

A satellite image of Earth's atmosphere, showing complex, swirling patterns of clouds and weather systems in shades of blue, green, and white. The patterns are dense and intricate, covering the entire visible surface of the planet.

DEVELOP

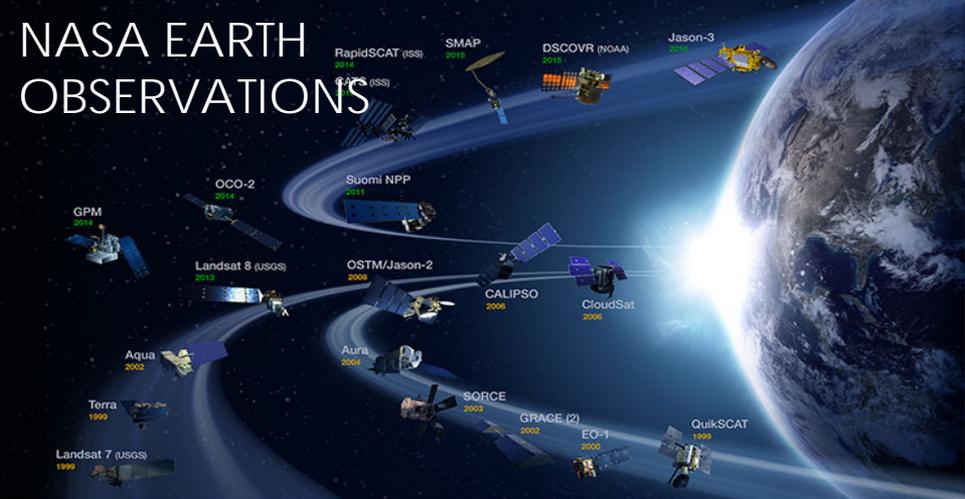
National Program

Shaping the future by integrating Earth observations into global "decision making"

What is DEVELOP?

DEVELOP, part of NASA's Applied Sciences Program, addresses environmental and public policy issues through interdisciplinary feasibility projects that apply the lens of NASA Earth observations to community concerns around the globe.

*DEVELOP is a dual-capacity building program:
Partners & Participants*



Where is DEVELOP?



NASA Center Locations

1. NASA Ames Research Center – Moffett Field, CA
2. NASA Goddard Space Flight Center – Greenbelt, MD
3. NASA Jet Propulsion Laboratory – Pasadena, CA
4. NASA Langley Research Center – Hampton, VA*
5. NASA Marshall Space Flight Center at NSSTC – Huntsville, AL

* The DEVELOP National Program Office is located at Langley.

Regional Locations

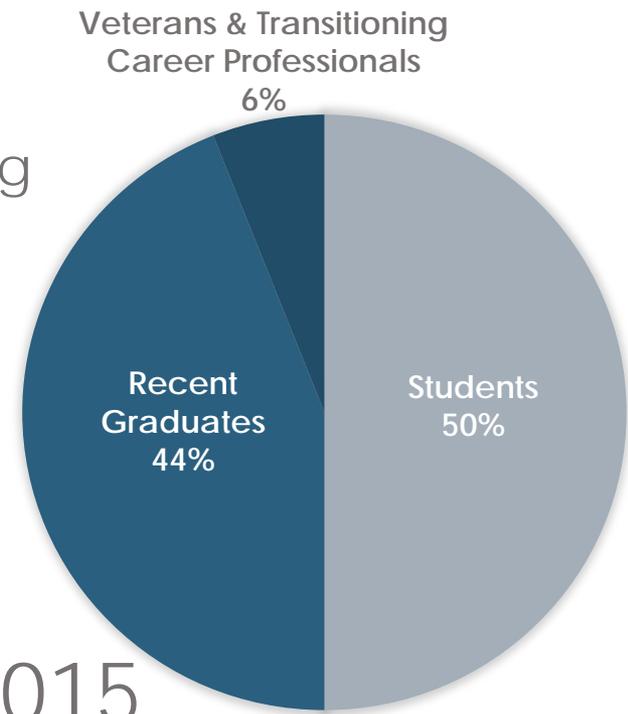
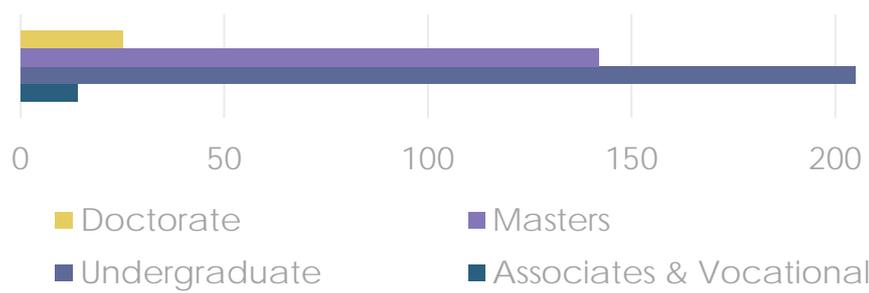
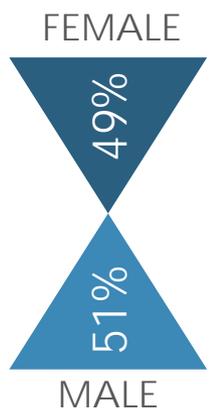
6. BLM at Idaho State University GIS TReC – Pocatello, ID
7. International Research Institute for Climate and Society – Palisades, NY
8. Mobile County Health Department – Mobile, AL
9. NOAA National Centers for Environmental Information – Asheville, NC
10. University of Georgia – Athens, GA
11. USGS at Colorado State University – Fort Collins, CO
12. Wise County and City of Norton Clerk of Court's Office – Wise, VA
13. Maricopa County Department of Public Health at Arizona State University – Tempe, AZ



