Examining the relation between biodiversity and surface temperature regimes in localized coastal upwelling zones using ECOSTRESS

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Motivation to use ECOSTRESS over water

- High spatial resolution
- Non-uniform sampling and re-visit times
- Ability to extract data up to and across the water-land interface
Project Goals:

1. Apply a split-window SST algorithm to ECOSTRESS L1B mapped radiance product

2. Compare S/W SST with L2 LST product and validate using data from other sensors (VIIRS, MODIS, Sentinel)

3. Develop shore temperature profiles using the LST product to investigate temperatures across the land-water interface

4. Mine biodiversity records (OBIS, GBIF) and relate to fine-scale SST patterns in upwelling areas like the CA coast and FL Keys

5. Work with MBON colleagues and the Pole to Pole network to validate ECOSTRESS beach temperatures with data from in-situ temperature loggers
L2 ECOSTRESS LST over water

Monterey

Los Angeles

California

Minnett et al. 2019
ECOSTRESS, MODIS and VIIRS (Channel Is.)

MODIS-Aqua 8/16/18 10:10 GMT
1-km pixel

VIIRS-SNPP 8/16/18 10:00 GMT
750-m pixel

ECOSTRESS 8/16/18 13:04 GMT
70-m pixel

DegC
ECOSTRESS LST vs. MODIS and VIIRS SST

Graphs showing the distribution of No. of Pixels against ECOSTRESS LST, VIIRS-SNPP SST, and MODIS-Aqua SST. Scatter plots comparing MODIS-Aqua vs. VIIRS-SNPP and ECOSTRESS vs. VIIRS-SNPP, as well as ECOSTRESS vs. MODIS-Aqua.
ECOSTRESS LST across the water-land interface - Shore Temperature Profiles (STP)

Cape Sable 2/17/19
ECOSTRESS and Biodiversity

Tittensor et al., Nature (2010):
“Our findings indicate a fundamental role of temperature or kinetic energy in structuring cross-taxon marine biodiversity”

How can ECOSTRESS data at 70-m resolution best be compared with observations patterns of biodiversity?

What areas of interest and taxa are best suited for these analyses?

How do shore temperature profiles differ in sandy beach environments compared to rocky shores? How do they vary seasonally and diurnally?
Data records of biodiversity

- Biodiversity is difficult to monitor, particularly in marine environments
- Very few autonomous observations of biodiversity data in the ocean
- Biodiversity data records can be sparse and patchy
- Two main repositories exist: OBIS and GBIF
- MBON: Regional networks of scientists, resource managers, and end-users working to integrate data from existing long-term programs to improve our understanding of the connections between marine biodiversity and ecosystem functions.
MBON Pole to Pole Robolimpet temp. loggers