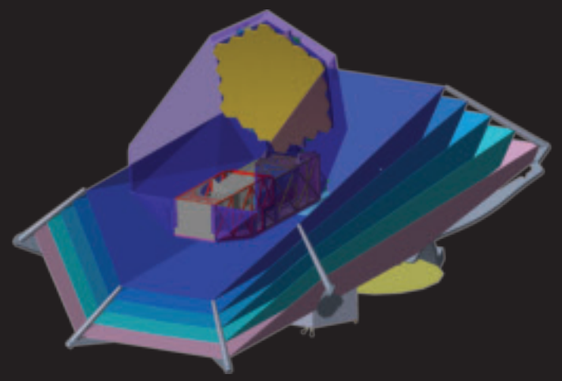
OST Mission Concept 1*

Observatory



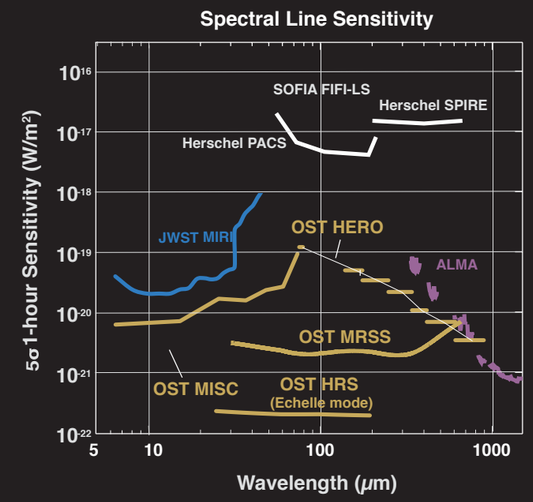
- 9.1 m off-axis primary mirror
- Cold (4K) telescope
- Wavelengths 5 – 660 μm
- 5 science instruments
- Launch 2030s
- Mission operations at Sun-Earth L2
- Data rate: 348 Mb/s
- 5 year lifetime, 10 year goal

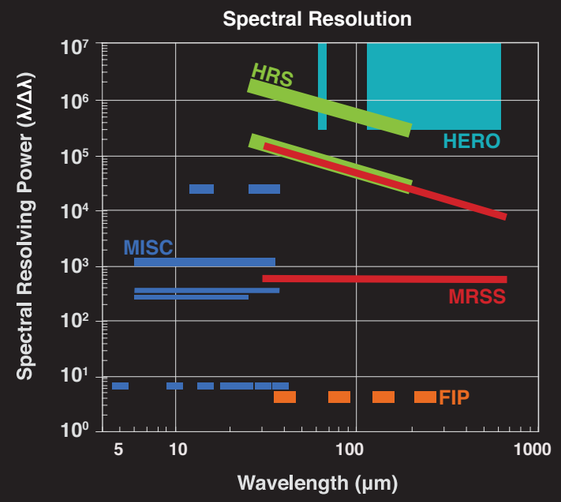
* OST is an evolving concept for the Far-IR Surveyor mission in NASA's visionary astrophysics roadmap. Stay tuned for Concept 2, coming in the fall of 2018.

Instruments

		Wavelength (μm)	Observing Modes
MISC	Mid-Infrared Imager, Spectrometer, Coronagraph	5-38	• Imaging, spectroscopy • Coronagraphy (10^{-6} contrast) • Transit Spectrometer < 10 ppm stability)
MRSS	Medium Resolution Survey Spectrometer - IFU	30-660	• Multi-band Spectroscopy
FIP	Far-Infrared Imager and Polarimeter	40, 80, 120, 240	• Broadband imaging • Field of view: 2.5'x5', 7.5'x15' • Differential polarimeteric imaging
HERO	Heterodyne Receiver for OST	63-66 , 111-610	• Multi-beam spectroscopy
HRS	High Resolution Spectrometer	25-200	• Spectroscopy

Performance





Leveraging improvements in detector technology and a large, cold primary mirror, OST will offer two to four order of magnitude improvement in sensitivity over Herschel. OST will bring arc-second imaging and unprecedented spectroscopic capabilities to the infrared universe.