Who are DEVELOPErs?

Eligibility Requirements:

- 18 and older
- Interested in Earth science & remote sensing
- US citizenship for NASA Centers



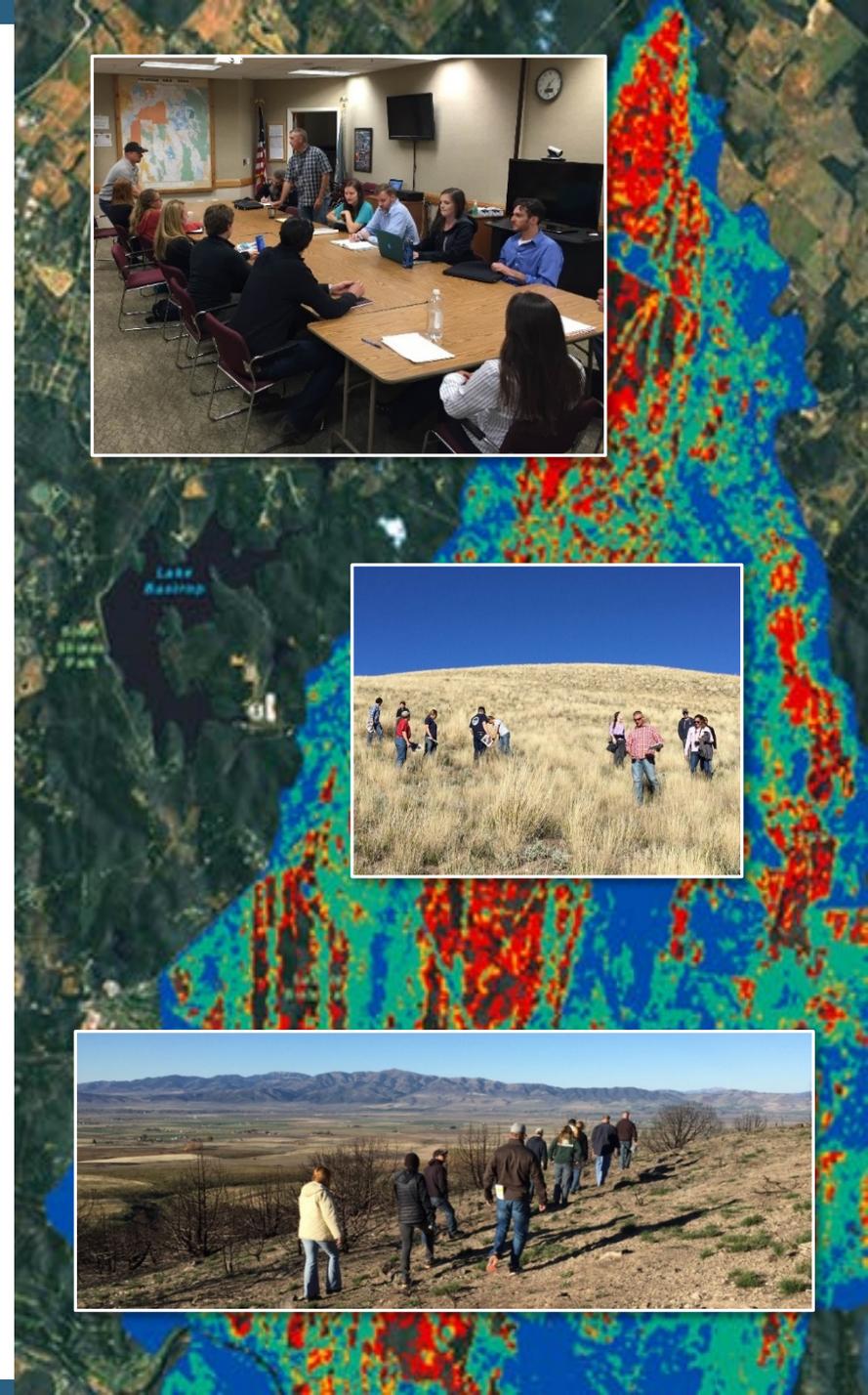
393 PARTICIPANTS in 2015

How do DEVELOP Projects Work?

Project Characteristics

- Address environmental **community concerns**
- Collaborate with decision making organizations who can benefit from using NASA Earth observations to **enhance decision making**
- Utilize and highlight the application of **NASA Earth observations**
- **Science advisors & mentors** from NASA and partner organizations ensure **scientific merit**

*DEVELOP is rapid feasibility:
10 Week Long Projects*





Recent Water Projects

2016 Spring

Atlanta Water: Identifying Key Urban Areas to Reduce Stormwater Runoff and Maximize Conservation Efforts in Metropolitan Atlanta (UGA)

Lake Victoria Water II: Developing an Automated, Near Real-Time System to Monitor *Eichhornia Crassipes* over the Winam Gulf in Lake Victoria (MSFC)

Texas Water II: Utilizing NASA Earth Observations to Assess Soil Moisture in Texas for Wildfire Mitigation (LaRC)

2015 Fall

Coastal Texas Water II: Using NASA Earth Observations to Assess the Health of the Laguna Madre through Land Cover Mapping and Thermal Analysis (MCHD)

Lake Tahoe Water: Creating a Global Continuous Detection Lake Level Monitoring Algorithm using Landsat Imagery (ARC)

New Mexico Water II: Delivering Automated Evapotranspiration Data to the New Mexico Office of the State Engineer for Enhanced Water Resource Decision Making (JPL)

Coastal Texas Water Resources II

Using NASA Earth Observations to Assess Laguna Madre Water Conditions Through Land Cover Mapping and Thermal Analysis

Community Concerns:

- ▶ Increasing Salinity of the Laguna Madre
- ▶ Surrounding lands privately owned
- ▶ Proliferation in spatial extent of honey mesquite trees

Partners:

- ▶ National Park Service, Padre Island National Seashore

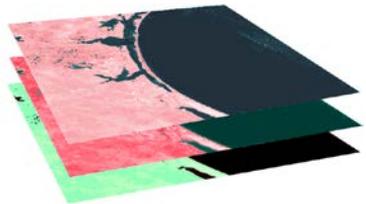
Impact:

- ▶ Investigated the relationship between the salinity of the Laguna Madre and the increase in honey mesquite trees using remote sensing technologies
- ▶ Developed a systematic method to study the relationships between environmental factors to assist the NPS in studying Laguna Madre hydrology



Methodology

Land Use/Land Cover (LULC)



