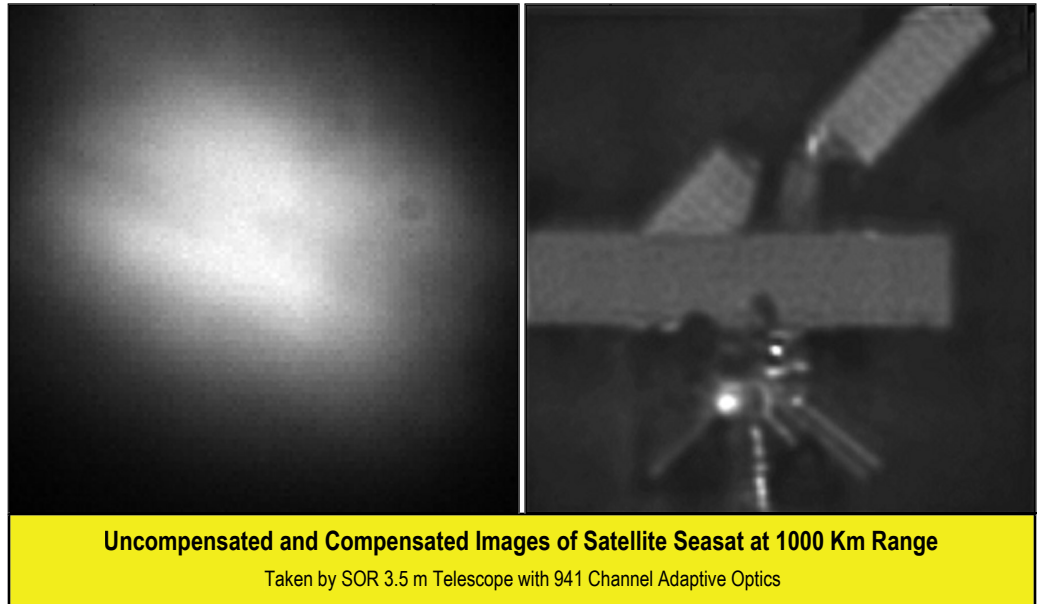


Success Story

HIGH-RESOLUTION SATELLITE IMAGERY FROM THE SOR 3.5 m TELESCOPE



The extremely high resolution of images collected by the Directed Energy Directorate's Starfire Optical Range (SOR) 3.5 m telescope and adaptive optics system demonstrates unprecedented atmospheric compensation capabilities for both imaging and laser weapons. Real-time compensated images show resolutions very near the theoretical limit of the telescope, enabling improved imaging performance for space surveillance and satellite diagnostics. The adaptive optics capabilities demonstrated are vital for effective laser weapons.



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Accomplishment

Modifications to the SOR's 941-channel adaptive optics system and telescope control systems produced significant improvements in atmospheric compensation performance. Images of low-earth orbit satellites showed resolutions very near the diffraction limit of the telescope (theoretical performance limit based on aperture size). This represents nearly complete elimination of atmospheric turbulence effects as well as correction of optical system flaws.

Background

The SOR is an advanced optical research site, located at Kirtland AFB, New Mexico, to develop advanced optical wavefront control technologies. Research focuses on field experiments in adaptive optics to compensate for the effects of atmospheric turbulence upon lasers and imagery. This technology is key for both real-time space imaging and a variety of laser weapons applications.

Equipment includes three major optical mounts: a 1.0 m beam director, a 1.5 m telescope, and a 3.5 m telescope, all capable of tracking low-earth orbit satellites. The 3.5 m telescope, equipped with a 941-channel adaptive optics system, is currently the largest and highest performance atmospheric compensation system in the world. The 3.5 m telescope/adaptive optics combination is highly successful, producing images of stars and satellites with resolutions approximately 65 times better than normal images.

Directorate researchers designed and integrated the adaptive optics system in-house at the SOR using a 941-actuator deformable mirror. Xinetics Corporation built the mirror.

Directed Energy
Emerging Technologies

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-DE-24)