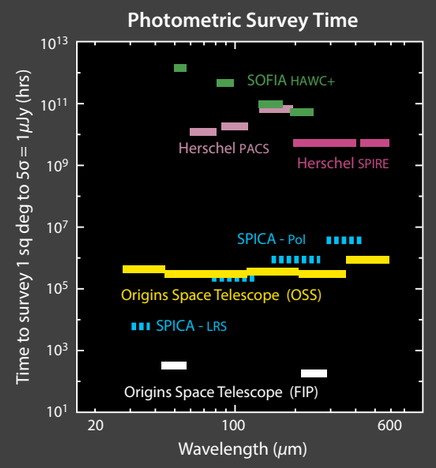




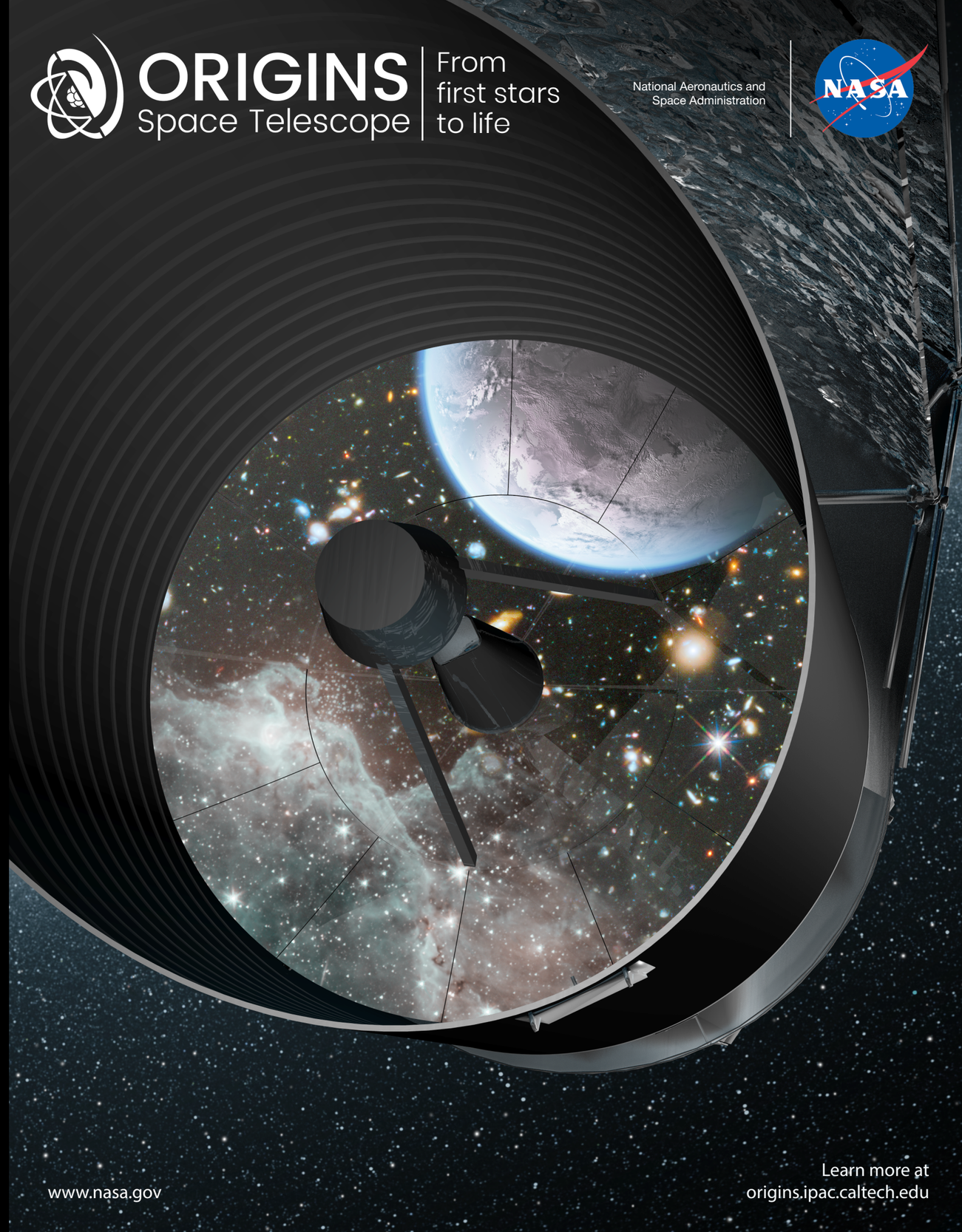
The Origins Space Telescope will map wide fields of view orders of magnitude faster than previous and planned missions, with instruments that provide low (FIP) or moderate spectral resolution (OSS).

