HyspIRI Applications Questions and Traceability Matrix

NASA Applied Sciences Program Mission Statement

Advance the realization of societal and economic benefits from NASA Earth science by identifying societal needs, conducting applied research and development, and collaborating with application developers and users.

…to improve and develop decision-making activities and enable transition and adoption by public- and/or private-sector organization(s) for sustained use in decision making and services to end users.

Jeffrey C. Luvall, Christine Lee, and Simon Hook Marshall Space Flight Center and JPL

θΔ ics

HyspIRI Key Science Questions

Question #	Question
cq1	How do Inland, Coastal, And Open Ocean Aquatic Ecosystems Changing Over Time Due To Local and Regional Land-Use Change And Other Factors? PDF
cq2	How are fires and vegetation composition coupled? PDF
cq3	Do volcanoes signal impending eruptions through changes in the temperature of the ground, rates of gas and aerosol emission, temperature and composition of crater lakes, or health and extent of vegetation cover? PDF
cq4	How do species, functional type, and biodiversity composition within ecosystems influence the energy, water and biogeochemical cycles under varying environmental conditions? PDF
cq5	What is the composition of exposed terrestrial surface of the Earth and how does it respond to anthropogenic and non anthropogenic drivers? PDF
cq6	How do patterns of human environmental and infectious diseases respond to leading environmental changes, particularly to urban growth and change and the associated impacts of urbanization? PDF
tq1	How can we help predict and mitigate earthquake and volcanic hazards through detection of transient thermal phenomena? PDF
tq2	What is the impact of global biomass burning on the terrestrial biosphere and atmosphere, and how is this impact changing over time? PDF
tq3	How is consumptive use of global freshwater supplies responding to environmental changes and demand, and what are the implications for sustainable management of water resources? PDF
tq4	How does urbanization affect the local, regional and global environment? Can we characterize this effect to help mitigate its impact on human health and welfare? PDF
tq5	What is the composition and temperature of the exposed surface of the Earth? How do these factors change over time and affect land use and habitability? PDF
vq1	What is the global spatial pattern of ecosystem and diversity distributions and how do ecosystems differ in their composition or biodiversity? PDF
vq2	What are the seasonal expressions and cycles for terrestrial and aquatic ecosystems, functional groups, and diagnostic species? How are these being altered by changes in environmental conditions, land use, and disturbance? PDF
vq3	How are the biogeochemical cycles that sustain life on Earth being altered/disrupted by natural and human-induced environmental change? How do these changes affect the composition and health of ecosystems and what are the feedbacks with other components of the Earth system? PDF
vq4	How are disturbance regimes changing and how do these changes affect the ecosystem processes that support life on Earth? PDF
vq5	How do changes in ecosystem composition and function affect human health, resource use, and resource management? PDF
vq6	What are the land surface soil/rock, snow/ice and shallow-water benthic compositions PDF

Mission Applications Value

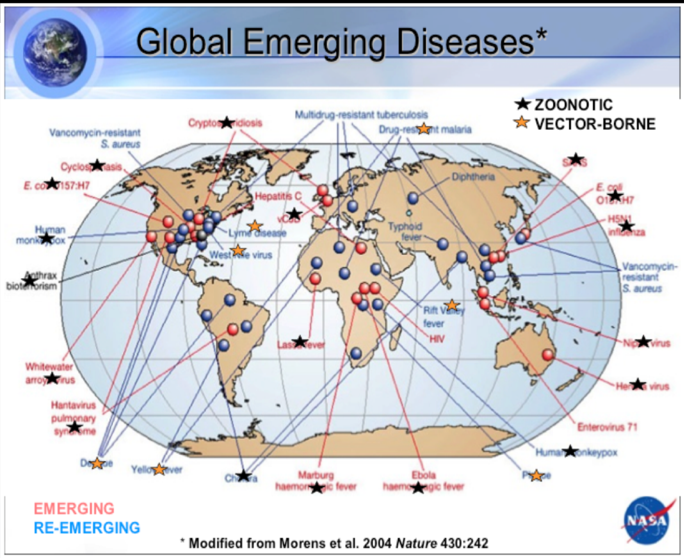
An Introduction to the NASA Hyperspectral. InfraRed Imager (HyspIRI) Mission and Preparatory Activities

8 C.M. Lee et al. / Remote Sensing of Environment 167 (2015) 6–19

Table 1
Urgent and unique science and applications addressed by the HyspIRI mission.

Field	Science questions	Applications
Terrestrial Systems	• Ecology — patterns and spatial distribution • Ecology — function, physiology, seasonal activity, phenology • Wildfires (changes to landscape/carbon budget) • Surface composition and change • Biodiversity/species distribution • Surface energy balances (e.g., assessing evapotranspiration)	• Agricultural applications (e.g., drought mitigation, water use efficiency, water supply) • Impacts of and response to natural/anthropogenic disturbances • Management of wildfires (e.g., megafires) • Impacts of landscape and landscape changes to human health • Conservation practices
Aquatic Systems	• Understanding optically complex waters (e.g., turbid, coastal, estuarine) • Shallow water bottom composition • Inland aquatic environments • Marine ecology, coral reefs composition/extent • Wetlands extent • Submerged aquatic vegetation and species identification/distribution • Geomorphology (shoreline changes) • Groundwater discharge • Flooding • Ocean color/ocean biology	• Water availability and quality (for human consumption or human use) such as tools for predicting onset and extent of (harmful) algal blooms • Tracking oil spills and other pollutants • Disasters assessment (e.g., for floods preparation or interventions) • Restoration and mitigation practices • Conservation practices • Impacts of and response to natural/anthropogenic disturbances
Biogeochemical	Carbon, water, nitrogen, oxygen, feedback into climate, carbon storage, and effects on ecosystem function/species populations	• Impacts on mitigation practices • Impacts on resource extraction, urbanization • Impacts on water quality (available water)
Atmosphere Geology	Atmospheric correction • Surface minerals composition • Geologic hazards such as earthquakes and as caused by volcanoes (prediction and plume detection)	Applicable to all areas • Resource mapping and extraction • Earthquake damage extent or early warning? • Impacts on air quality and human health

HyspIRI Mission Applications



Vector Borne Diseases

Harmful Algal Blooms

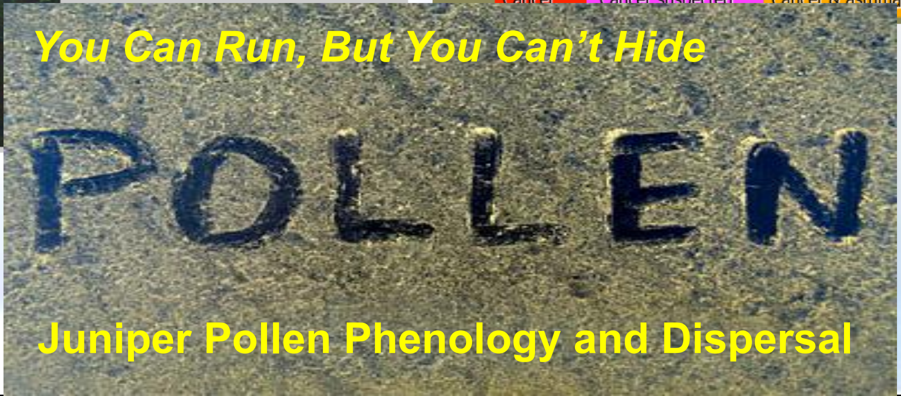
Dust

Middle East Dust – Trace Composition

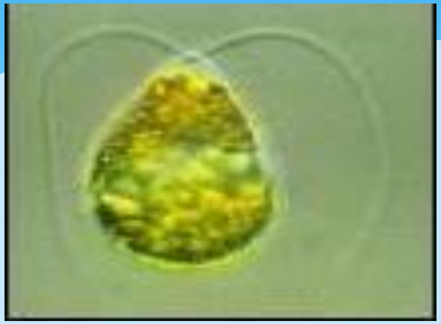
Links between selected elements and some known lung function conditions and diseases

	Desert Dust <10 µm	Desert Dust 20-40 µm
Mn (ppm)	450	331.98
Fe (ppm)	25500	18111.61
Co (ppm)	11.72	8.24
Pb (ppm)	17.22	9.45
Cu (ppm)	220	152.64
Cd (ppm)	1.24	0.70
Mg (ppm)	13230.49	10572.70
Al (ppm)	15912.39	13154.60
Ca (ppm)	139577.64	140250.15
Na (ppm)	1098.28	1476.86
Cr (ppm) [but species critical]	181.32	187.36
Zn (ppm)	105.18	72.30
Ni (ppm)	93.28	60.44
Ti (ppm)	1095.52	539.81

Cancer | Cancer suspected | Cancer & asthma | Emphysema | Asthma



Spectral identification of phytoplankton from space

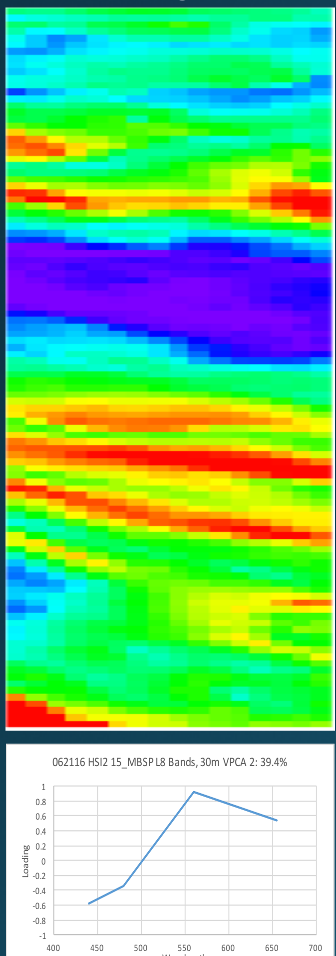


- Different types of phytoplankton and cyanobacteria have different pigments.
- Pigments have specific absorption and reflectance patterns
- Spectral shapes can be used to identify different algal and cyanophyte phyla
- Capitalizes on all information available in hyperspectral-resolution spectra
- But, must unmix reflectance spectra

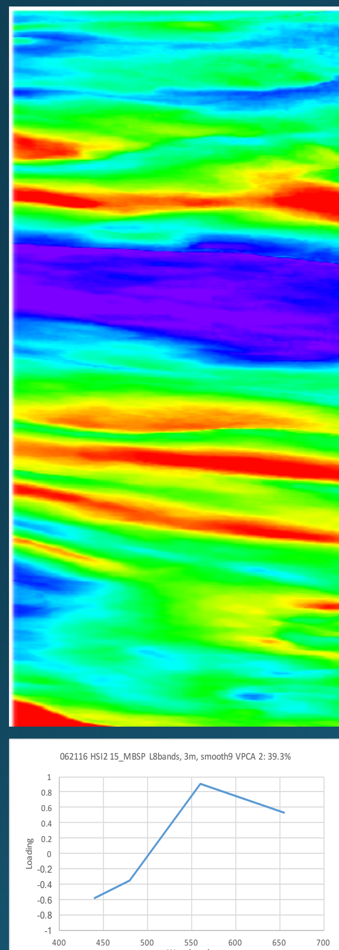
Graphics: Courtesy of NASA/GSFC.