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ORIGINS Space Telescope

From first stars to life

National Aeronautics and Space Administration

NASA

Ingredients of life and habitable worlds

Growth of black holes and galaxies

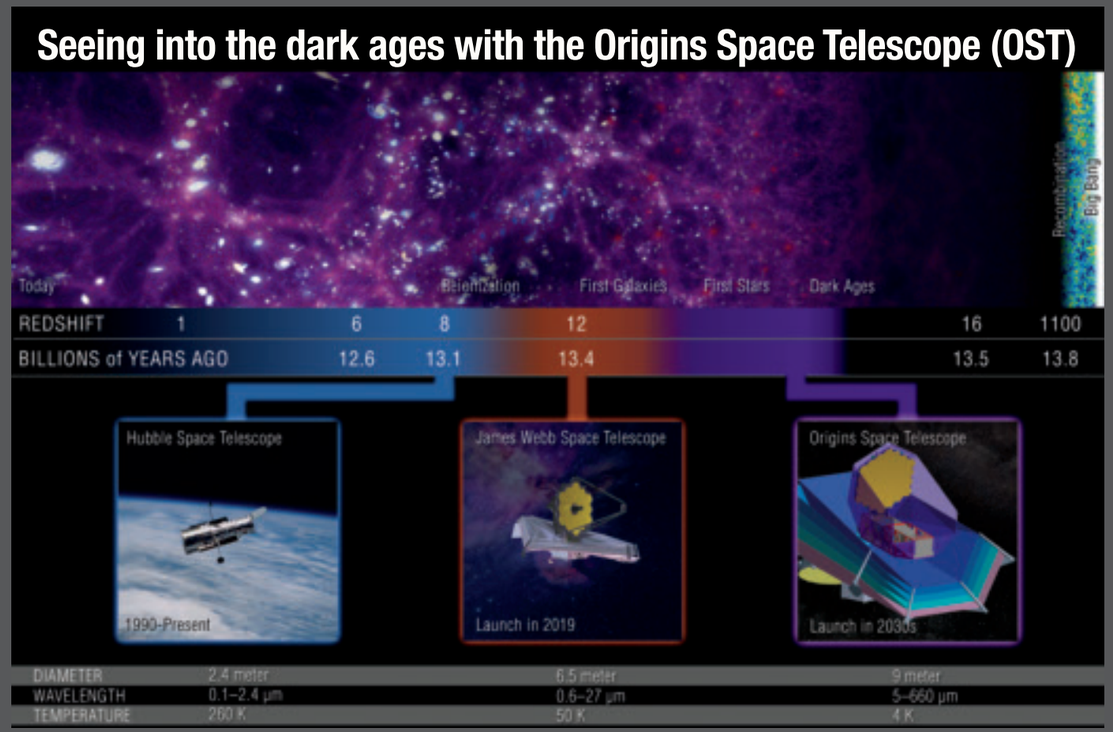
Charting the rise of metals and dust

Our solar system in context

The Origins Space Telescope will trace the history of our origins from the time dust and heavy elements permanently altered the cosmic landscape to present day life with 10,000 times more sensitivity than any prior far-infrared facility.

