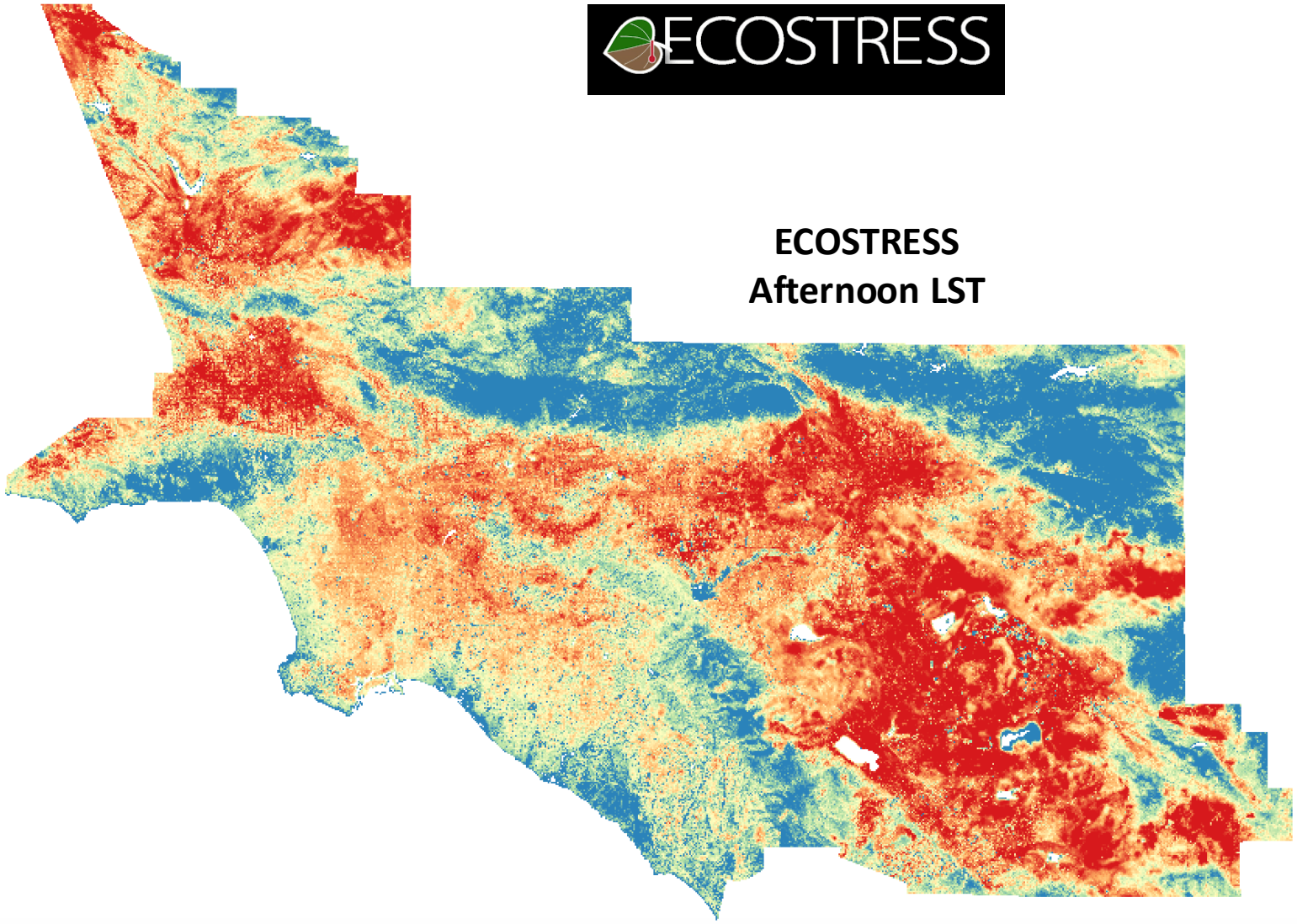


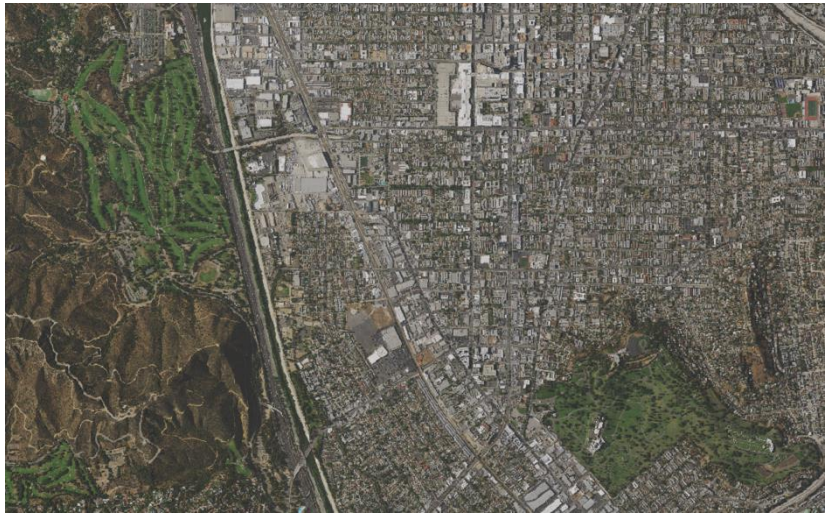
July, August, September (2018 and 2019) between 1-3pm