Ortiz et al., (HyspIRI 2015)

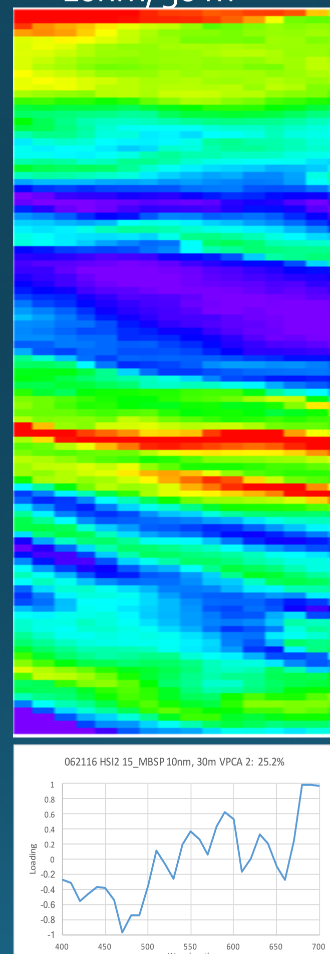
VPCA 2 Simulated L8 bands, 30m



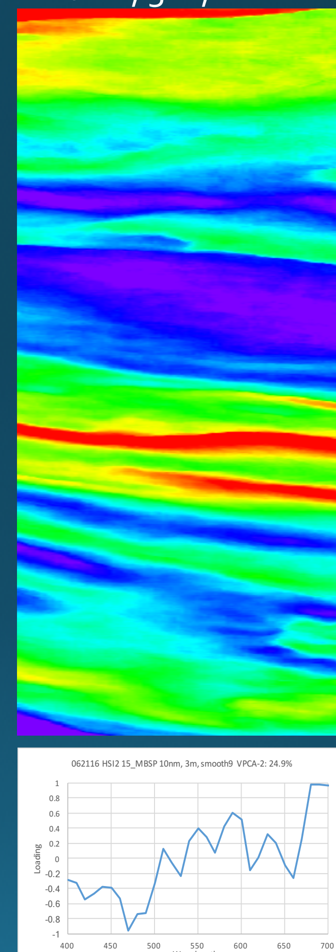
VPCA 2 Simulated L8 bands, 3m, Smooth 9x9



VPCA 2 HSI2 10nm, 30 m



VPCA 2 HSI2 10nm, 3 m,

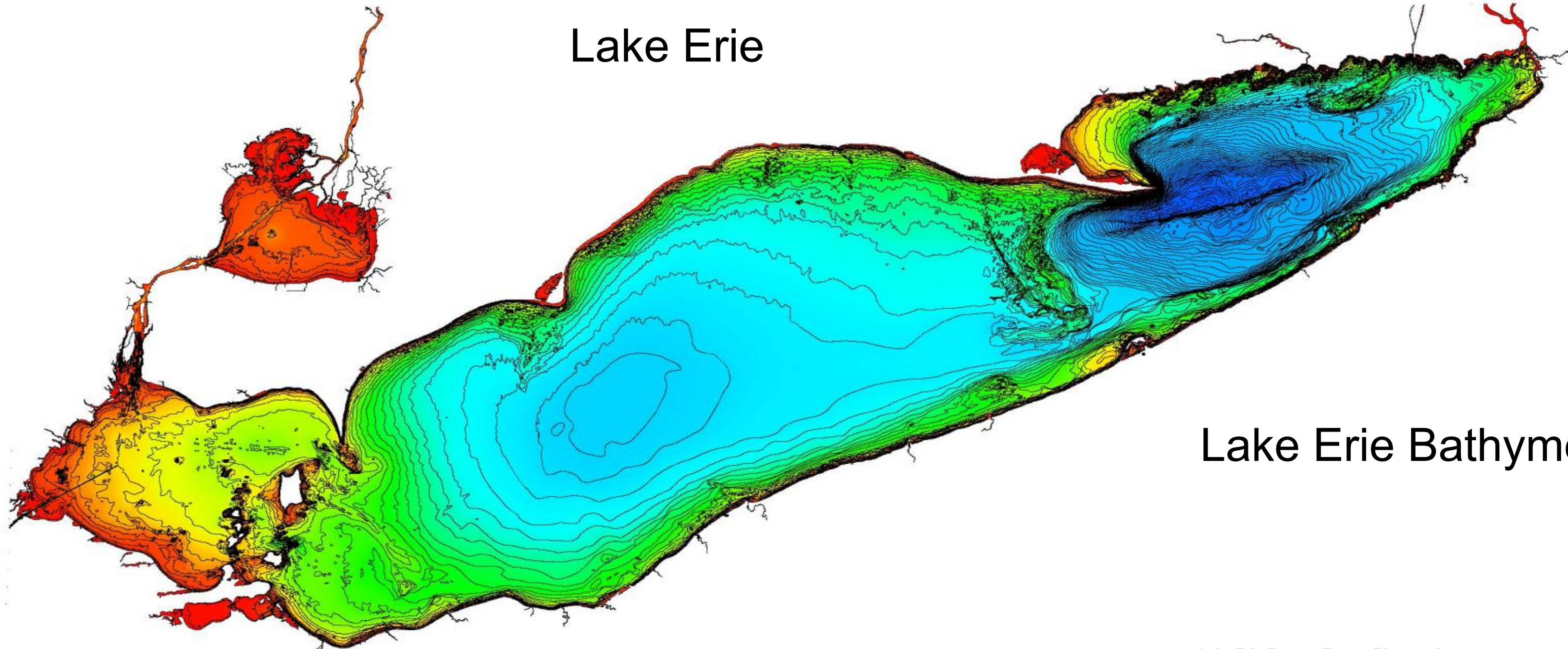


Composition:
Haematite,
Green algae,
-α carotene
and
phycocyanin
(R=0.90)

↑N

Ortiz et al., (HyspIRI 2017; jortiz@kent.edu)

Lake Erie

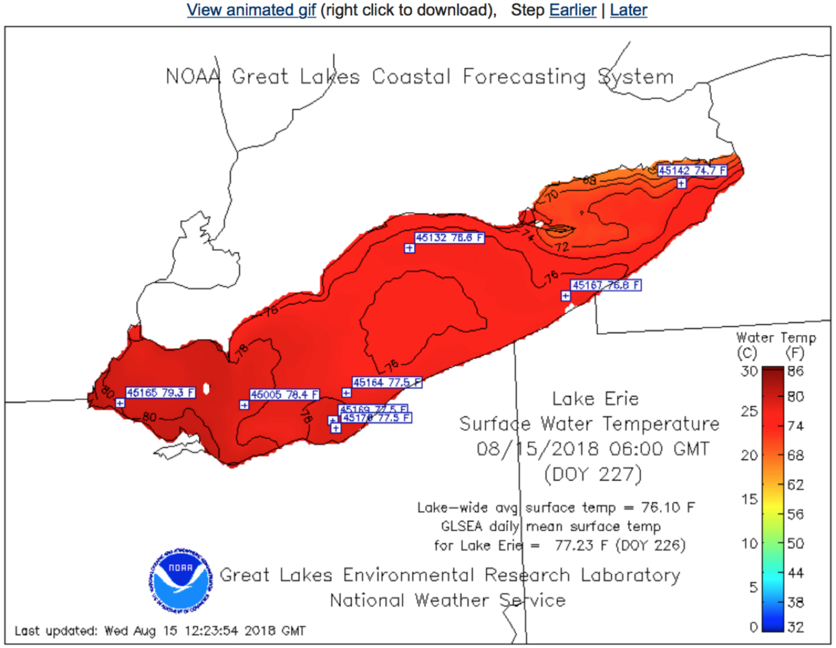


Lake Erie Bathymetry

Lake Erie Surface Temps (Nowcast)

Animation -00 -03 -06 -09 -12 -15 -18 -21 -24 -27 -30 -33 -36 -39 -42 -45 -48

View animated gif (right click to download), Step Earlier | Later



Lake Erie Bottom Temps (Nowcast)

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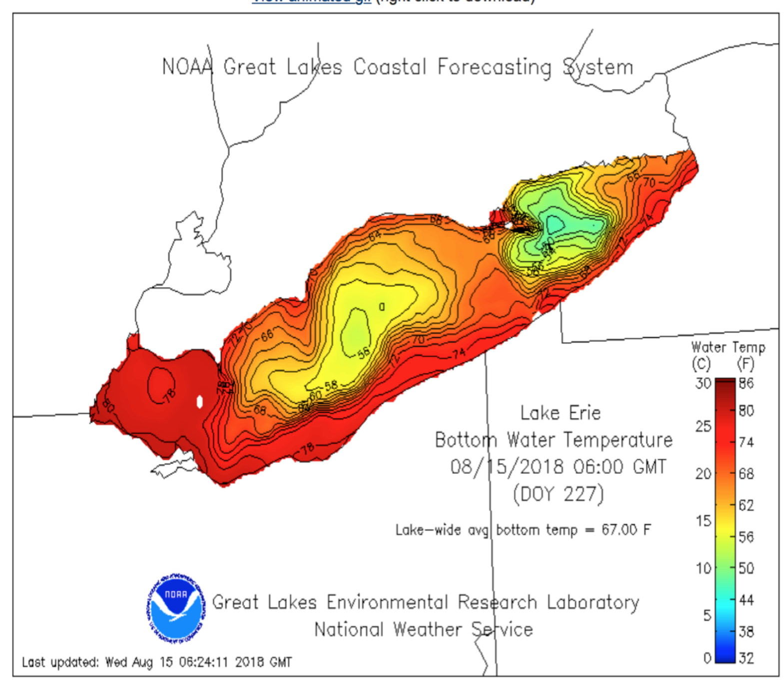
View animated gif (right click to download)