Bands 4,3,2 stack and TOA Reflectance

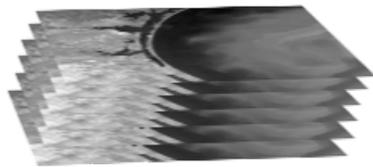


LULC Map

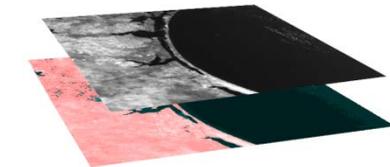


Accuracy Assessment

Vegetation Indices



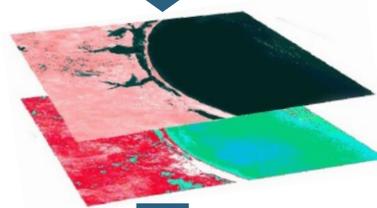
Landsat 5 (TM) Bands



$$NDII = \frac{NIR - SWIR}{NIR + SWIR}$$



NDII Map

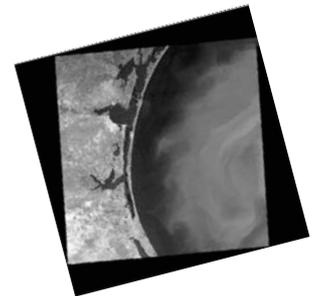


$$NDVI = \frac{NIR - Red}{NIR + Red}$$



NDVI Map

Thermal Analysis



Landsat 5 (TM) Band 6

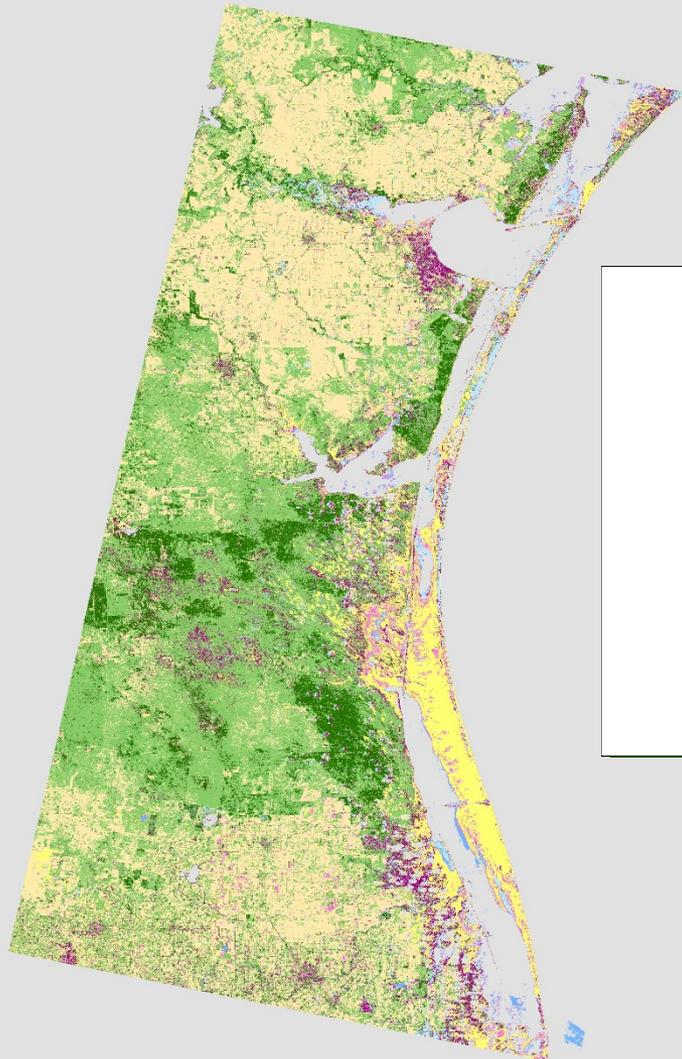


DN to TOA Radiance to Celsius

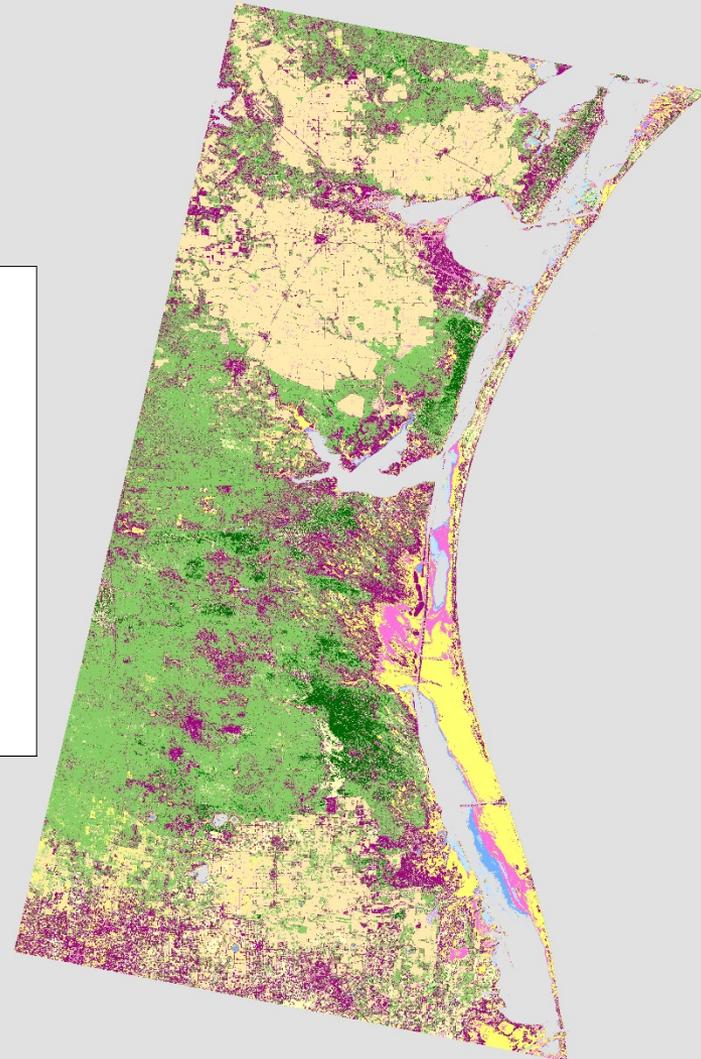
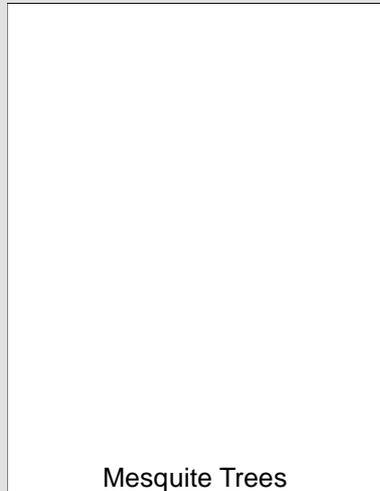


