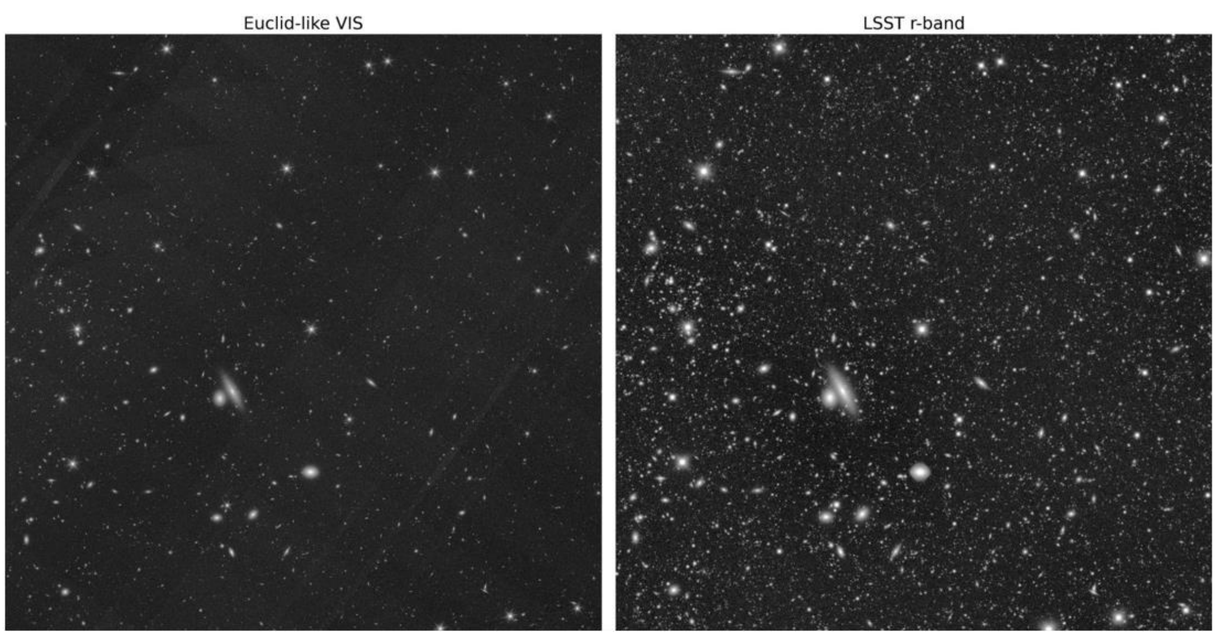
FY24 Strategic University Research Partnership (SURP)

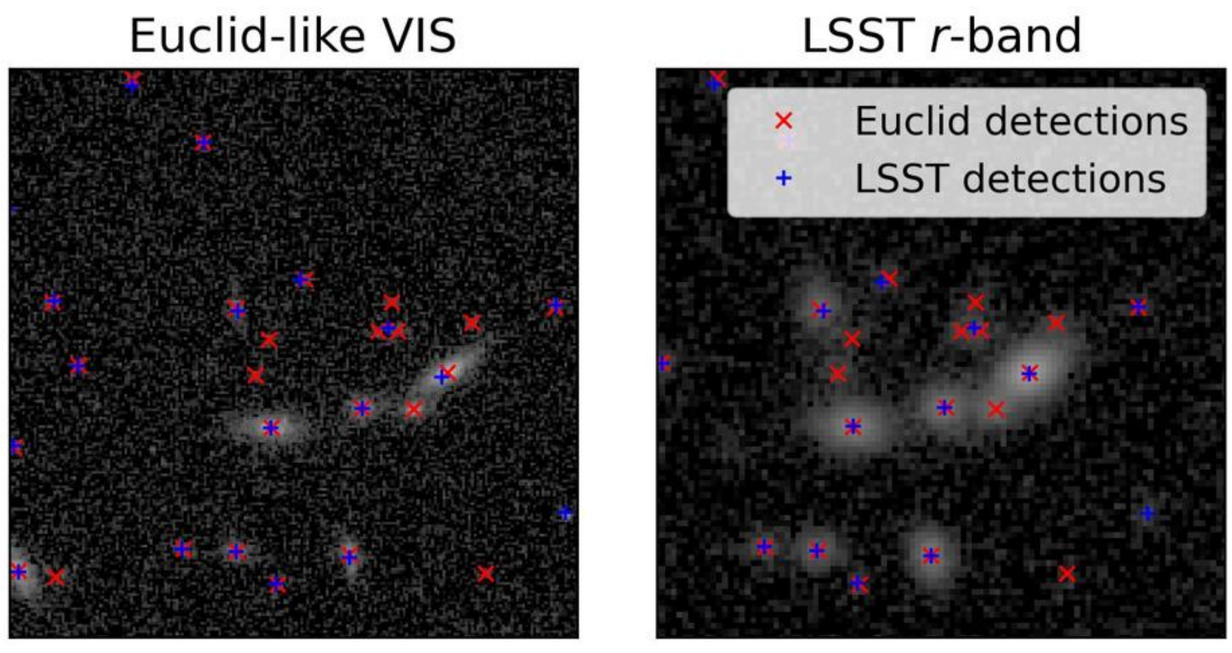
Transforming cosmological discovery through joint analysis of ground- and space-based imaging