Integration of Airborne Aerosol Prediction Systems and Vegetation Phenology to Track Pollen for Asthma Alerts in Public Health Decision Support Systems

Jeffrey C Luvall Marshall Space Flight Center

William A. Sprigg, Alfredo Huete, Goran Pejanovic, & Slobodan Nickovic
University of Arizona,

Heide Krapfl
Environmental Health Epidemiology Bureau, NM Department of Health

Amy Budge Earth Data Analysis Center, Alan Zelicoff, Dept of Family &
Community Medicine, Orrin Myers University of New Mexico
ARES Corporation

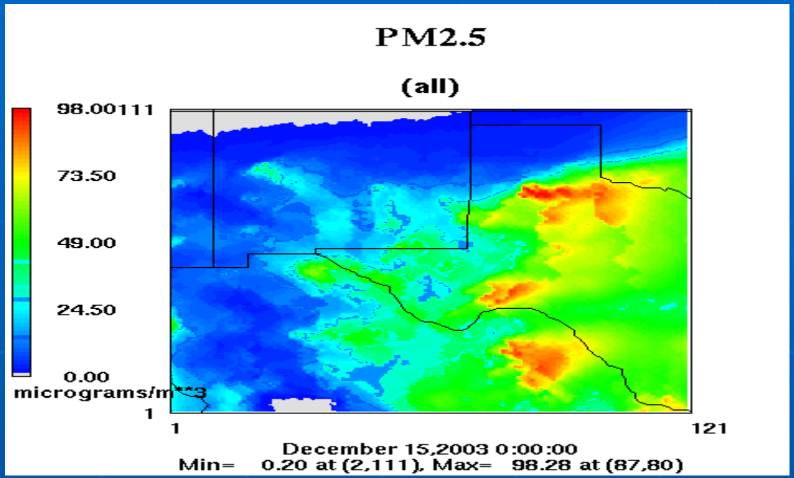
Peter K. Van de water California State University, Fresno

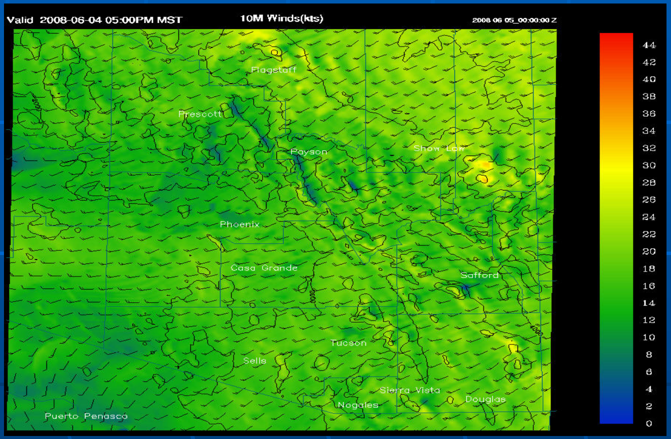
Estelle Levetin Dept. Biology University of Tulsa

Theresa Crimmins & *Jake Weltzin USGS National Phenology Network*

Weather - DREAM

Dust REgional Atmospheric Modeling (DREAM) system



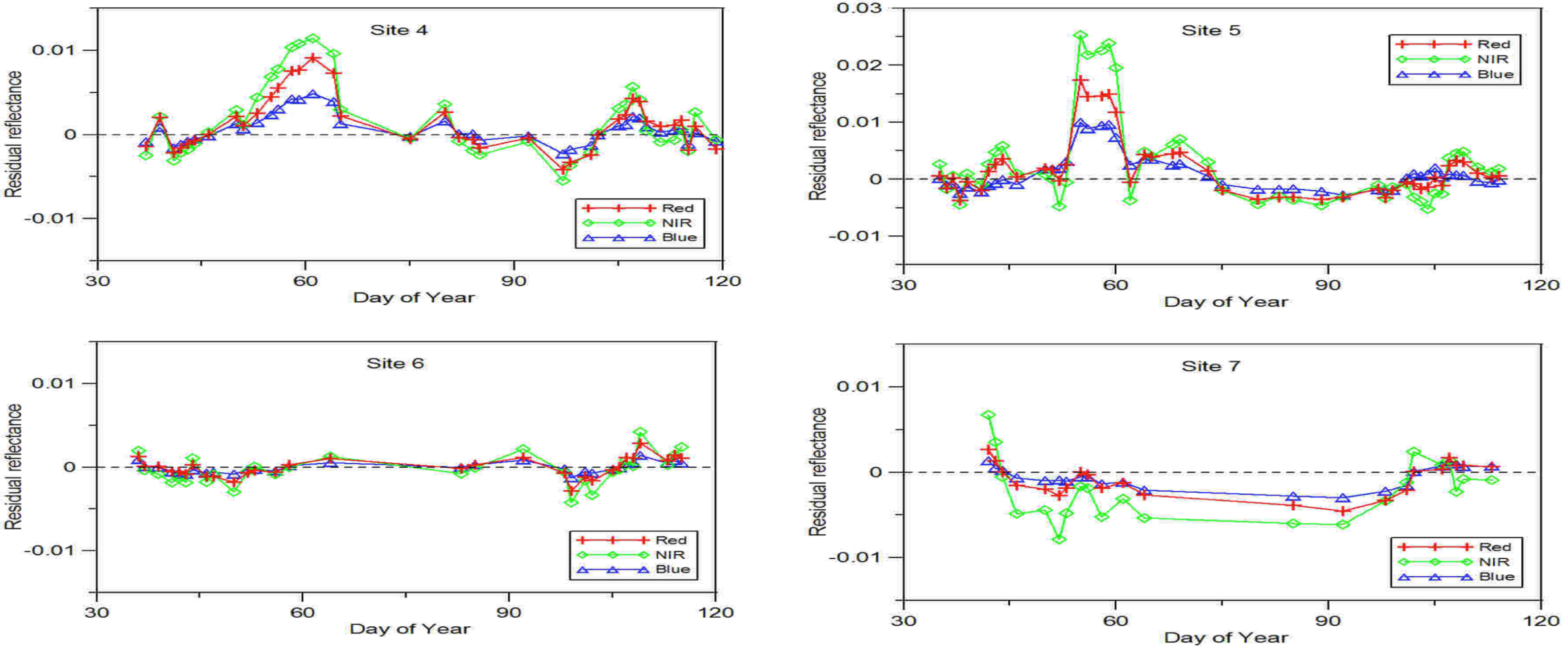


UA-NCEP/ NMM 10-m wind forecast

S. Nickovic et al., A model for prediction of desert dust cycle in the atmosphere, *JGR* **106**, 18113–18129 (2001) .

Yin et al., Modeling wind-blown desert dust in the southwestern United States for public health warning: A case study, *Atmos. Environ*. **39**, 6243-6254 (2005).

Yin et al.,The impact of using different land cover data on wind-blown desert dust modeling results in the southwestern United States *Atmos. Environ*., **41**, 2214-2224 (2007).



Temporal profiles of residual MODIS reflectances at the four study sites.