ORIGINS Space Telescope

From first stars to life

National Aeronautics and Space Administration

NASA



www.nasa.gov

Learn more at origins.ipac.caltech.edu

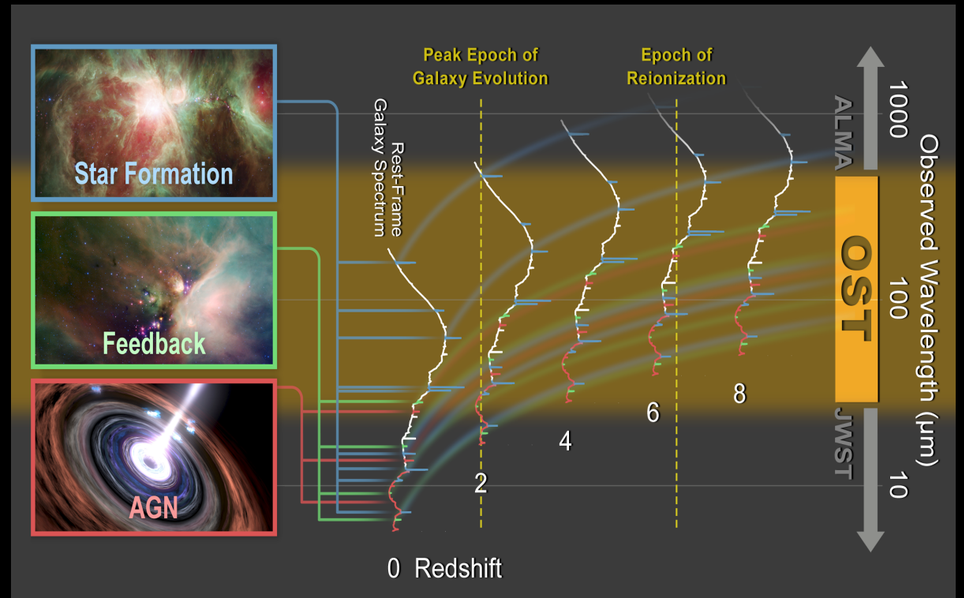
Tracing galaxy and black hole growth

across cosmic time

Origins will measure how galaxies form stars, build-up metals, and grow their super-massive black holes from reionization to today.

With deep and wide 3D surveys of millions of galaxies, Origins will:

- measure star formation and black hole accretion rates over 95% of cosmic time
- trace the rise of metals, dust and organic molecules
- measure galactic outflows and feedback over the past 10 Gyr