Extract the Lagoon

Results - LULC



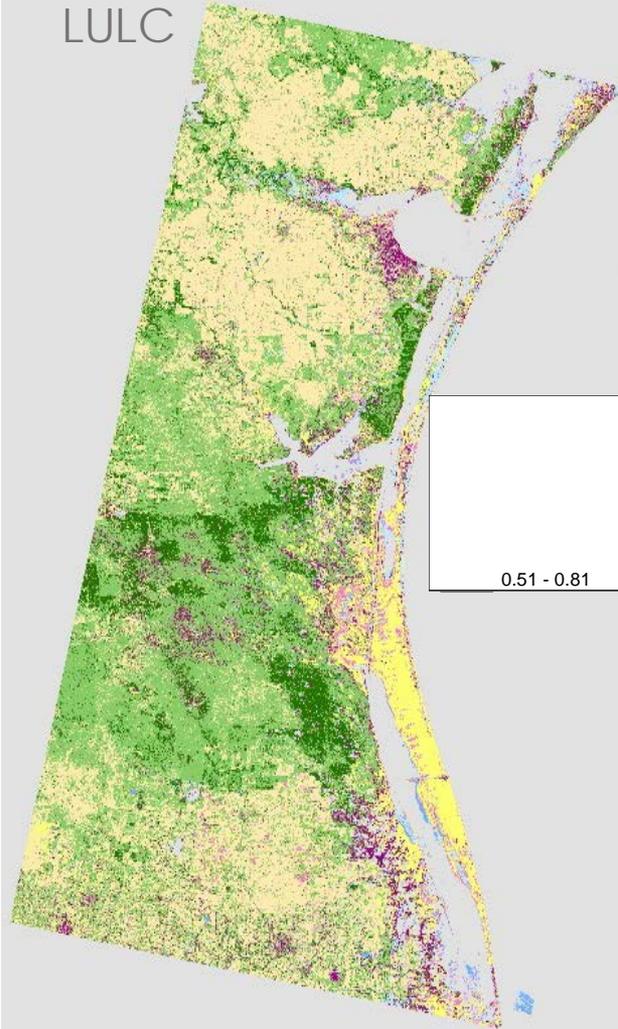
July 1986



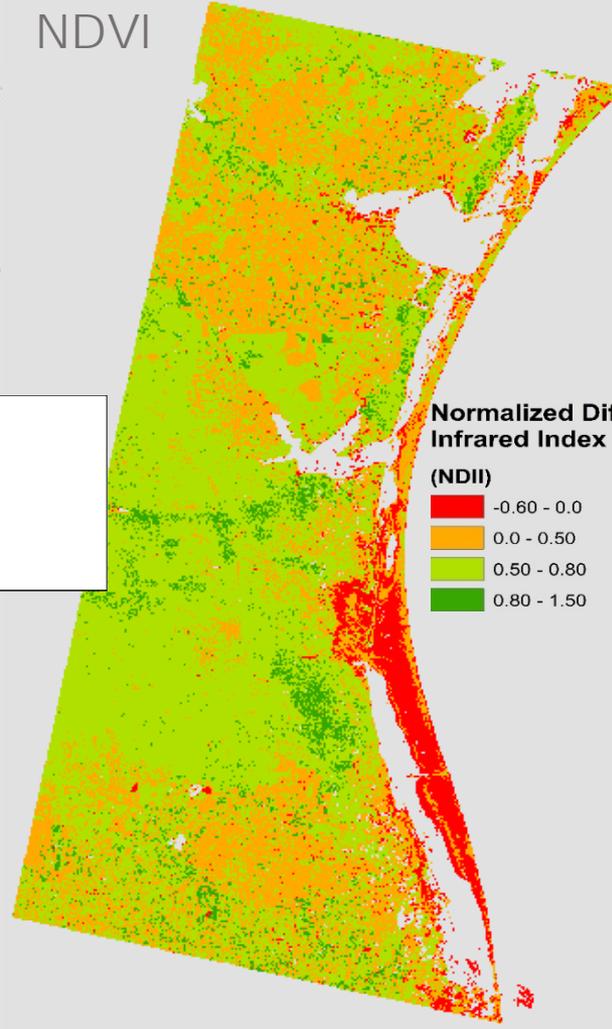
September 2000

Results – NDVI & NDII (July 1986)