Convolve to the hyperspectral data to MODIS sensor broad bandpasses

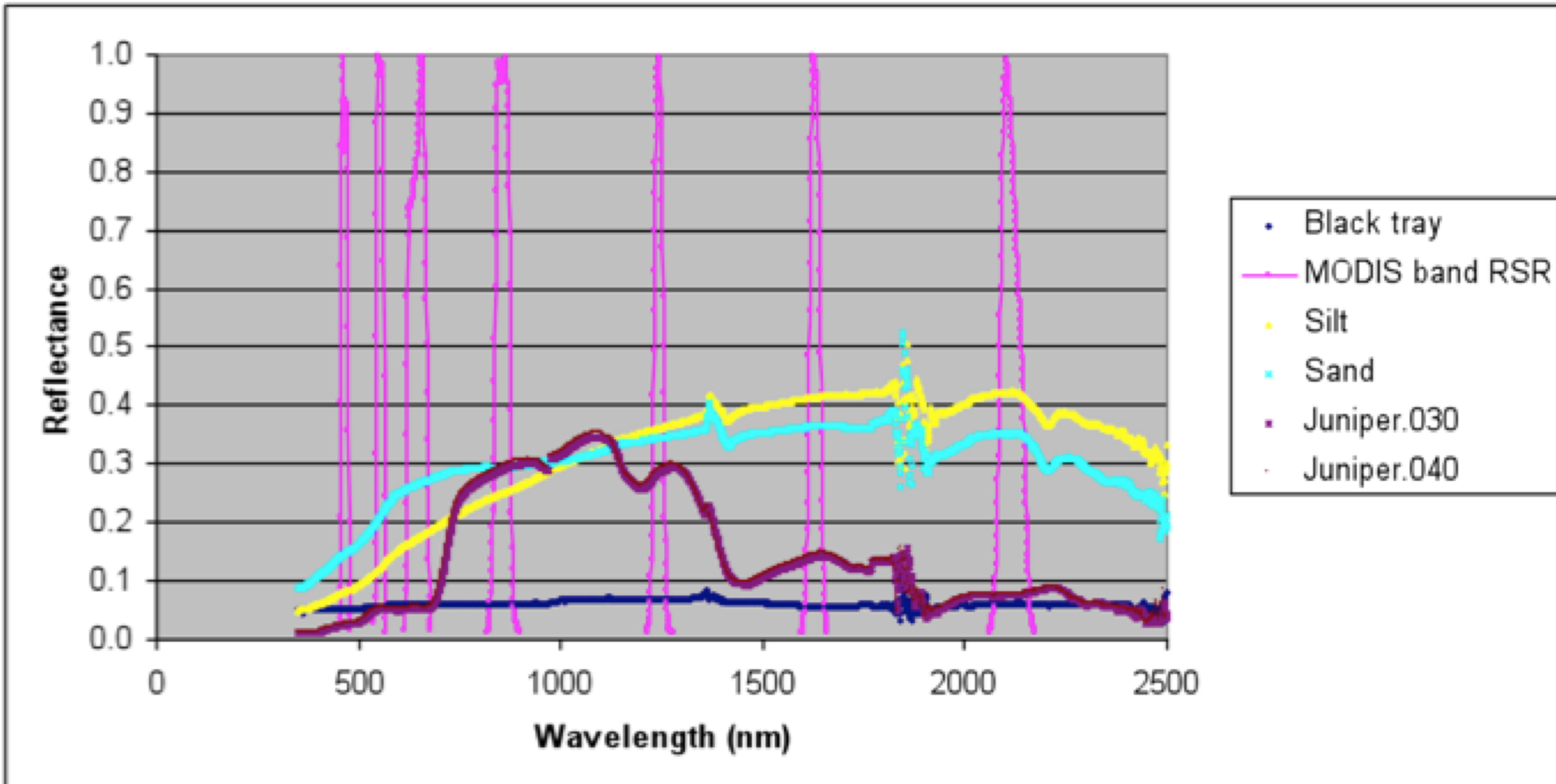
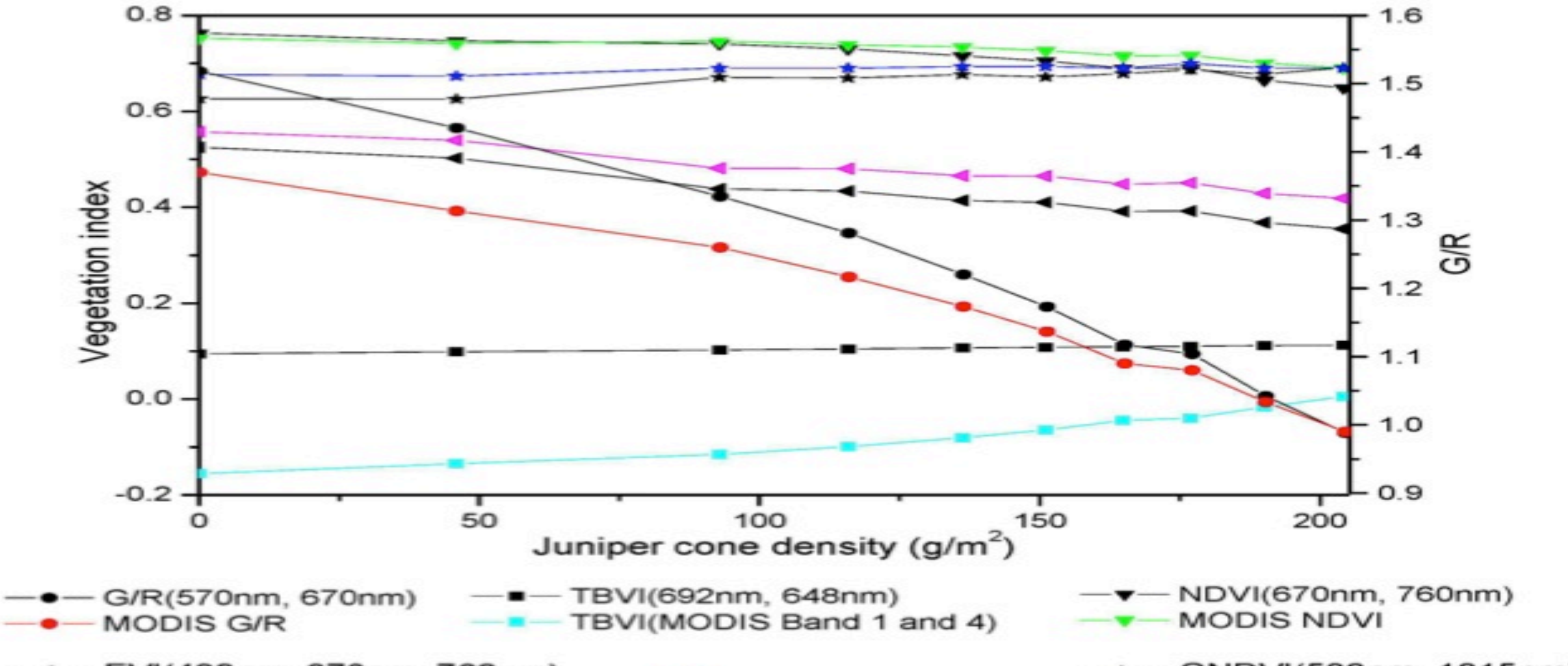


Figure 6. (a)Vegetation index and (b) relative changes of vegetation index (including G/R) at different juniper cone densities, those vegetation indices calculated by MODIS Bands and narrow bands with the best-fit R^2 values in Table 2



(a)

Response of Spectral Reflectances and Vegetation Indices on Varying Juniper Cone Densities.
Dailiang Peng, et al. 2013 *Remote Sensing* 5:5330-5345

Pollen Source Mask (PREAM)

GAP derived distribution

J. ashei

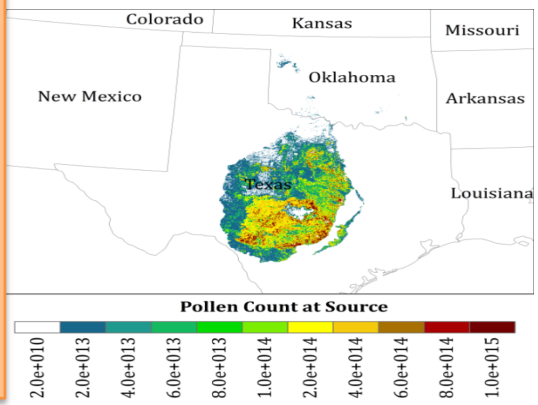
December to January

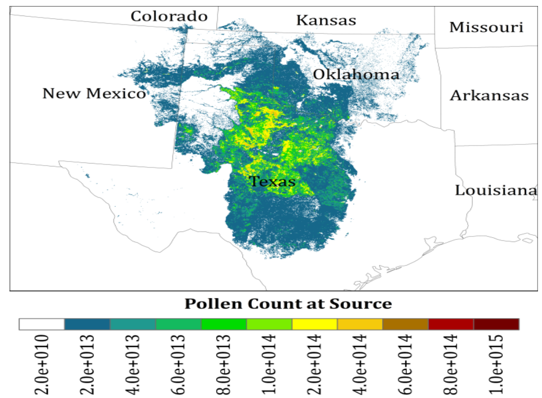
J. pinchotii

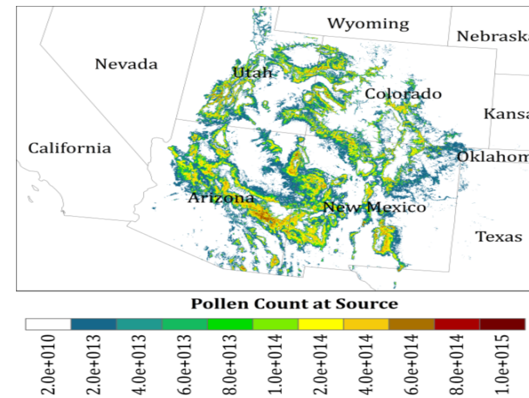
late September-November

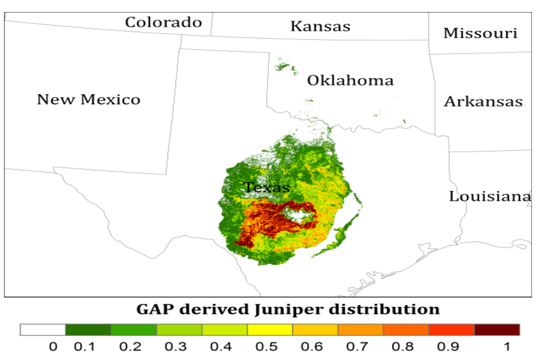
J. monosperma, scopulorum

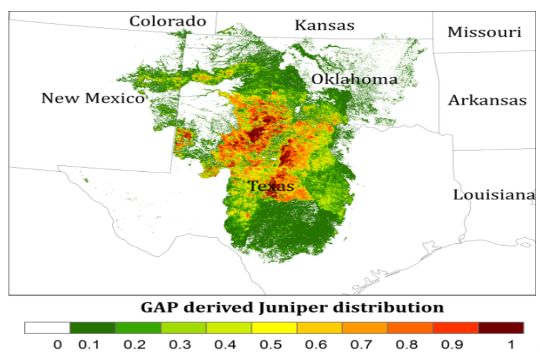
March-May

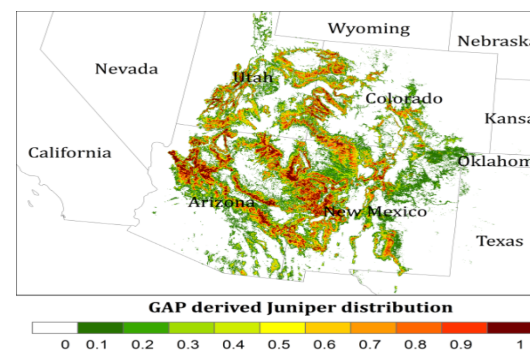






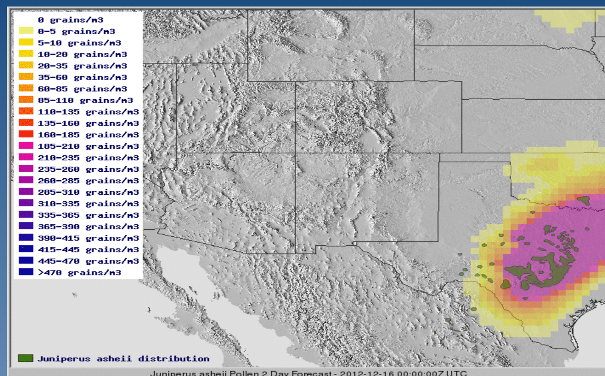






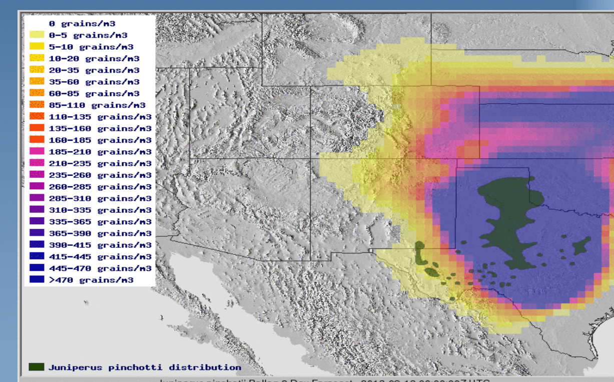
Spatial resolution: ~1 km (990 m)