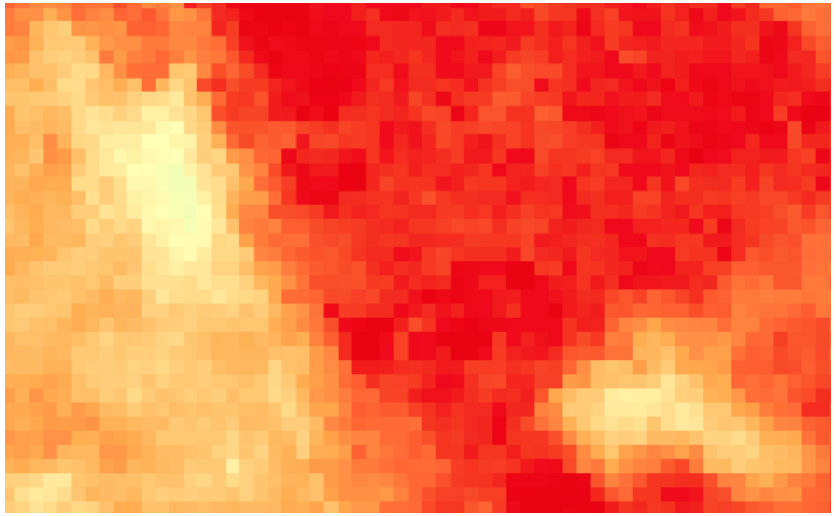
Can ECOSTRESS sharpened urban land surface temperature (LST) product be used to distinguish between irrigated and non-irrigated vegetation in southern California?

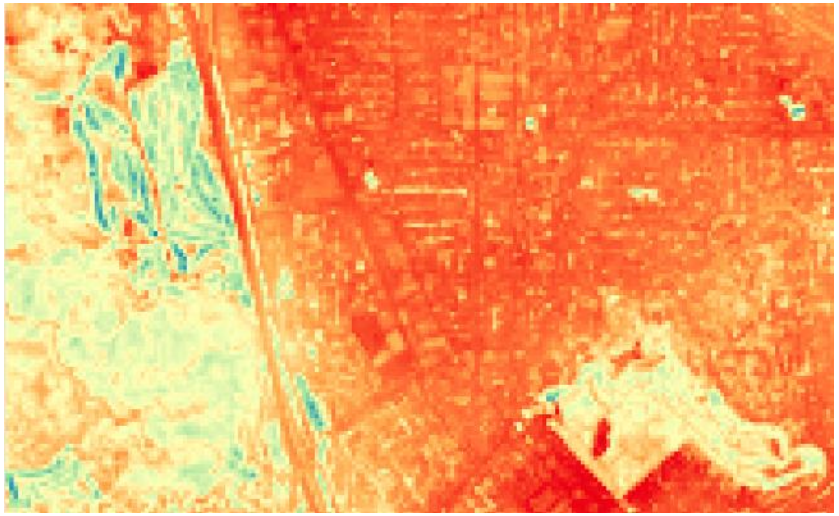
Coleman et al. 2020 [RSE]

Kerry Cawse Nicholson, Glynn Hulley, and the ECOSTRESS Team
Jet Propulsion Laboratory, California Institute of Technology

Land Surface Temperature (LST) downscaling (‘sharpening’) with Sentinel-2 VSWIR data



