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Harley Thronson
Avi Mandell
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Jason Tumlinson

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Harley Thronson
Astrophysics Division
NASA Goddard Space Flight Center
Greenbelt, Maryland 20771

Avi Mandell
Solar System Exploration Division
NASA Goddard Space Flight Center
Greenbelt, Maryland 20771

Ron Polidan
Polidan Science Systems & Technologies, LLC
3884 Northwest Orchard Court, Suite 100
Terrebonne, Oregon 97760

Jason Tumlinson
Space Telescope Science Institute, 3700 San Martin Drive
Baltimore, Maryland 21218

Since the beginning of modern astronomical science in the early 1900s, astronomers have yearned to escape the turbulence and absorption of Earth's atmosphere by placing observatories in space. One of the first papers to lay out the advantages of space astronomy was by Lyman Spitzer in 1946, "Astronomical Advantages of an Extra-Terrestrial Observatory," though later in life he minimized the influence of this work. Since that time, and especially gaining momentum in the 1960s after the launch of Sputnik, astronomers, technologists, and engineers continued to advance, organizing scientific conferences, advocating for necessary technologies, and assessing sophisticated designs for increasingly ambitious space observations at ultraviolet, visual, and infrared (UVOIR) wavelengths. These community-wide endeavors, combined with the explosion in technological capability enabled by the Apollo era, led to rapid advancement in space observatory performance that culminated in the spectacularly successful Hubble Space Telescope (HST), launched in 1990 and still returning surpassing scientific results.

Even before HST was in orbit, however, scientists and technologists were advocating for even more capable UVOIR missions with a special emphasis on the search for biomarkers in hypothetical Earth-like planets in the solar neighborhood. The influential 1989 "Next Generation Space Telescope" (NGST) conference at the Space Telescope Science Institute brought together several dozen scientists and engineers to produce a post-HST concept and science goals that would remain the core UVOIR mission design and justification for many years. However, by the end of the 1990s and despite many years of unambiguous success by HST and many reports advocating for a successor, the UVOIR version of the NGST from 1990 had been supplanted by the IR-optimized NGST of 2000, subsequently renamed the James Webb Space Telescope (JWST).

Now that JWST is fast approaching its expected launch date of 2018, the UVOIR science community's attention has returned to the design and development of a future large-aperture observatory capable of revolutionary advances beyond what HST and ground-based telescopes can achieve. Increasingly sophisticated designs and deeper science goals were developed over the past several years by industry, academic, and government teams in the US and abroad. Notable among these studies was the 2015 publication of the AURA study, "From Cosmic Birth to Living Earths," which described in detail the compelling science promise of large-aperture space astronomy at UVOIR wavelengths: to identify the signs of life on exoplanets in the nearby galaxy and to examine all the astrophysical processes that create the conditions for that life. These decades of work culminated in late 2015 with the Astrophysics Division at NASA Headquarters selecting for assessment for consideration by the National Academies the Large UVOIR (LUVOIR) Surveyor, along with three other concepts.

With this milestone reached, the four guest editors of this special section, along with JATIS editor-in-chief Mark Clampin, agreed to a solicitation for manuscripts on various aspects of such a major future space observatory. Our goal was to compile in one place work to date that supported NASA's selection of LUVOIR for study.

This special section ranges widely, with papers on maximizing yields of candidate exo-Earths, development of a technology roadmap for LUVOIR, notional instruments for the mission, alternative architectures for a LUVOIR mission, notional space architectures to enable such a major mission, and a short history of major UVOIR concepts that led to the selection of LUVOIR Surveyor for study.

Harley Thronson received his PhD in 1978 from the University of Chicago. He is currently senior scientist for Advanced Astrophysics Concepts at Goddard Space Flight Center and chief technologist for the Cosmic Origins and Physics of the Cosmos Program Offices. His responsibilities include assessing major technologies for future astrophysics missions. Previously, while at NASA Headquarters, he was program scientist for the Hubble and Spitzer Space Telescopes, the James Webb Space Telescope, and NASA's Astrobiology Program. He has published more than 120 research papers and edited eleven books.

Avi Mandell is a scientist in the Planetary Systems Laboratory at NASA GSFC. His research focuses on characterizing extrasolar planets and the formation and evolution of planetary systems, specifically to understand factors that determine whether a planetary system can form habitable planets. He is the group lead for the Exoplanet Climate Group at GSFC, and is the principal investigator for the integral field spectrograph for the WFIRST exoplanet coronograph. He received his PhD from Penn State University in 2007.

Ron Polidan: Biography is not available.

Jason Tumlinson is an astronomer at the Space Telescope Science Institute (STScI), where he pursues research interests in the formation of galaxies and the chemical enrichment of the universe. His programmatic interests focus on the optimization of science outcomes from space telescopes across their life cycle from conception through development and into operations. He received his PhD in astrophysics from the University of Colorado in 2002 and joined STScI in 2008 following postdoctoral fellowships at the University of Chicago and Yale.