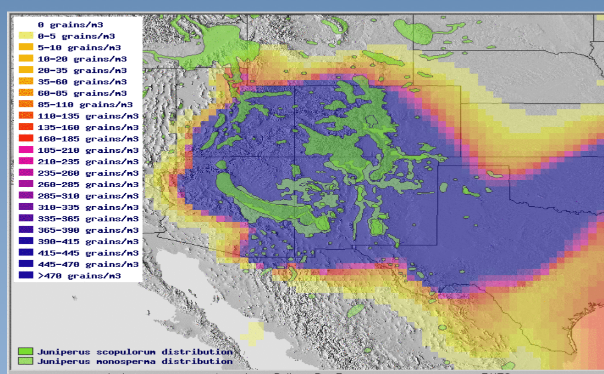
Sample Products



2-day forecast of *J. ashei* pollen at 3-hr intervals for Dec 16-17, 2012

2-day forecast of *J. pinchotii* pollen at 3-hr intervals for Sep 12-13, 2013





2-day forecast of *J. monosperma* / *J. scopulorum* pollen at 3-hr intervals for Apr 7-8, 2013

EDAC

The University of New Mexico

NEW MEXICO DEPARTMENT OF HEALTH Building a Healthy New Mexico

Environmental PUBLIC HEALTH Tracking EPHT

NM Tracking Home

New Mexico EPHT Application Home | Log Out | Data Discovery | Graphs | Mapping Applications

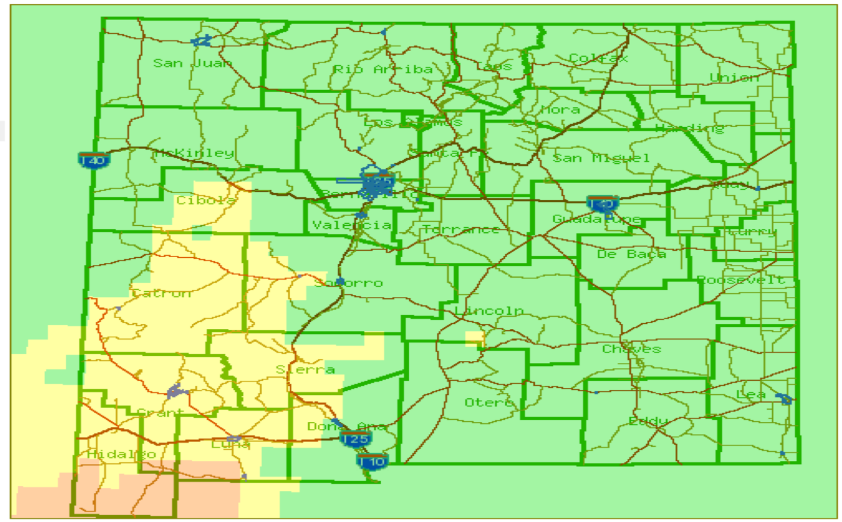
Welcome to the New Mexico EPHT Mapping Applications Page

How to use this map

The layers that you have requested to map are listed below. To add them to the map click 'add to map'. When you first add your EPHT query layer it will appear above the other layers in your map. You can use the arrowed buttons beside each layer in the table of contents to move layers up and down in the list for viewing. Navigation controls for the map are just below the map. Hovering over any of the controls gives you directions for their use. You must have popups enabled in your web browser in order to be able to query features in the map. You can use the small locator map above to zoom on the map in addition to using the zoom button below the map, just click and drag.

Map Layers from: your EPHT data search

DREAM dust output PM2.5 - Classified 24-Hr Mean 2009-04-11T00:00:00Z **add to map**



lon: lat:

Table of Contents

1 DREAM dust output PM2.5 - Classified 24-Hr Mean 2009-04-11T00:00:00Z

- Excellent
- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy
- Hazardous

2 Water System Boundaries

- Water System Boundaries

This portal was supported by Cooperative Agreement Number 5 U38EH000183 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors (webmasters) and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

western columbine

View All Species

Join Us!

We are looking for volunteers to help us monitor plant and animal species found across the United States. Click "Observe" to join us!

Observe

Featured Projects

1 of 2 ››

Sponsors

USA National Phenology Network

The USA National Phenology Network brings together citizen scientists, government agencies, non-profit groups, educators and students of all ages to monitor the impacts of climate change on plants and animals in the United States. The network harnesses the power of people and the Internet to collect and share information, providing researchers with far more data than they could collect alone.

Learn more about us

What is phenology?

Phenology refers to recurring plant and animal life cycle stages, or phenophases, such as leafing and flowering, maturation of agricultural plants, emergence of insects, and migration of birds. Many of these events are sensitive to climatic variation and change, and are simple to observe and record. As an USA-NPN observer, you can help scientists identify and understand environmental trends so we can better adapt to climate change.

Why is phenology important?

USA-NPN News | **Phenology Feed** | **Join the Conversation**

- Phenoclimatology Position at UA
- Introducing the USA-NPN Video
- ***Nature's Notebook:*** "How to Observe" Handbook and Training Videos
- Phenology Special Issue in the Philosophical Transactions of the Royal Society
- USA-NPN Reports (including Strategic Plan and 2009 Annual Report)
- Call for Papers: 4th Annual PROSE in Tucson, AZ, October 2010

- Recent Media Reports
- Newsletter Archive

Are you...?

New to phenology?

Ready to start observing?

One of our partners?

Interested in creating a partnership?

An educator?

Interested in finding data to use?

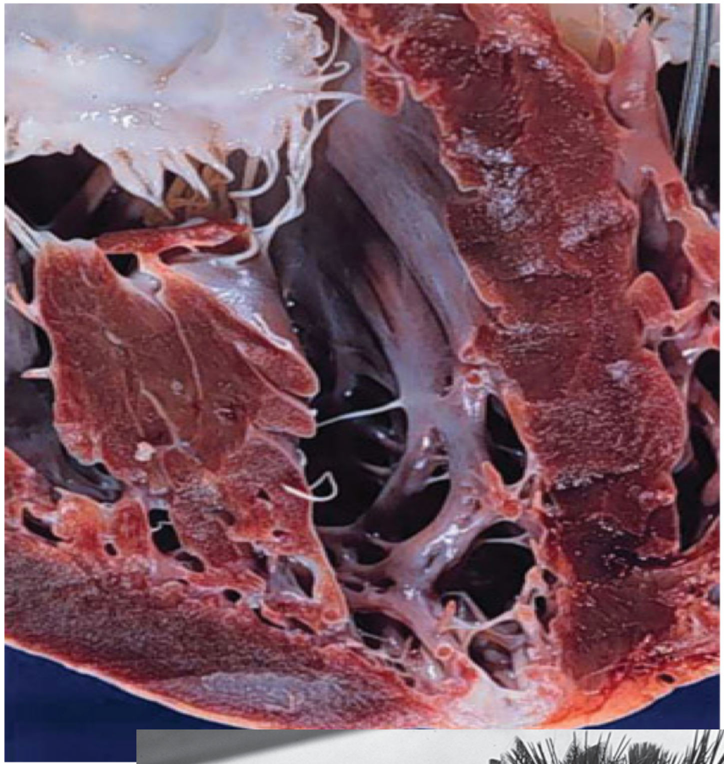
A media outlet?