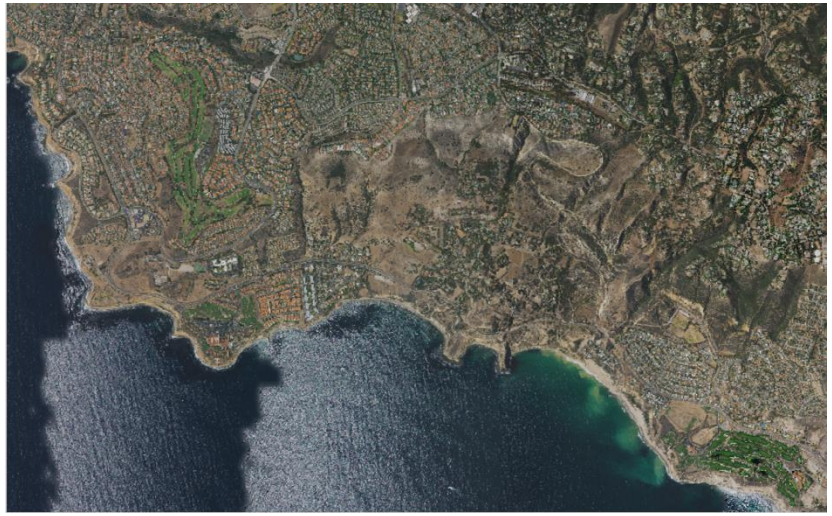


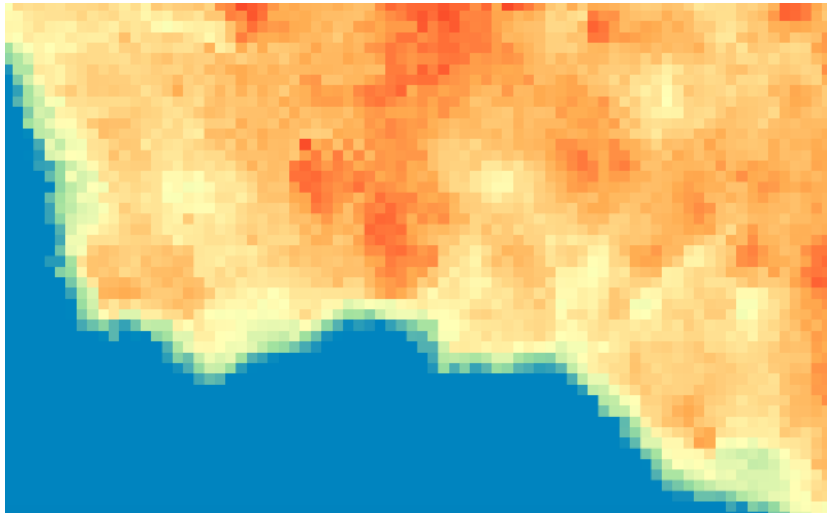


0.6 m NAIP base imagery

100 m ECOSTRESS LST

10 m sharpened ECOSTRESS LST



