Analyzing Advantages of ECOSTRESS as a Tool for Drought Detection and Water Management Practices

NASA DEVELOP National Program
Background

- Project Partner: EARTH University
- 2013 Drought in Costa Rica
- 2015 El Niño
Overview of methods

• How will ECOSTRESS improve the current methods used for the analysis of vegetative stress?

• TWO sources of imagery: Landsat and MODIS

• TWO methods of detection: NDVI and Evapotranspiration
Temporal Results

- **NDVI**
  - Landsat
  - MODIS

- **Evapotranspiration (W m$^{-2}$)**
  - Landsat Evapotranspiration Data to Come!
  - MODIS

**Trend**
- (3-day average)
- (seasonally corrected)

**Drought years:**
- 2013-2015
Daily Aggregation of ET, NDVI, LST: 2003-2015 for MODIS

[Graphs showing time series of evapotranspiration and NDVI with shaded areas labeled 'Wet Season.']

[Graphs showing time series of evapotranspiration and LST with shaded areas labeled 'Wet Season.']
Spatial Results: Landsat vs. MODIS

NDVI

2013
Landsat
MODIS

2014
Landsat
MODIS

2015
Landsat
MODIS

Evapotranspiration

January 22, 2004

< 175 W m²
> 345 W m²

Landsat
MODIS
Conclusions so far...

• ET derived from the PT-JPL model directly mirrors the seasonal patterns of Costa Rica

• NDVI exhibits a 2 month lag, and misses the dry period from July-August entirely

• MODIS allows us to track vegetation stress in near-real time, but using Landsat allows us to track exactly where vegetation stress is occurring at the farm scale

• MORE results to come!
Acknowledgements

• Thanks to the whole ECOSTRESS Science Team for creating a product we desperately need!

• Thanks to Greg Halverson for PT-JPL MODIS & Landsat pipeline.

• Special thanks to Dr. Josh Fisher and Dr. Christine Lee for their guidance and support throughout the project.