a


0-1-3
KODAK SAFETY FILM

1

e

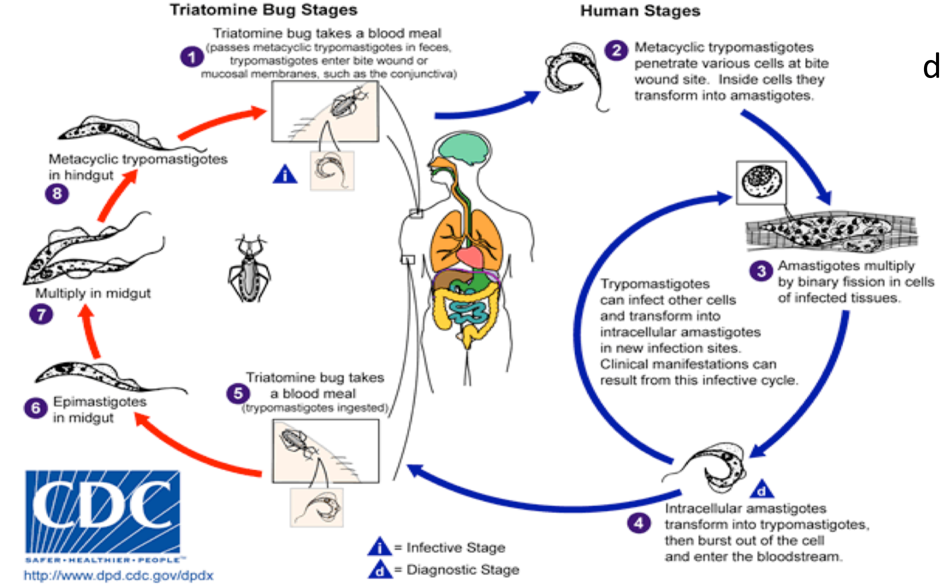


3

b

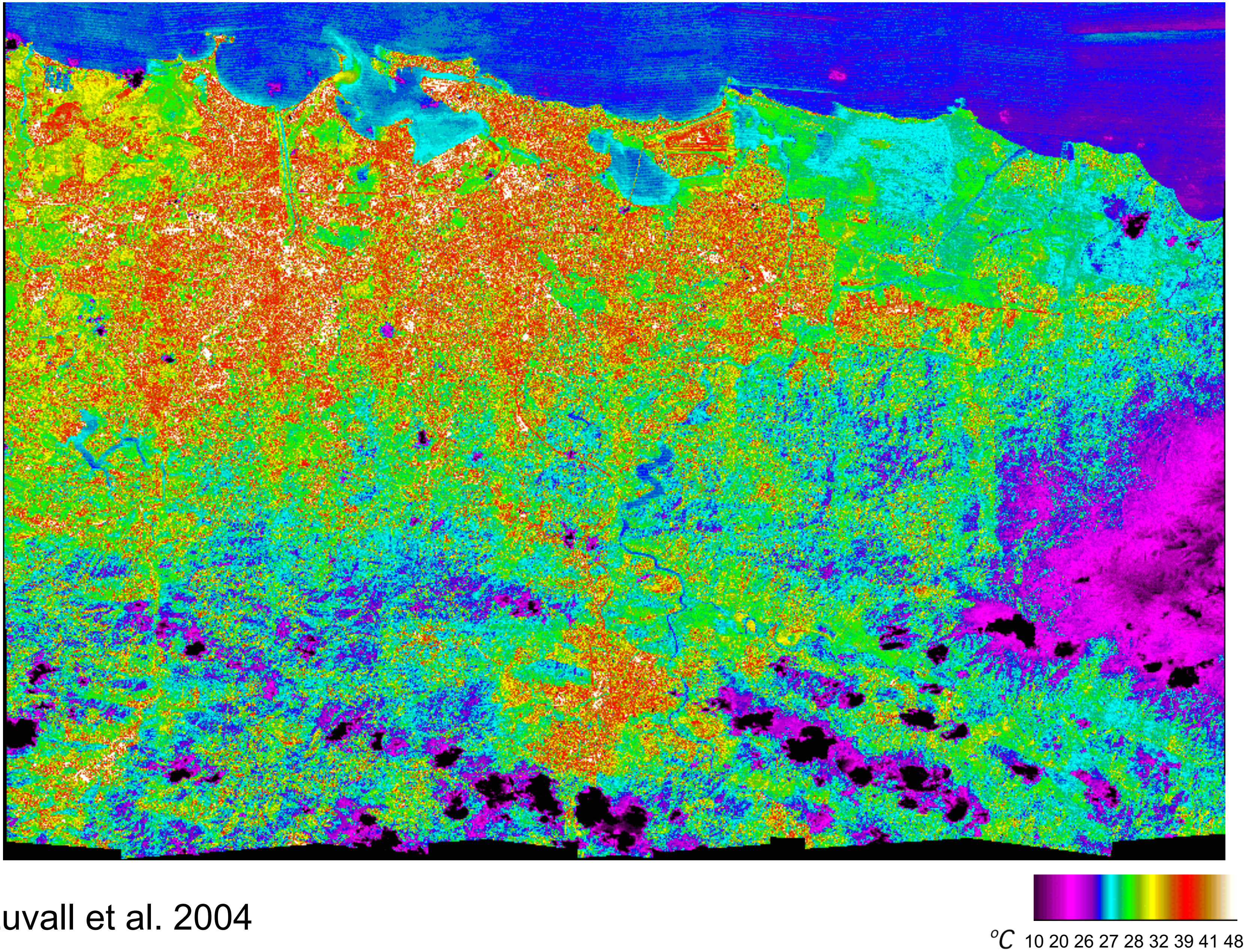
2

d


Triatomine Bug Stages
Human Stages
1 Triatomine bug takes a blood meal (passes metacyclic trypomastigotes in feces, trypomastigotes enter bite wound or mucosal membranes, such as the conjunctiva)
2 Metacyclic trypomastigotes penetrate various cells at bite wound site. Inside cells they transform into amastigotes.
3 Amastigotes multiply by binary fission in cells of infected tissues.
Trypomastigotes can infect other cells and transform into intracellular amastigotes in new infection sites. Clinical manifestations can result from this infective cycle.
4 Intracellular amastigotes transform into trypomastigotes, then burst out of the cell and enter the bloodstream.
5 Triatomine bug takes a blood meal (trypomastigotes ingested)
6 Epimastigotes in midgut
7 Multiply in midgut
8 Metacyclic trypomastigotes in hindgut
i = Infective Stage
d = Diagnostic Stage
CDC
SAFER·HEALTHIER·PEOPLE™
http://www.dpd.cdc.gov/dpdx

c

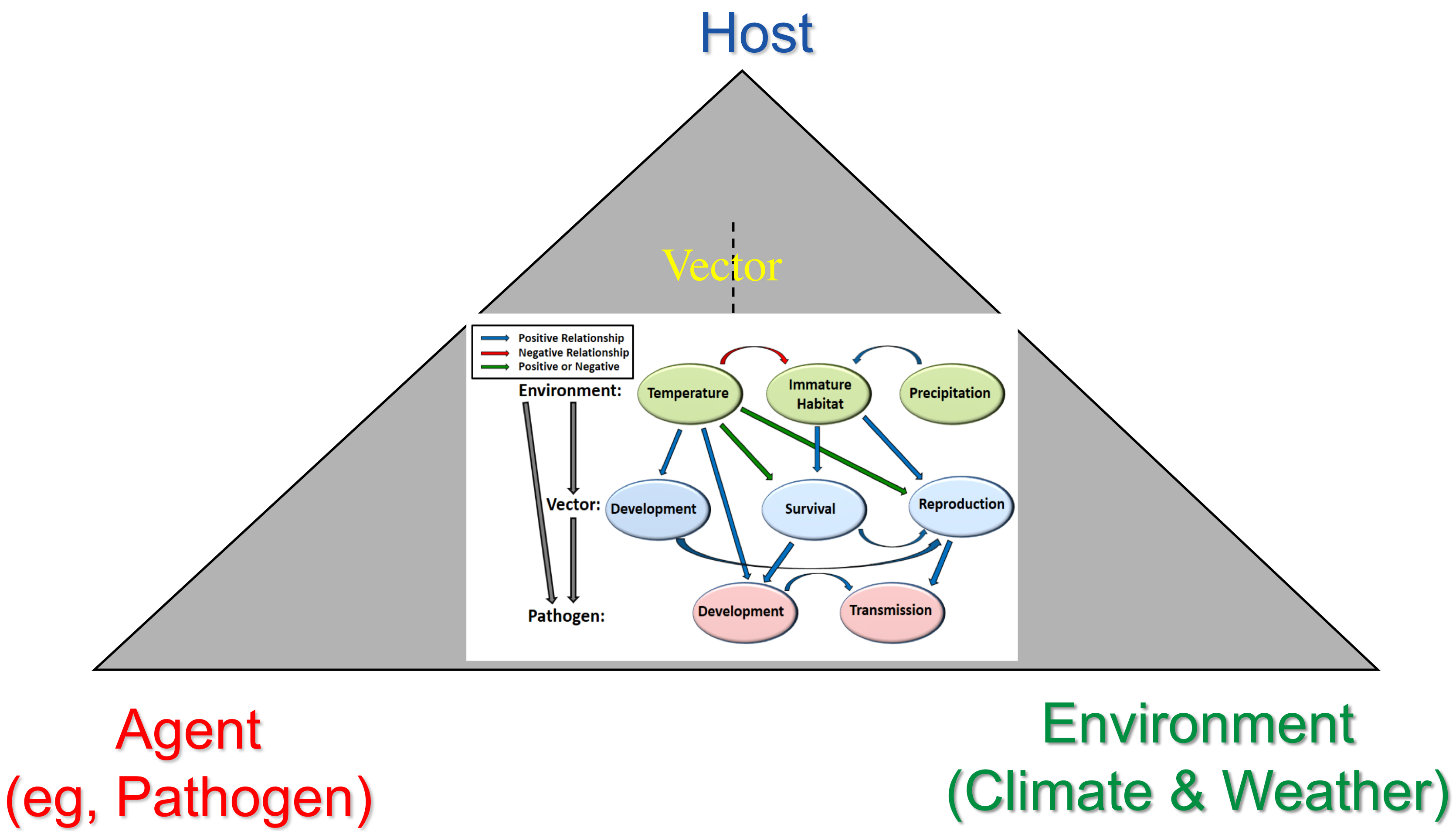
San Juan F5 Mosaic Temperature (10m)



Luvall et al. 2004

Epidemiologic Triangle of Disease (Vector-borne Diseases)

A multi-factorial relationship between hosts, agents, vectors and environment



Morin 2014

Potentially, An Increased Risk of Transmission

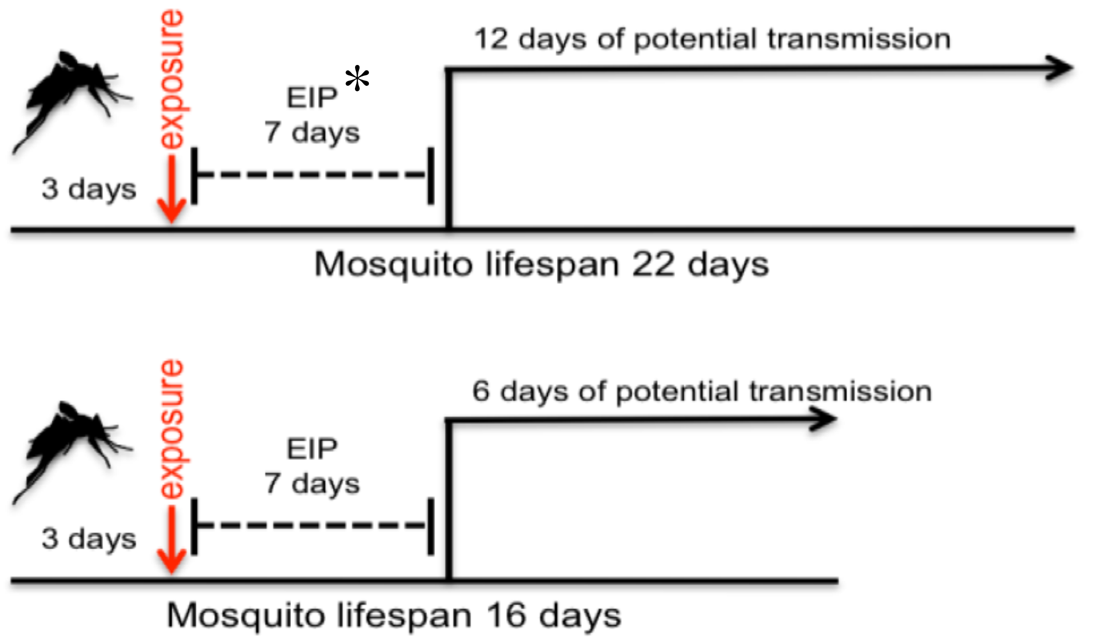


Figure 8 (from Christofferson & Mores 2016): Schematic demonstrating the impact of mosquito mortality on the cumulative transmission potential of an arbovirus.

*Extrinsic Incubation Period (EIP). This process is known to be influenced by both intrinsic (such as viral strain and/or mosquito population) and extrinsic factors (such as temperature and humidity)

NASA's Project Objectives

- To use high spatial resolution thermal infrared and visible data obtained from aircraft to measure, map, and model the surface energy budget characteristics of surfaces typical of the urban landscape for three US cities.
- Provide these data to EPA for evaluation of the overall "fabric" of the cities in relation to the urban heat island and air quality modeling.
- Transfer NASA technology and research to the public.