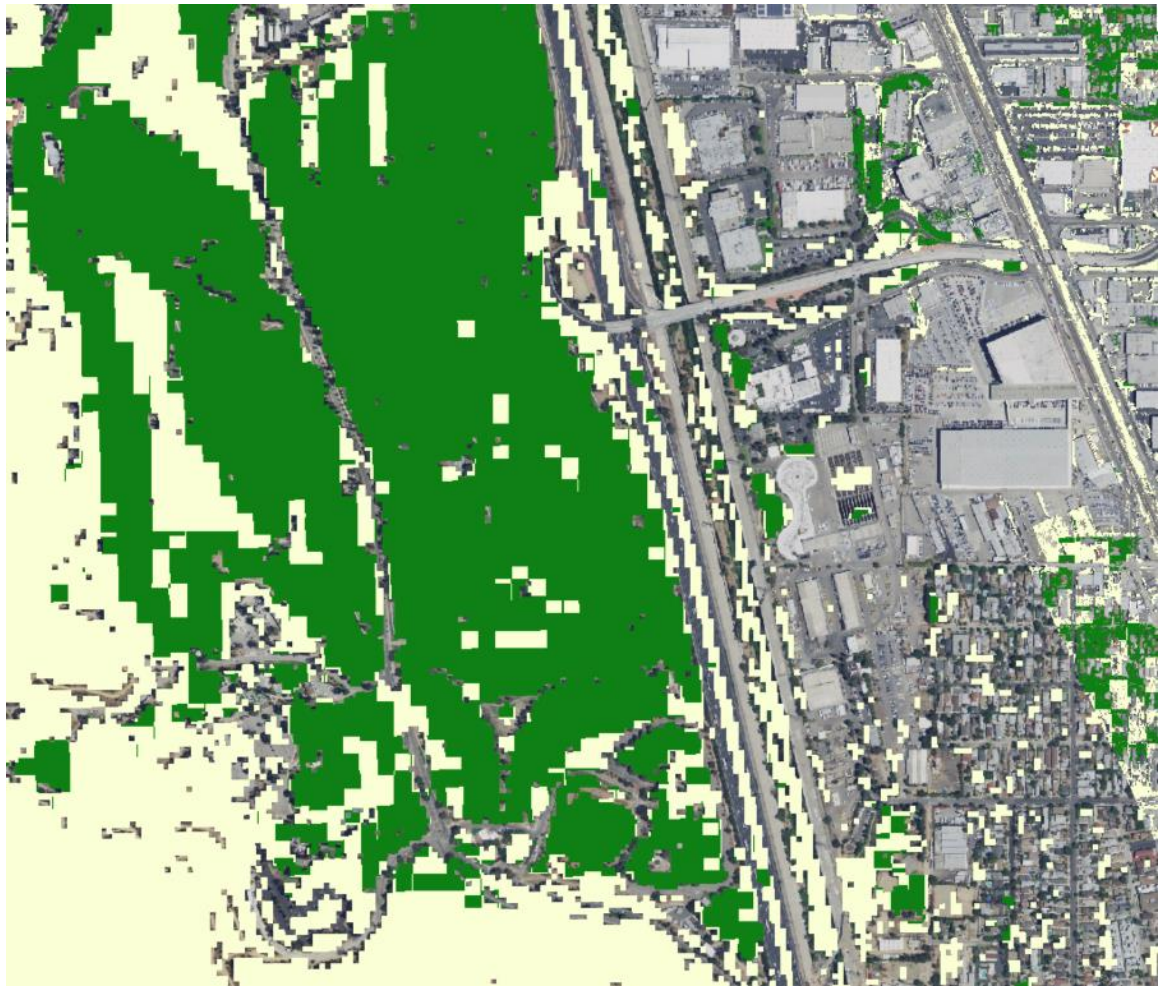


Landsat 8 RGB-NIR + NDVI + ECOSTRESS LST*Fractional Cover

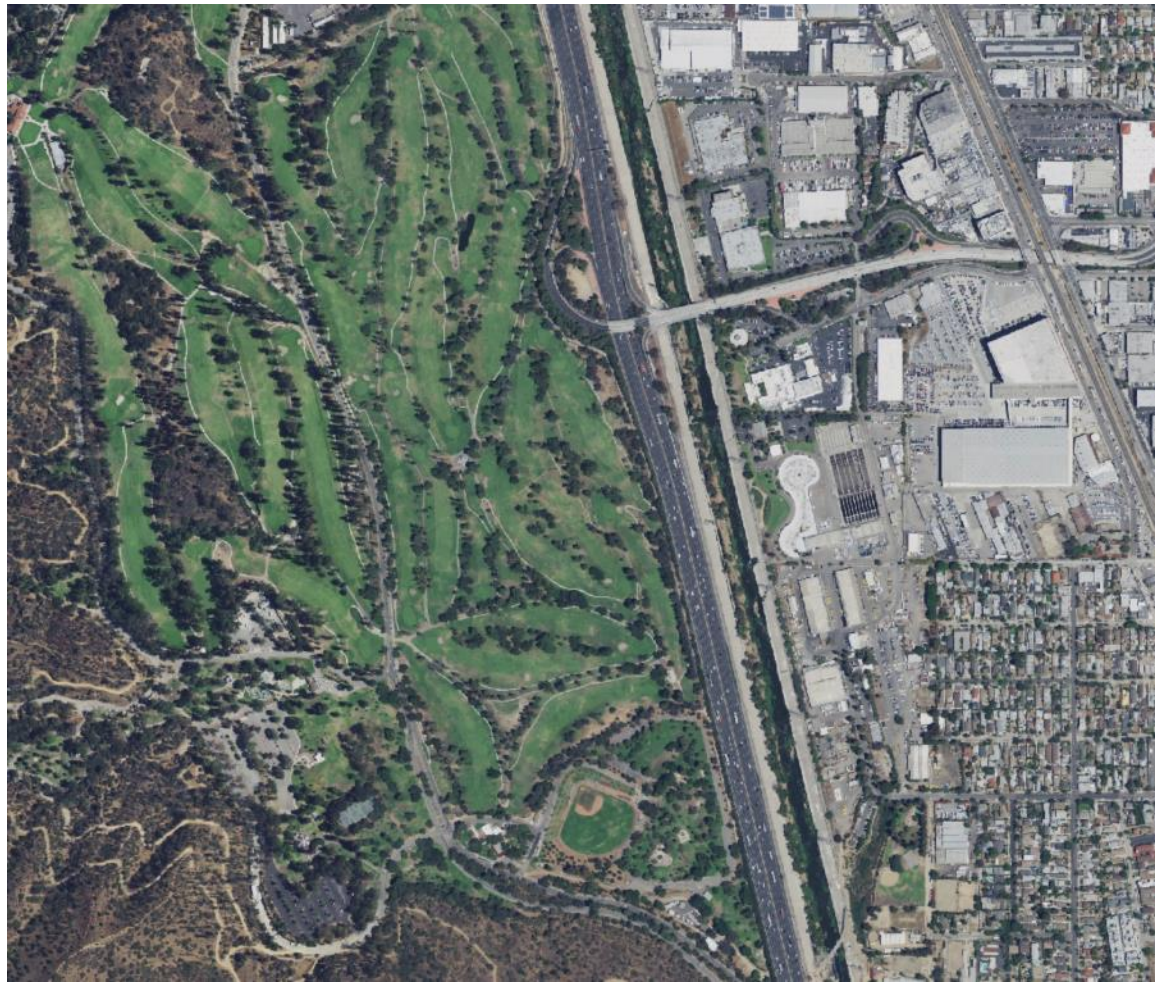
Irrigated