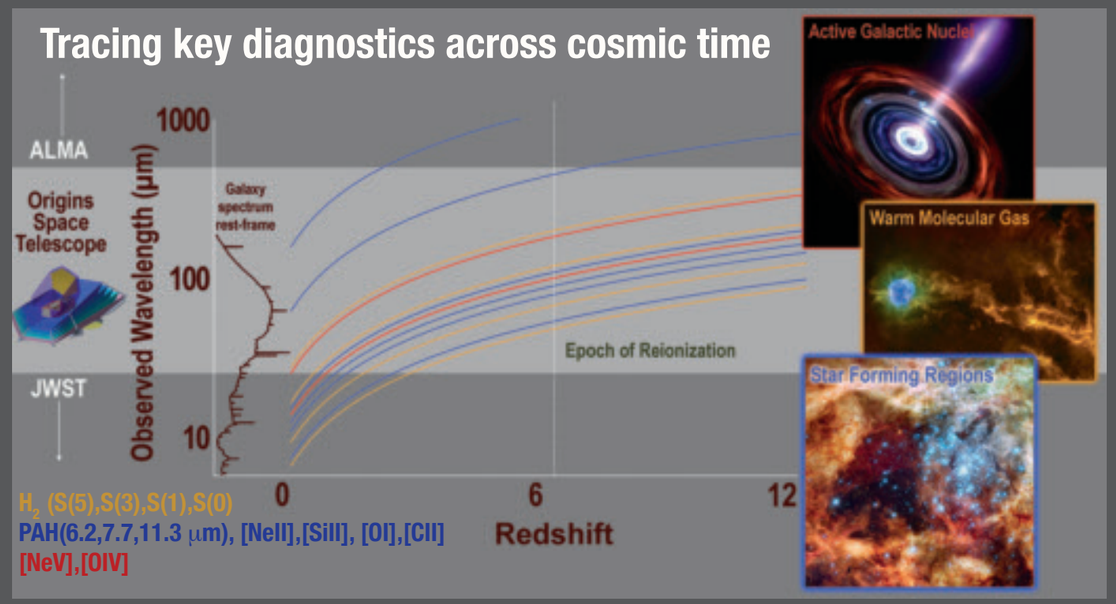
Learn more at asd.gsfc.nasa.gov/firs and origins.ipac.caltech.edu

www.nasa.gov

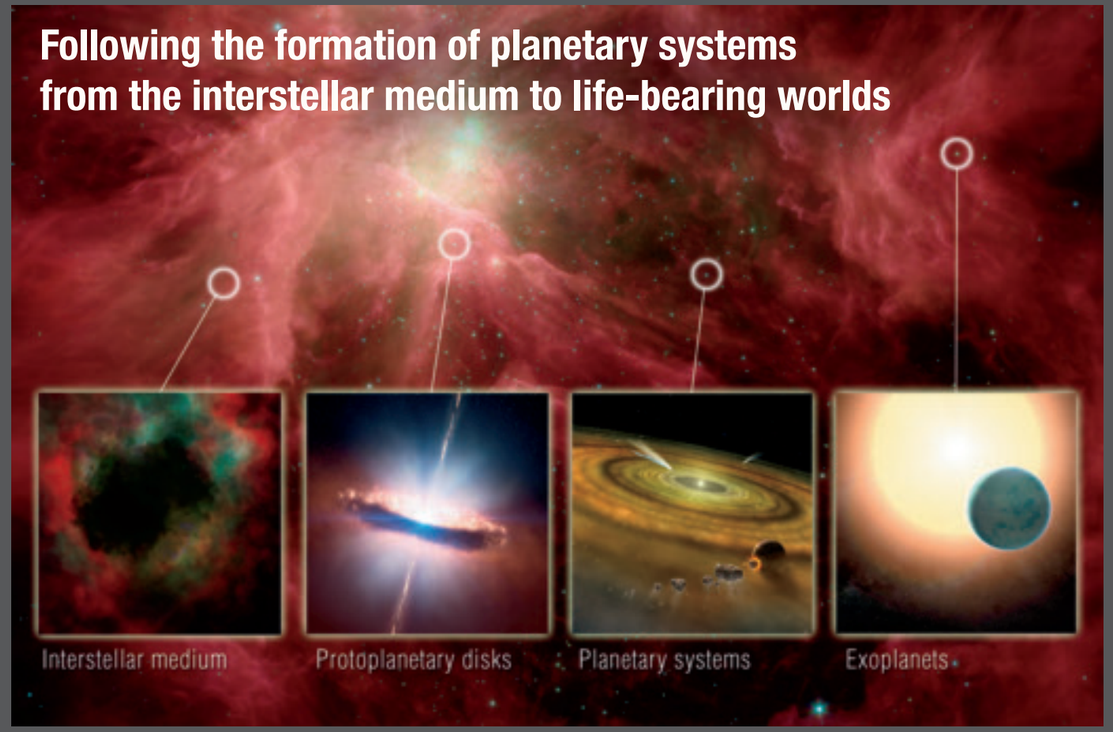


A core science goal of the OST mission is to study the the **cosmological history of star, galaxy, and structure formation** into the epoch of reionization. OST will obtain spectra for **millions of galaxies** across cosmic time, doing for FIR spectroscopy what SDSS did for optical spectroscopy. With this data set, OST will:

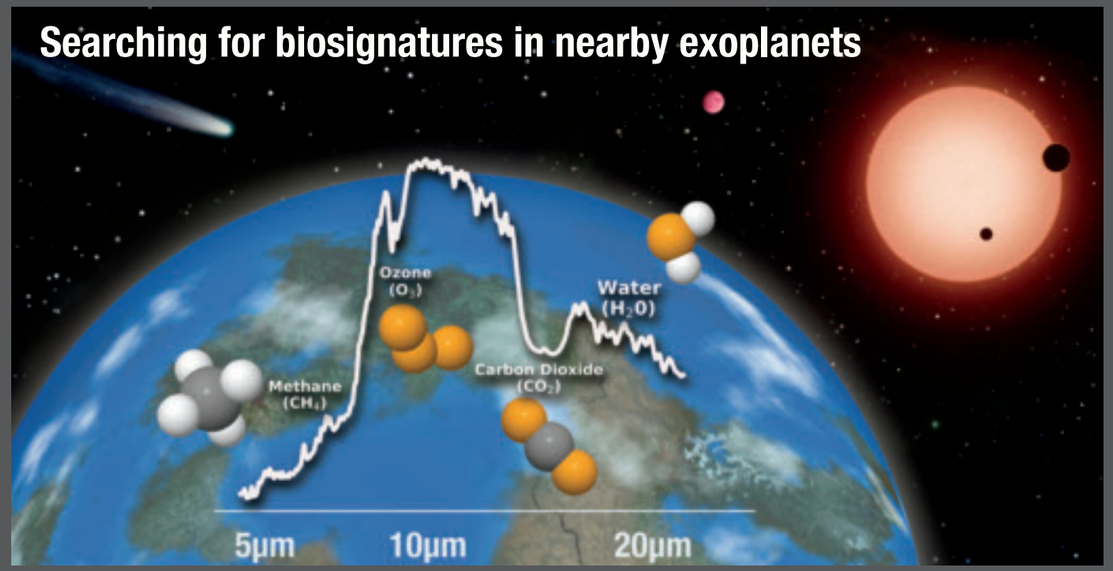
- trace the **rise of metals** from the first galaxies until today using infrared fine-structure emission lines
- quantify the dust enrichment history of the Universe and reveal the **first cosmic sources of dust** through PAH emission
- measure the physical conditions of the intergalactic medium and galaxies at z > 6, into the **epoch of reionization**
- probe the birth of galaxies through warm molecular hydrogen emission during the **cosmic dark ages**



Crucially, OST fills in the spectroscopic window between ALMA and JWST, enabling a complete picture of galaxy formation and evolution from the present day and into the cosmic dark ages



The **tremendous sensitivity** from the mid to far-infrared offered by the OST opens new windows through which to explore the **trail of life's ingredients** from planetary origins to inhabited worlds. With its **wide spectral grasp**, OST can detect nearly the **entire rotational spectrum of water**, including its ground states, to trace the origins of life-fostering water in the cold dense interstellar medium. OST will survey hundreds of **planet-forming disks** through all evolutionary states to reveal planetary origins through their hidden gas mass and the location of the water snowline.



With its mid-infrared transit spectrometer, OST will search for **bio-indicators** (H_2O and CO_2) and biosignatures (O_3 and CH_4) in nearby exoplanets to determine if we are **alone in the Universe**. OST can measure water's **D/H fingerprint in over 500 comets** to provide the leap needed to understand the delivery of water to our own inhabited planet. OST places our **solar system in context** by characterizing Kuiper belt objects and imaging Kuiper belt analogs in other solar systems.