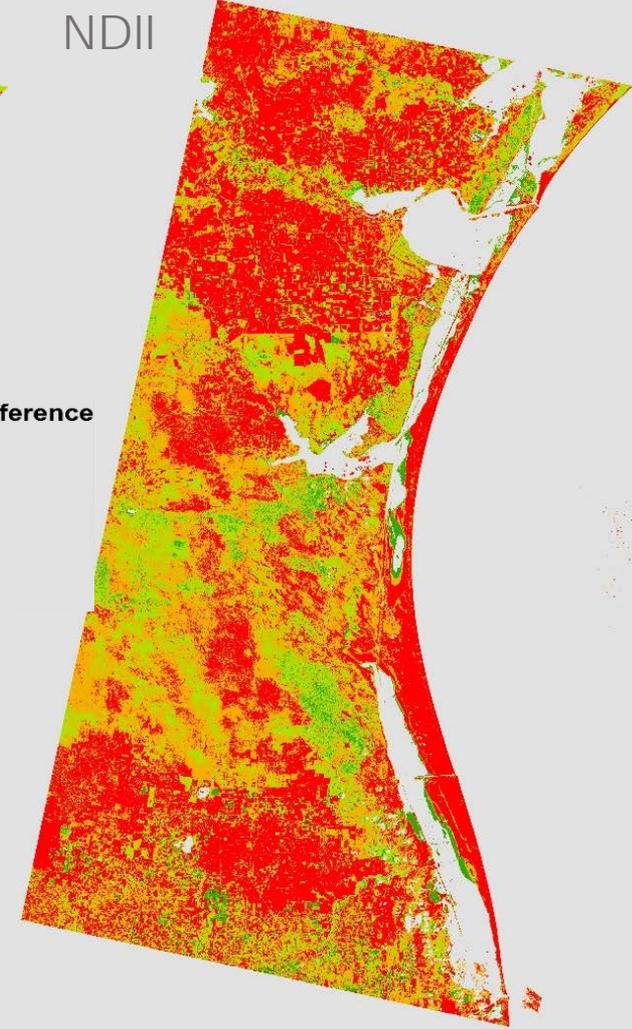
LULC



NDVI



NDII



**Normalized Difference
Infrared Index
(NDII)**