Non-Irrigated

30 m irrigated/non-irrigated classification



2018 NAIP imagery

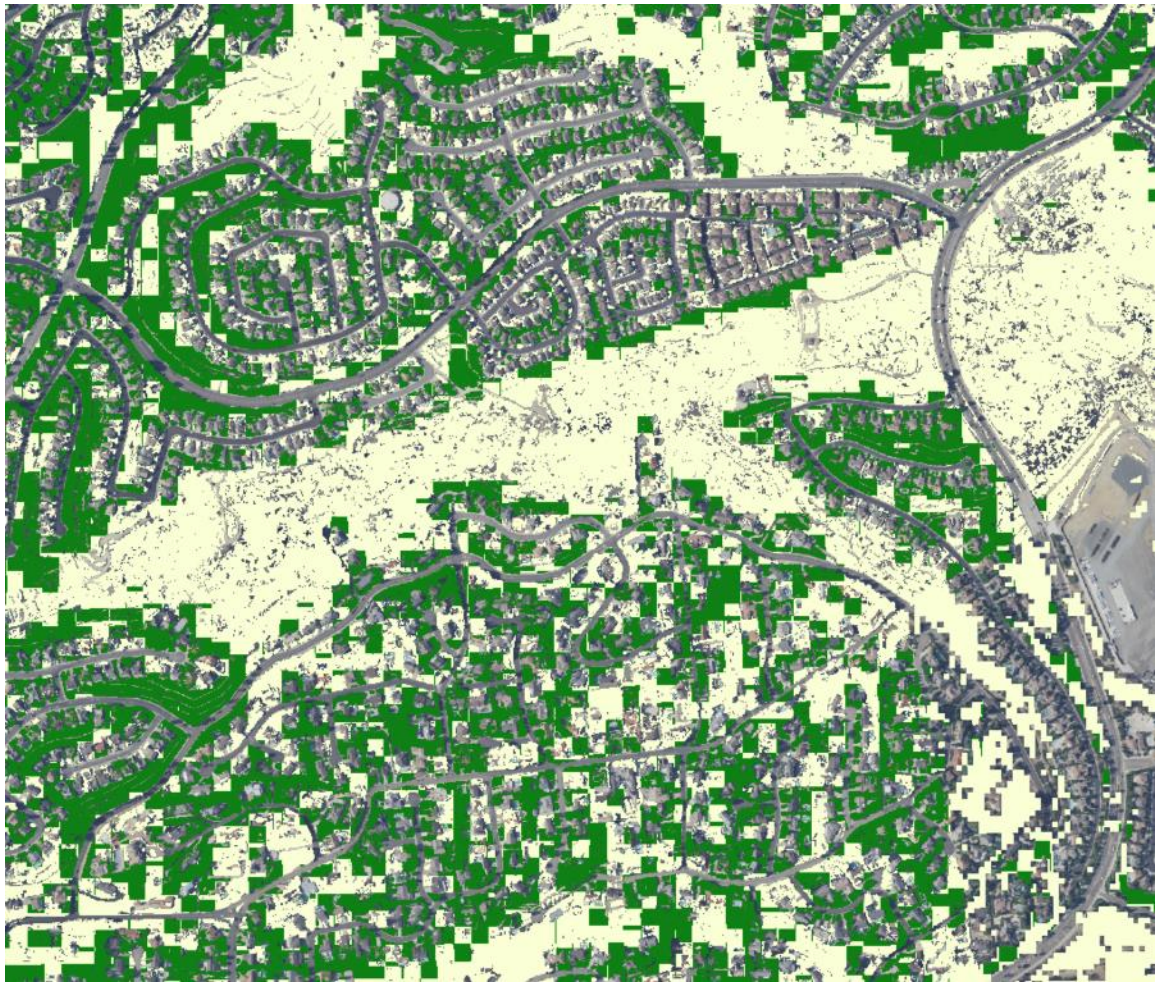


Landsat 8 RGB-NIR + NDVI + ECOSTRESS LST*Fractional Cover