NASA's Project Atlanta
~ 1996 - 2001

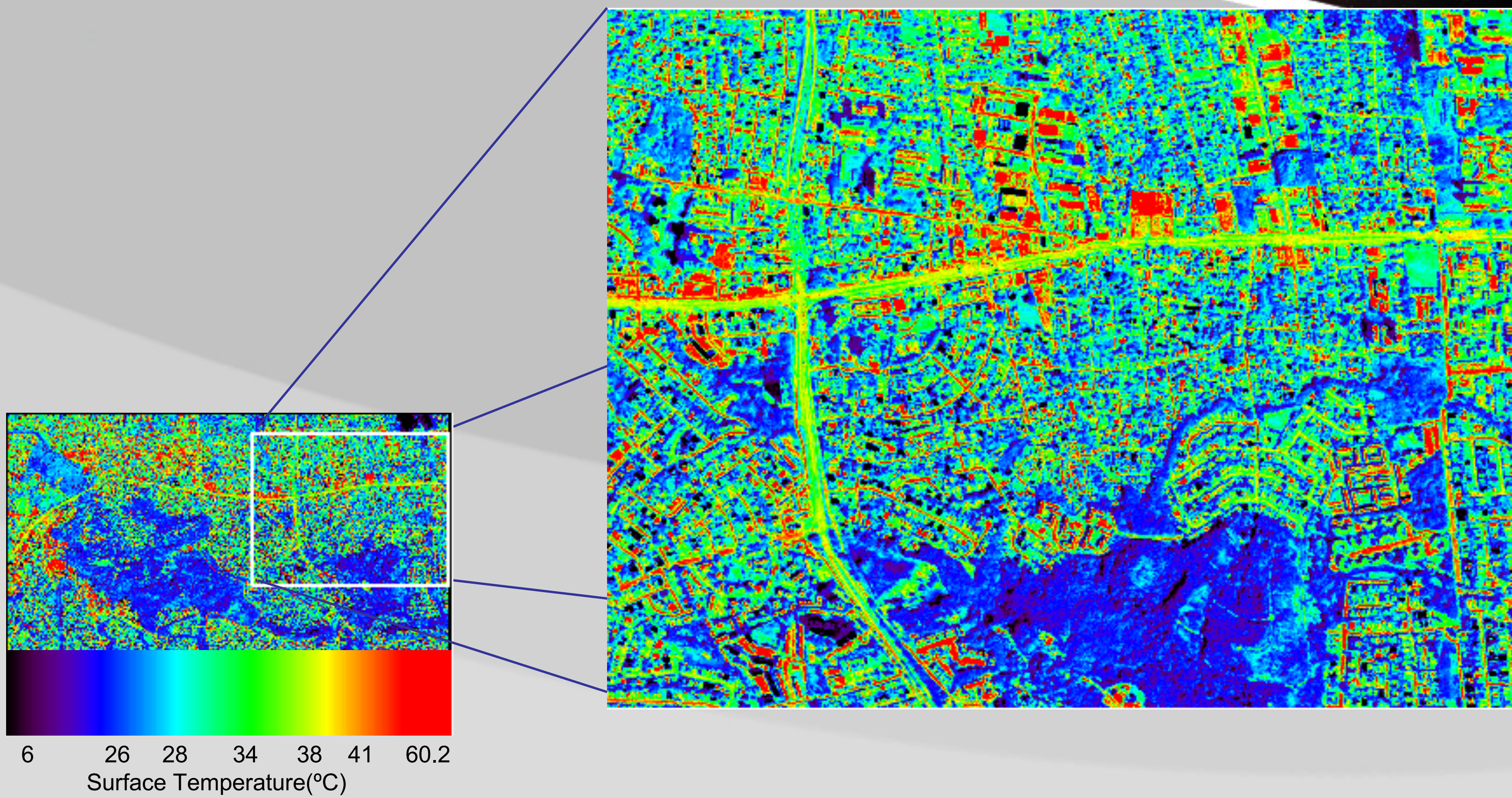
EPA/NASA Urban Heat Island Pilot Project
~ 1997- 2000

NASA EPSCoR San Juan, Puerto Rico UHI
2004

Urban Heat Island Mitigation Strategies

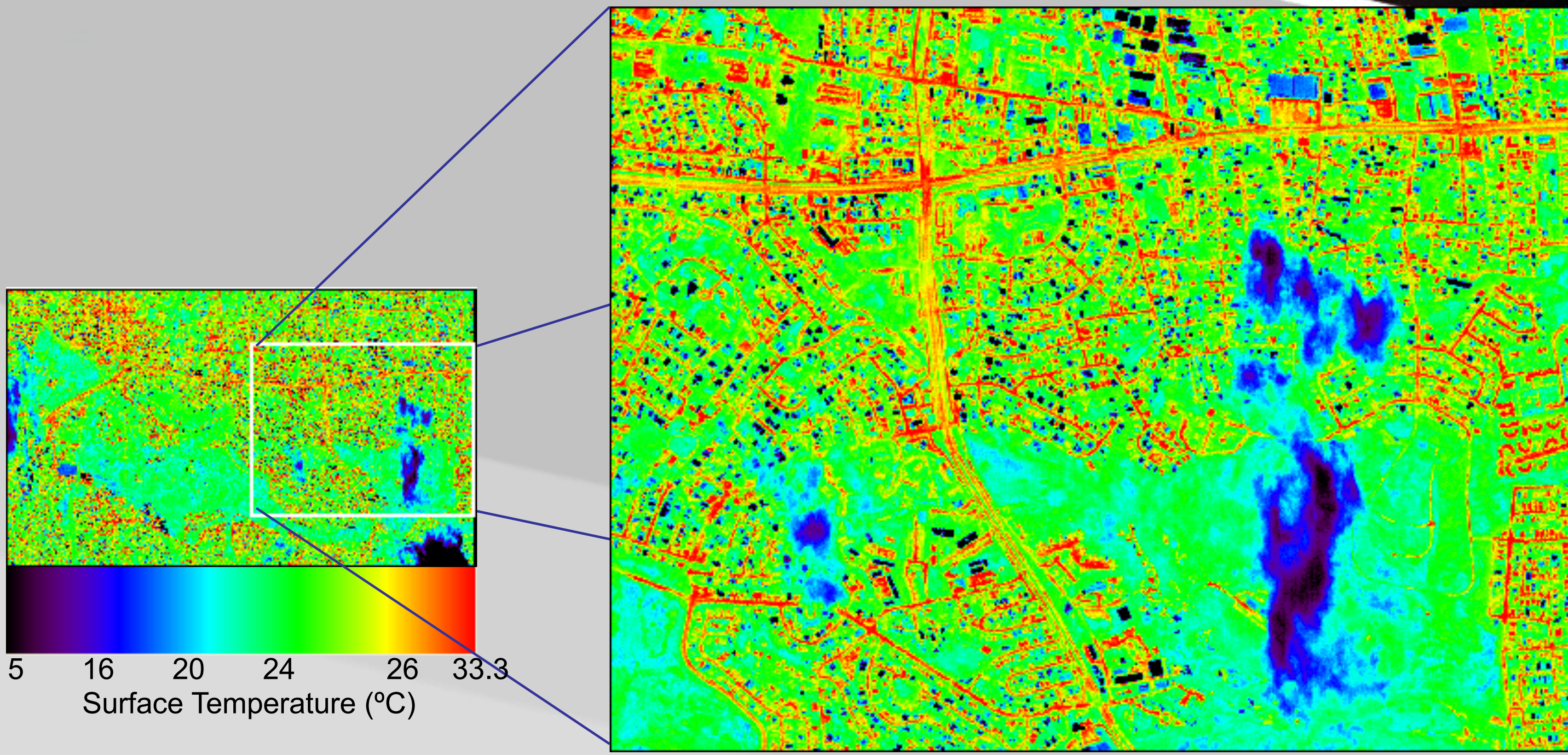
- Albedo Modification
  - Lighter colored roofs and pavements
  - New materials/coatings
- Plant trees and increase green space
  - Shade buildings, rooftops, parking lots and roads
  - Cool the air through transpiration
- Rooftop gardens
  - Keep roofs cool by shading and/or transpiration
  - storm water reduction