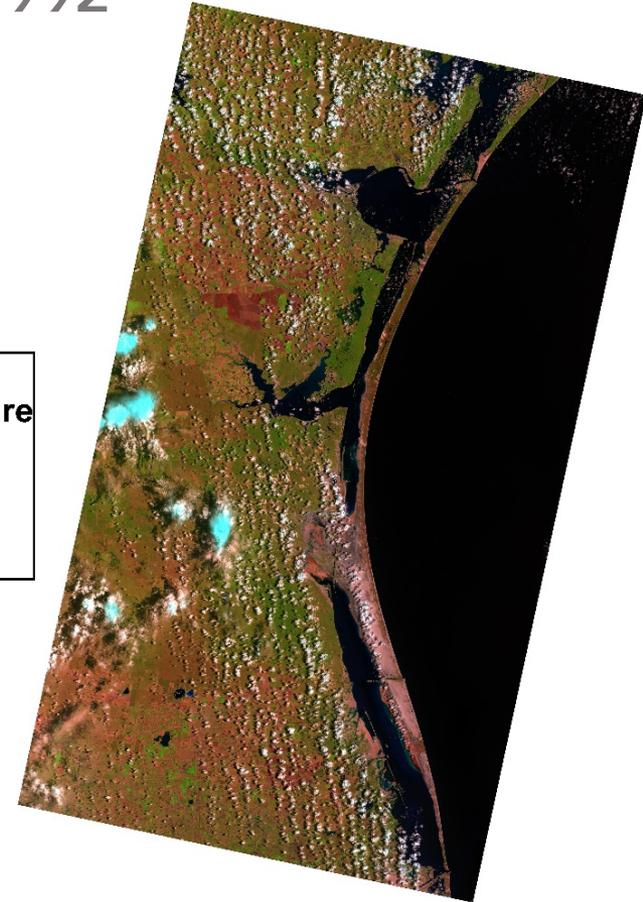
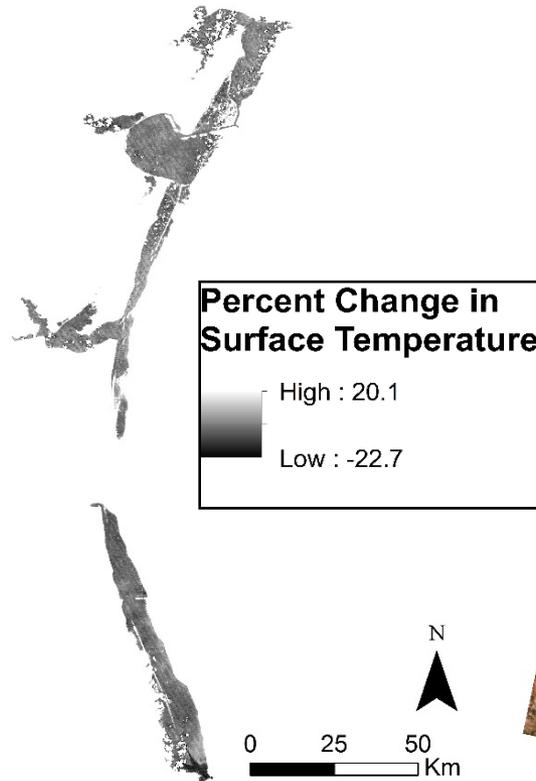
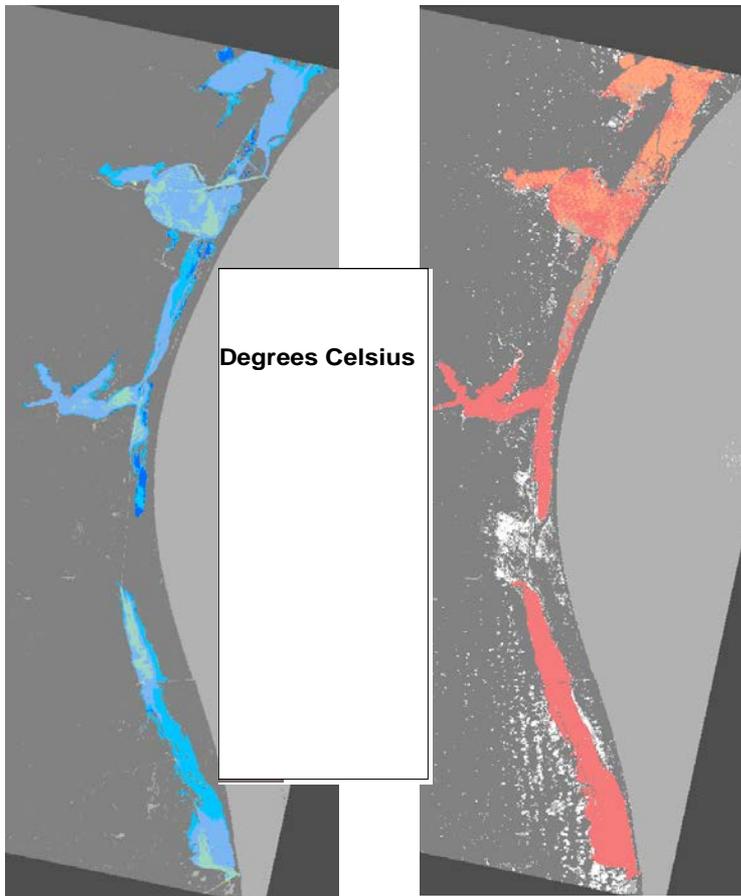