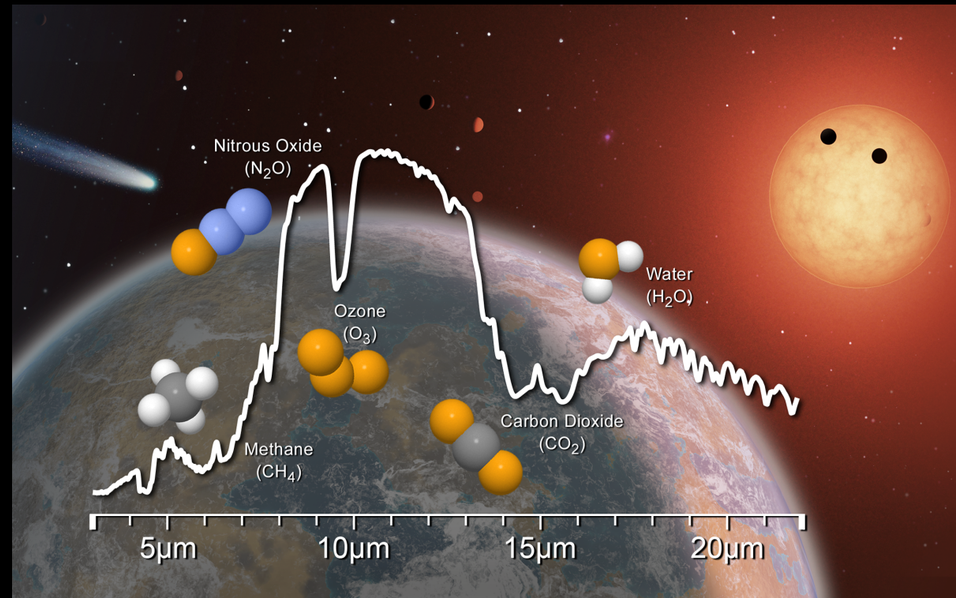


Searching for biosignatures

in nearby exoplanets

With a mid-infrared transit spectrometer operating simultaneously over a wide wavelength range, OST will assess the habitability of nearby exoplanets and search for signs of life.

By constraining the presence of bio-indicators (H_2O and CO_2) and biosignatures (O_3, N_2O, and CH_4) in rocky planets transiting M dwarfs (the most common type of star in our galaxy), OST will be capable of answering the age-old questions of "Are we alone?"



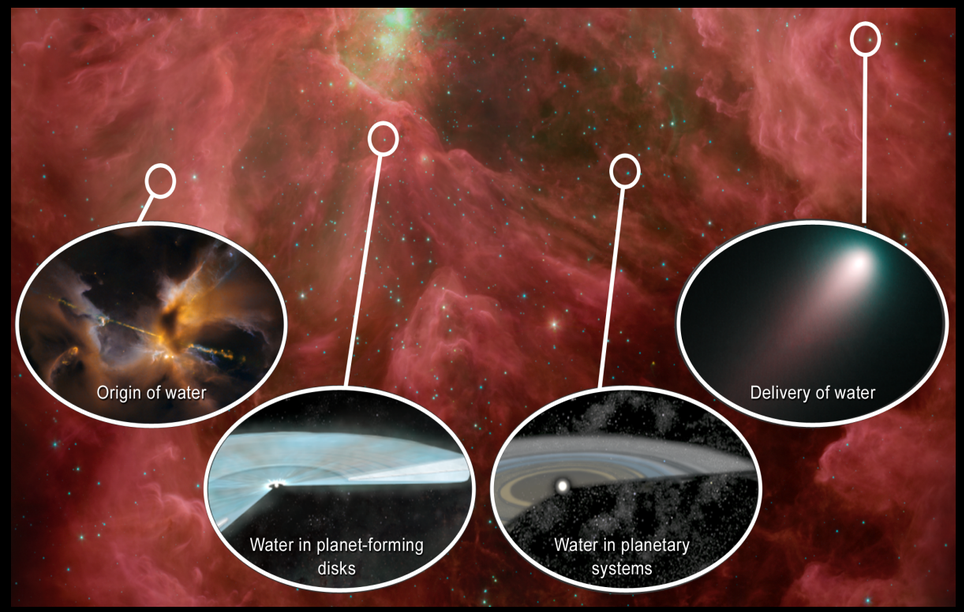
Following planetary system formation

from the interstellar medium to life-bearing worlds

Origins will detect nearly the entire rotational spectrum of water in 1000 planet-forming disks to reveal the trail of life's ingredients through all evolutionary stages from planetary origins to habitable worlds.

Origins will use the ground-state line of deuterated hydrogen (HD) to determine the planet-forming mass in the Galaxy.

Origins will measure the D/H ratio in over 100 comets to understand the delivery of water to our own inhabited planet.



Discovery space

of Origins

Origins will make significant progress on the three science themes within one year of time leaving 4+ years for all science. Origins is not only capable of addressing known questions but has a vast discovery space that will enable astronomers in the 2030s to find new phenomena and address unknown questions. All science programs on Origins will be selected by the community via peer review.

What science will you pursue with Origins?