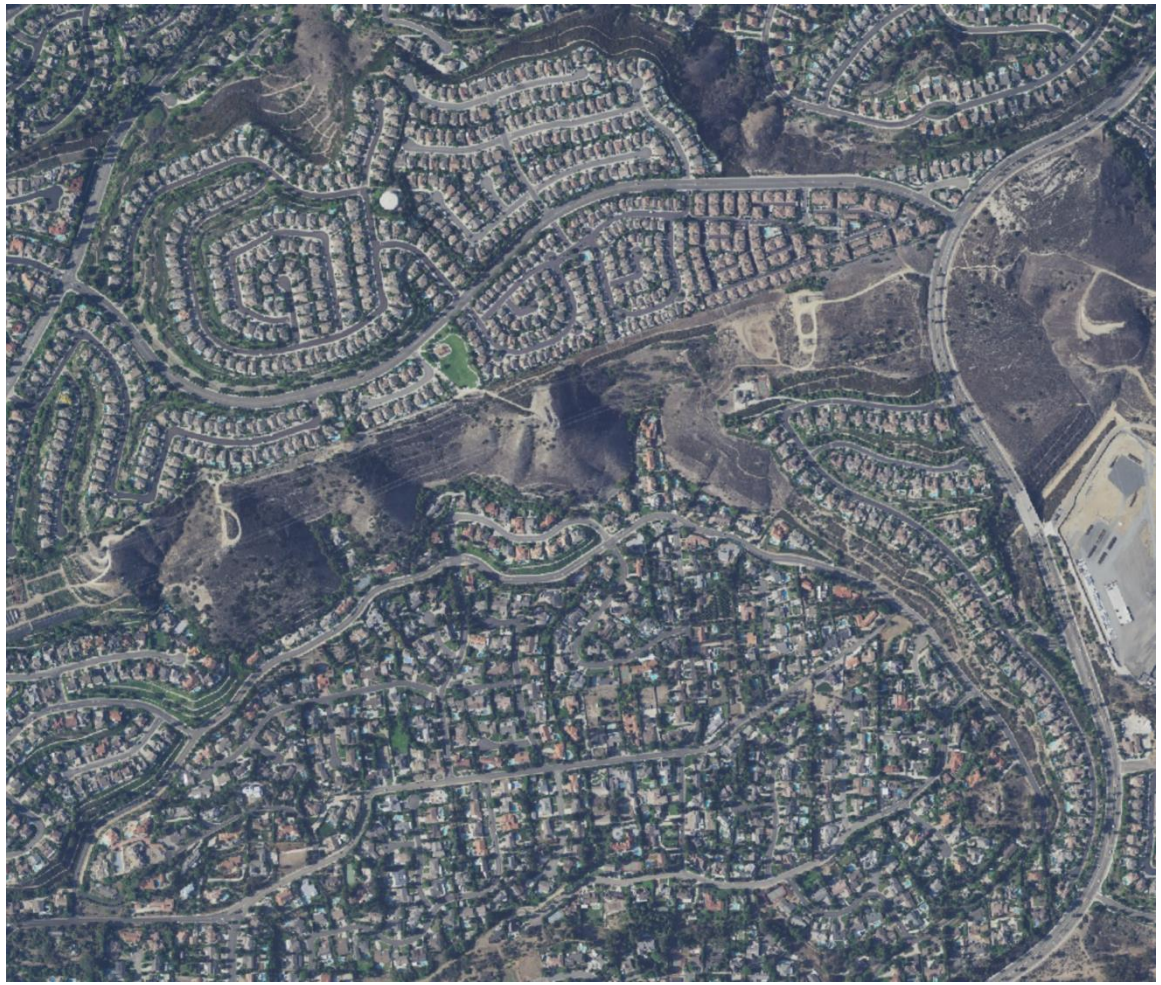
Irrigated

Non-Irrigated

30 m irrigated/non-irrigated classification



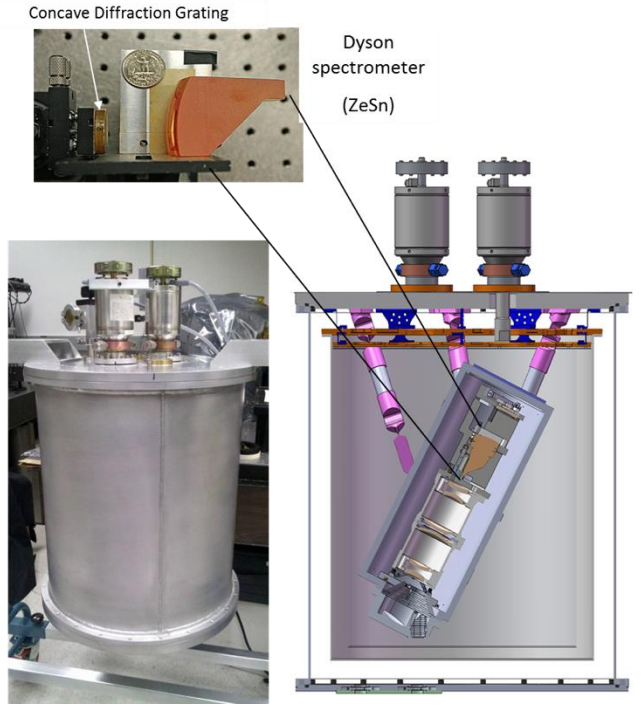