Principal Investigator: Jason Rhodes (320)**; Co-Investigators:** Rachel Mandelbaum (CMU), Federico Berlfein (CMU), Axel Guinot (CMU), Andy Park (CMU), Xiangchong Li (CMU)

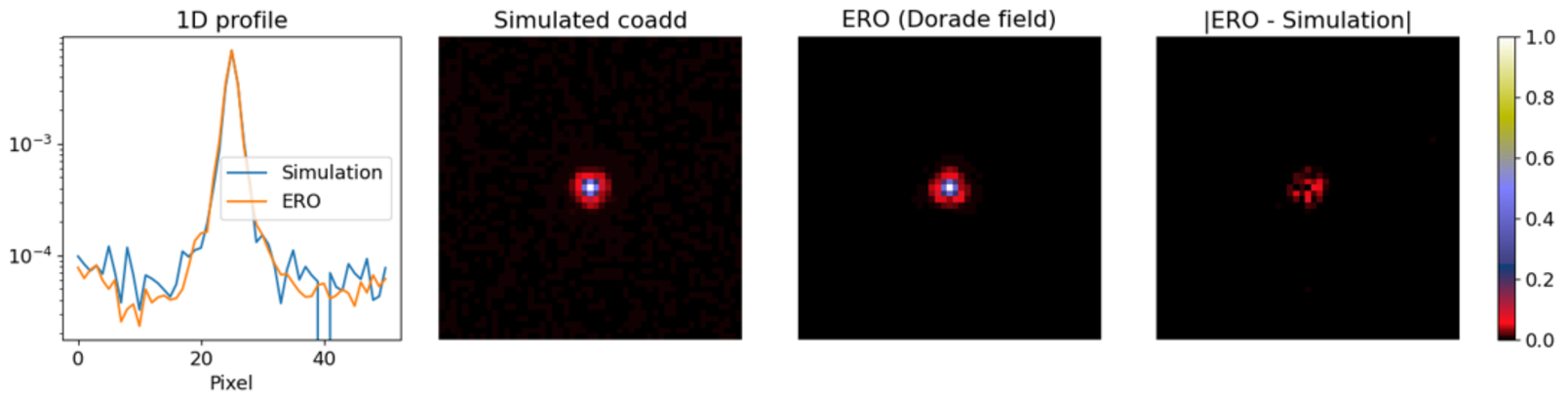
Objectives: Our overall objective is to develop a pipeline to constrain cosmological parameters by combining calibrated images from ESA's Euclid space telescope and the Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST). The first step (year 1) was to make joint simulations of images from Euclid and LSST surveys. In future years we will use these simulations to validate our analysis pipeline and quantify the gains in reducing statistical uncertainties in the cosmology constraints by combining the two surveys.



Left: Coadded image from the Euclid-like simulation. Right: Coadded image of the Rubin simulation. Both images show the same field. We can see that while the Rubin observations are deeper, Euclid has better resolution.



Zoom in of the above images highlighting the benefits from a joint processing of space and ground-based observations. LSST detects fainter objects but Euclid disambiguates blended objects



Comparison of the simulated Point Spread Function (PSF) and the real PSF from a real Euclid observation. The PSF is derived by averaging through selected stars on the coadded simulated image and the coadded real image. We measured less than a 4% difference in the Full Width Half Maximum (FWHM) in the real and simulated images.

PI/Task Mgr. Contact Information:
Jason Rhodes (32) 626-318-7165
jason.d.rhodes@jpl.nasa.gov

National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

www.nasa.gov

RPD-000 Clearance Number: CL#00-0000