Results – Thermal Analysis

Dormant
Season

Growing
Season

July 1992

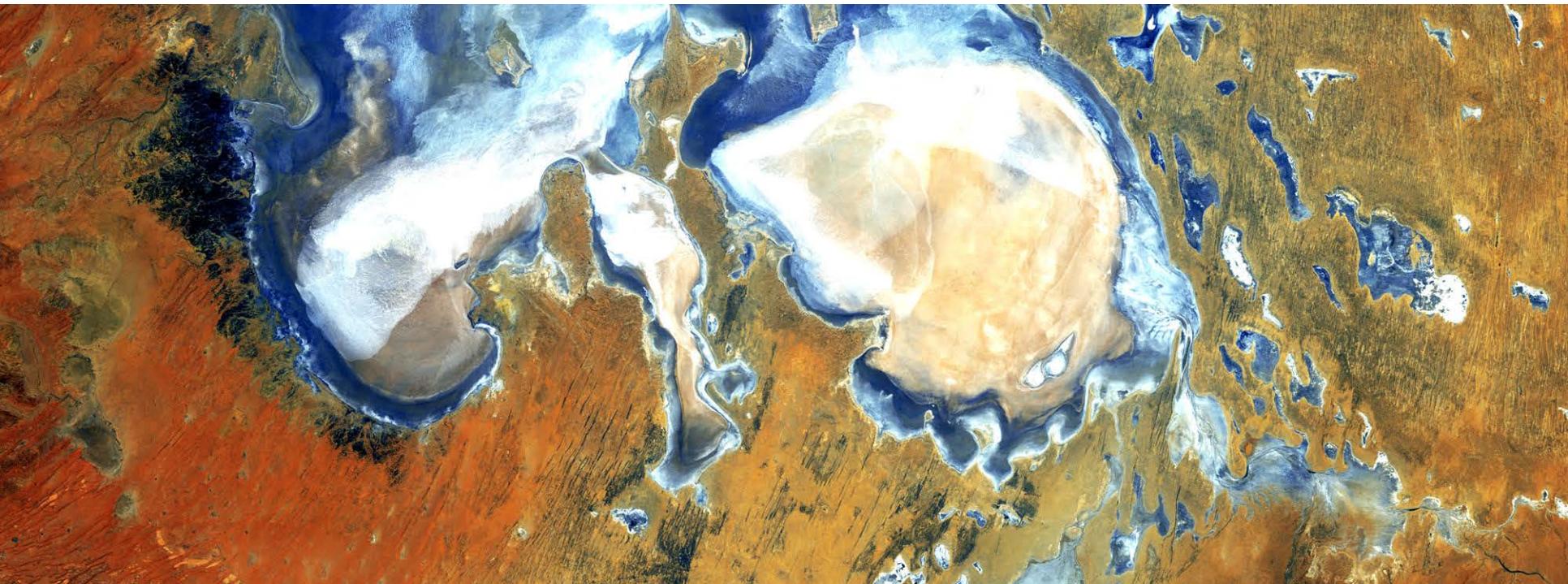


Some anomalies were found,
but were inconclusive

Percent change in the surface temperature
was calculated using the global mean
temperature

How to Get Involved

- Propose a project idea
- Volunteer to advise a project





What Makes for a Successful DEVELOP Project Idea?

- Achievable with NASA Earth observing resources over 1-3 10-week terms
- Addresses an actionable community concern
- Robust communication with end-user
- Specific study region rather than a broad study area
- Expectations are clear

*Deadline for Spring 2016 Proposals:
Late September*

Proposal template is available upon request

Thank You!

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