2018 NAIP imagery

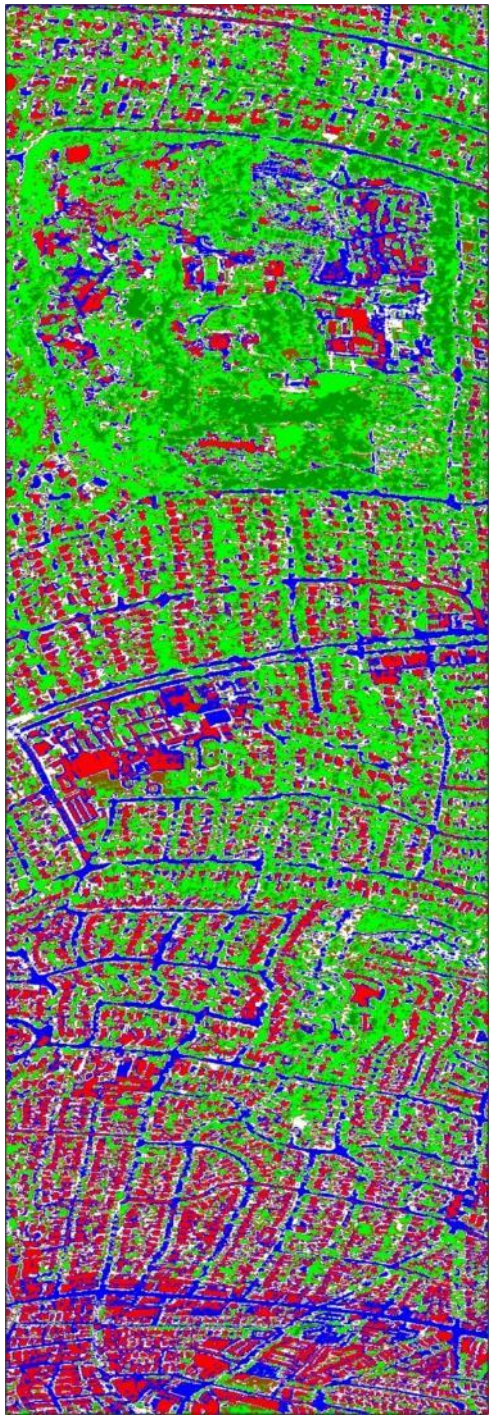


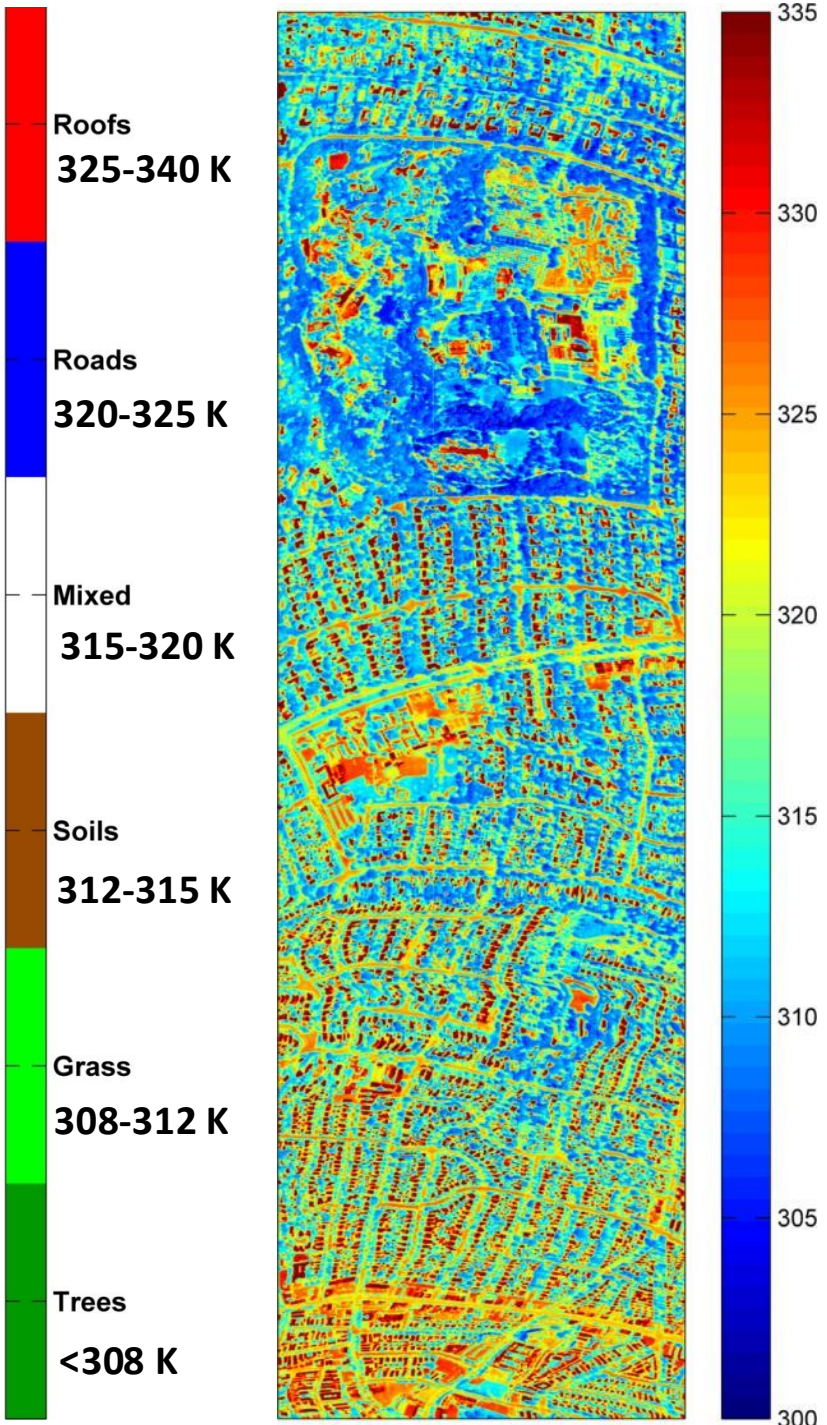
Hyperspectral Thermal Emission Spectrometer (HyTES)

Instrument Characteristic	HyTES
Mass (Scanhead)[1]	12kg
Power	400W
Volume	1m x 0.5m (Cylinder)
Number of pixels x track	512
Number of bands	256
Spectral Range	7.5-12 um
Integration time (1 scanline)	30 ms
Total Field of View	50 degrees
Calibration (preflight)	Full aperture blackbody
QWIP Array Size	1024x512
QWIP Pitch *	19.5um
QWIP Temperature	40K
Spectrometer Temperature	100K
Slit Width	39 µm
Pixel size at 2000 m flight altitude	3.64m
Pixel size at 20,000 m flight altitude	36.4m

HyTES produces wide-swath TIR images with high spectral (256 bands, 7.4-12 µm) and high spatial resolution (~2m at 1000m) that allows wide area mapping of surface temperature, mineral composition, trace gases, fire emissions, and evapotranspiration.







Huntington Gardens Pasadena, CA

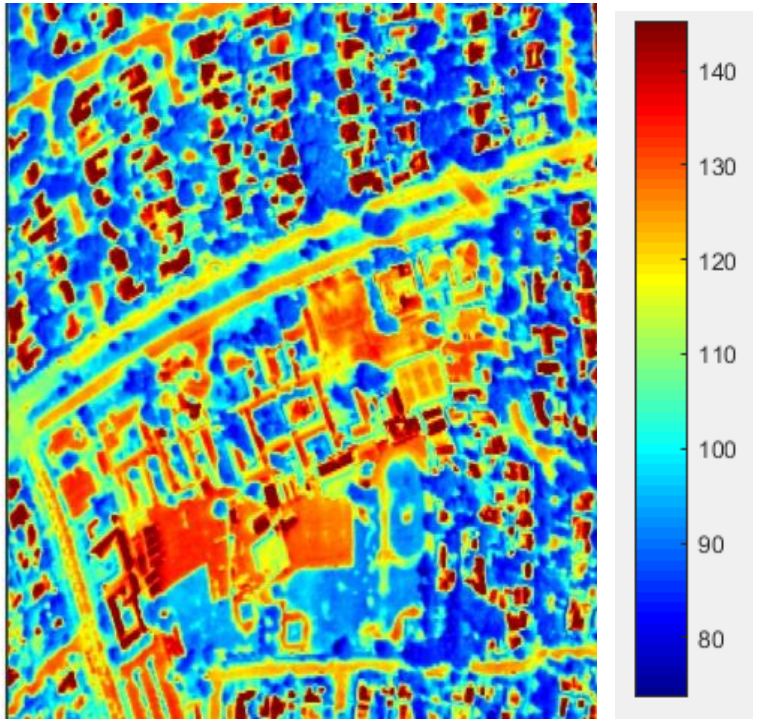
Land Cover Classification at 4m resolution using HyTES thermal IR


Reflective road coating
35 °C (5 °C of cooling)
Asphalt roads
+40 °C
Tree cooling
25 °C (15 °C
of cooling)
Lorde Str
Mark Str
Clement Str
0
25
50 m
HyTES Land Surface Temperature
03/26/2022, 4:17 pm

Mapping School-yard Temperatures

ECOSTRESS Summer Averages (70m, 2021-2024) Sharpened to 5m With HyTES

Huntington Middle School on a hot summer's day (°F)



GOAL:
(1) Map the temperatures of schools utilizing thermal sharpening
(2) Identify significant temperature differences based on tree canopy coverage and sociodemographic status.

Green Schoolyards America