Surface Temperature Day: Flight 1 Line 23 Hato Rey



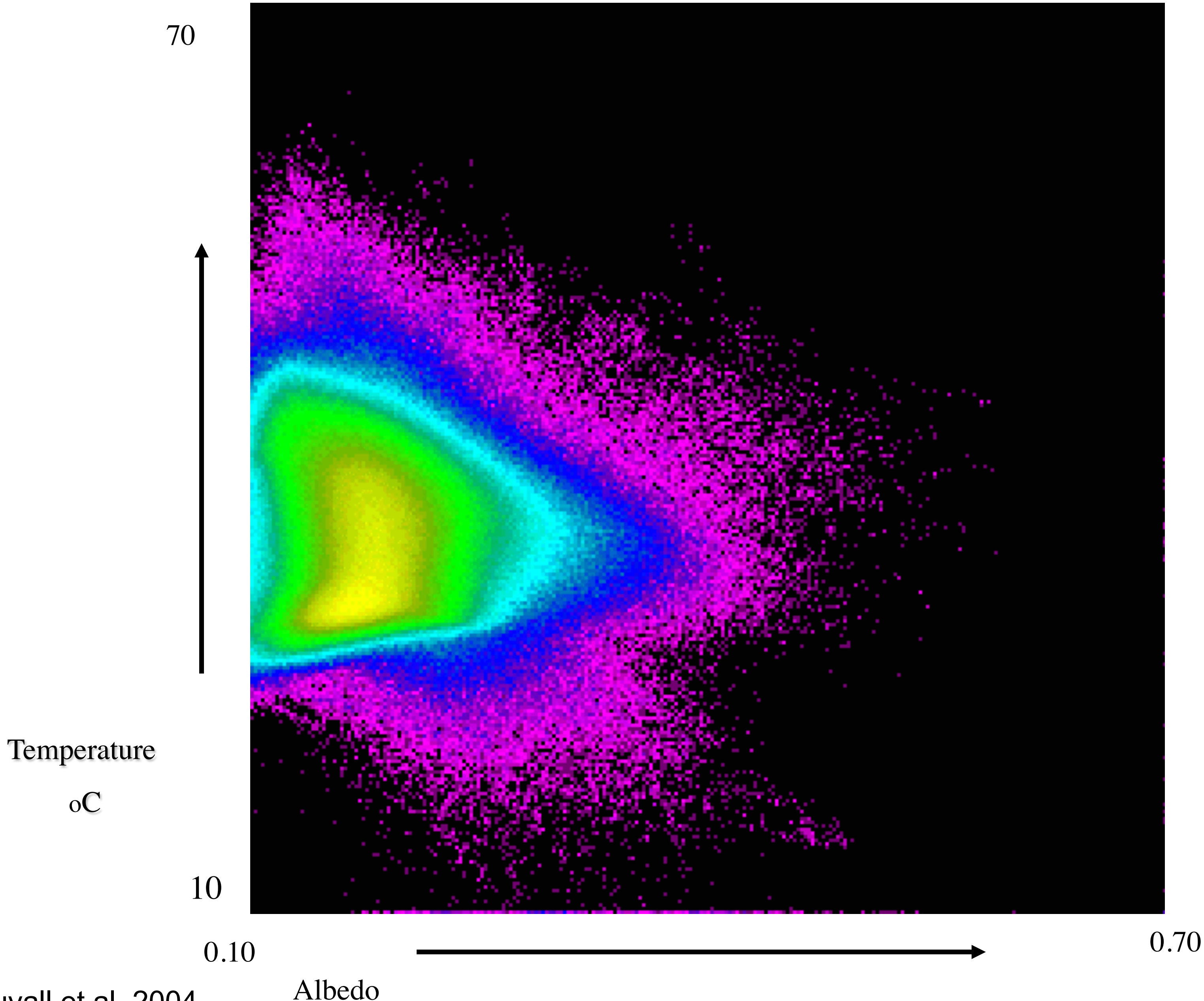
Luvall et al. 2004

Surface Temperature at Night: Flight 2 Line 23 Hato Rey



Luvall et al. 2004

San Juan Puerto Rico
Albedo vs Temperature



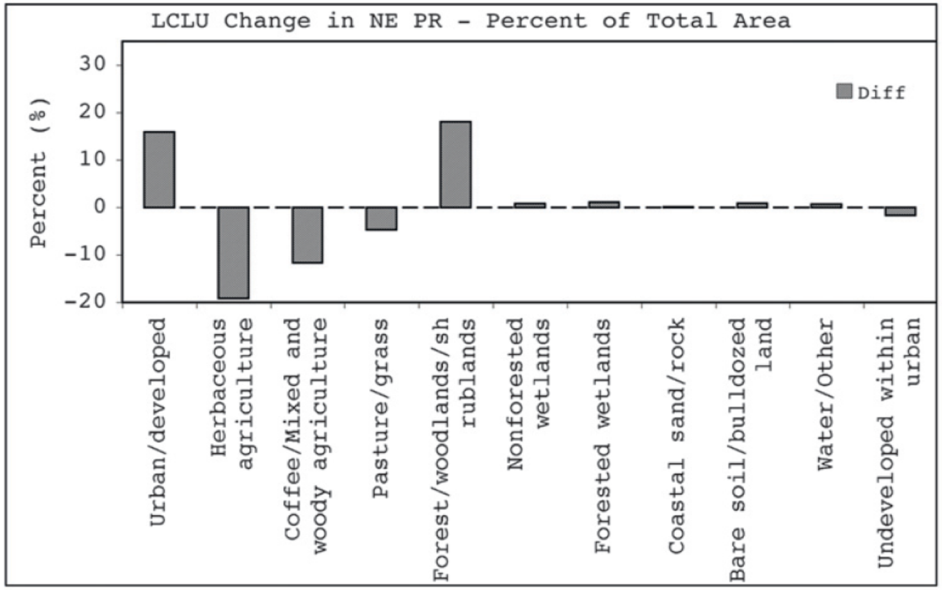
Luvall et al. 2004

Urban Factors Important in Dengue Risk for Colombo, Sri Lanka

Table 7. Descriptive statistics of dengue cases, environmental and socio-demographic characteristics compared across GND with incidence rate (IR) above and below the median IR

	Overall	High IR[%]	Low IR[%]	P-value
Characteristics of dengue cases				
Number of Cases (n)	5379	3096	2283	
Number of Dengue cases by years				**0.0342**
Year 2005	436	245 (7.9)	191 (8.4)	
year 2006	300	156 (5.0)	135 (5.9)	
Year 2007	261	167 (5.4)	102 (4.5)	
Year 2008	314	195 (6.3)	116 (5.1)	
Year 2009	812	479 (15.5)	322 (14.1)	
Year 2010	1269	700 (22.6)	578 (25.3)	
Year 2011	1987	1154 (37.3)	839 (36.8)	
Age (mean, SD)	13.7	14.9 (14.3)	12.1 (12.8)	
Age range (in years)	0.1-89	0.1 -89	0.1 -81	
Age Categories (n, %)				**<0.0001**
0-5	1688 (31.4)	884 (28.6)	804 (35.2)	
5.1 - 9	1222 (22.7)	687 (22.2)	535 (23.4)	
9.1 to 19	1168 (21.7)	643 (20.8)	525 (23.0)	
>19	1302 (24.2)	882 (28.5)	419 (18.4)	
Sex				0.6017
Males	2897 (53.9)	1658 (46.5)	1239 (45.7)	
Females	2482 (46.1)	1438 (53.6)	1044 (54.3)	
Environmental Characteristics				
Buildings (mean, SD)	0.47 (0.07)	0.48	0.45	0.1548
Vegetation	0.22 (0.09)	0.21 (0.09)	0.22(0.08)	0.7117
Roads	0.08 (0.04)	0.12 (0.07)	0.13 (0.05)	0.7304
Shadow	0.13 (0.06)	0.08 (0.04)	0.07 (0.04)	0.4616
Green Space	0.04 (0.04)	0.04 (0.05)	0.04 (0.03)	0.9504
Household Characteristics				
Brick Walls	0.4 (0.1)	0.64 (0.12)	0.54 (0.14)	**0.001**
Cement Walls	0.6 (0.1)	0.31 (0.13)	0.40 (0.13)	**0.0169**
Other wall materials	0.1 (0.1)	0.05 (0.07)	0.06 (0.7)	0.5195
Tile Roofs	0.4 (0.2)	0.36 (0.13)	0.36 (0.13)	**0.0244**
Asbestos Roof	0.5 (0.1)	0.52 (0.13)	0.55 (0.09)	0.3901
Other wall materials	0.1 (0.1)	0.04 (0.06)	0.08 (0.08)	0.0294
Population Characteristics				
Population density (per 1000 sq meters)	20 (12.7)	18 (13)	24 (11)	0.06
Housing density	4.2 (2.5)	347 (258)	494 (223)	**0.0277**

Meghan Tipre 2014 PhD, UAB



Northeastern Puerto Rico

Description	class	1951	2000	Diff
Background/water	0			
Urban/developed	30	1.92	17.81	15.89
Herbaceous agriculture	8	19.19	0.09	-19.10
Coffee/Mixed and woody agriculture	12	12.38	0.76	-11.62
Pasture/grass	27	33.73	28.99	-4.74
Forest/woodlands/shrublands	3	9.37	27.43	18.06
Nonforested wetlands	16	0.00	0.76	0.76
Forested wetlands	19	0.00	1.08	1.08
Coastal sand/rock	26	0.00	0.14	0.14
Bare soil/bulldozed land	29	0.00	0.91	0.91
Water/Other	1	0.23	0.93	0.70
Undeveloped within urban	7	1.71	0.00	-1.71

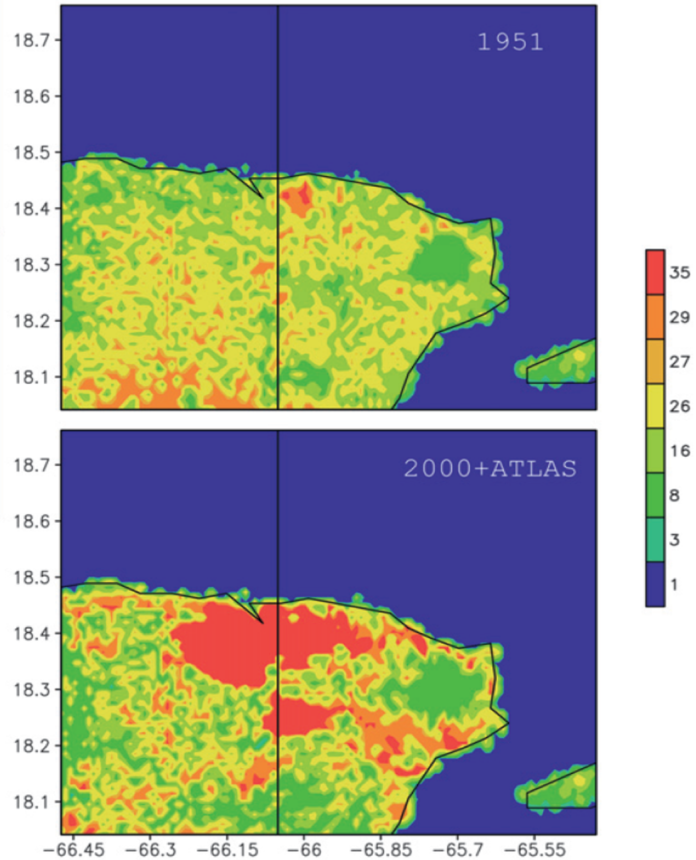


FIG. 3. (right) Map showing the LCLU specifications in northeastern Puerto Rico for (top) 1951 and (bottom) 2000; 2000 information is complemented with remote sensing data obtained from the ATLAS sensor. The thick solid vertical line represents the location of the north–south vertical cross section in Figs. 8 and 9. (left) (top) Histogram of historical LCLU changes in percent of total area covered from 1951 to 2000 and (bottom) description of the most relevant vegetation and land classes with percent change and conversion rates.

Comarazamy, Daniel E, Jorge E Gonz‡lez, Jeffrey C Luvall, Douglas L Rickman, and Robert D Bornstein. 2013. “Climate Impacts of Land-Cover and Land-Use Changes in Tropical Islands Under Conditions of Global Climate Change.”Journal of Climate 26 (5): 1535–50. doi:10.1175/JCLI-D-12-00087.

GeoHealth: A geospatial surveillance and response system resource for vector borne diseases in the Americas

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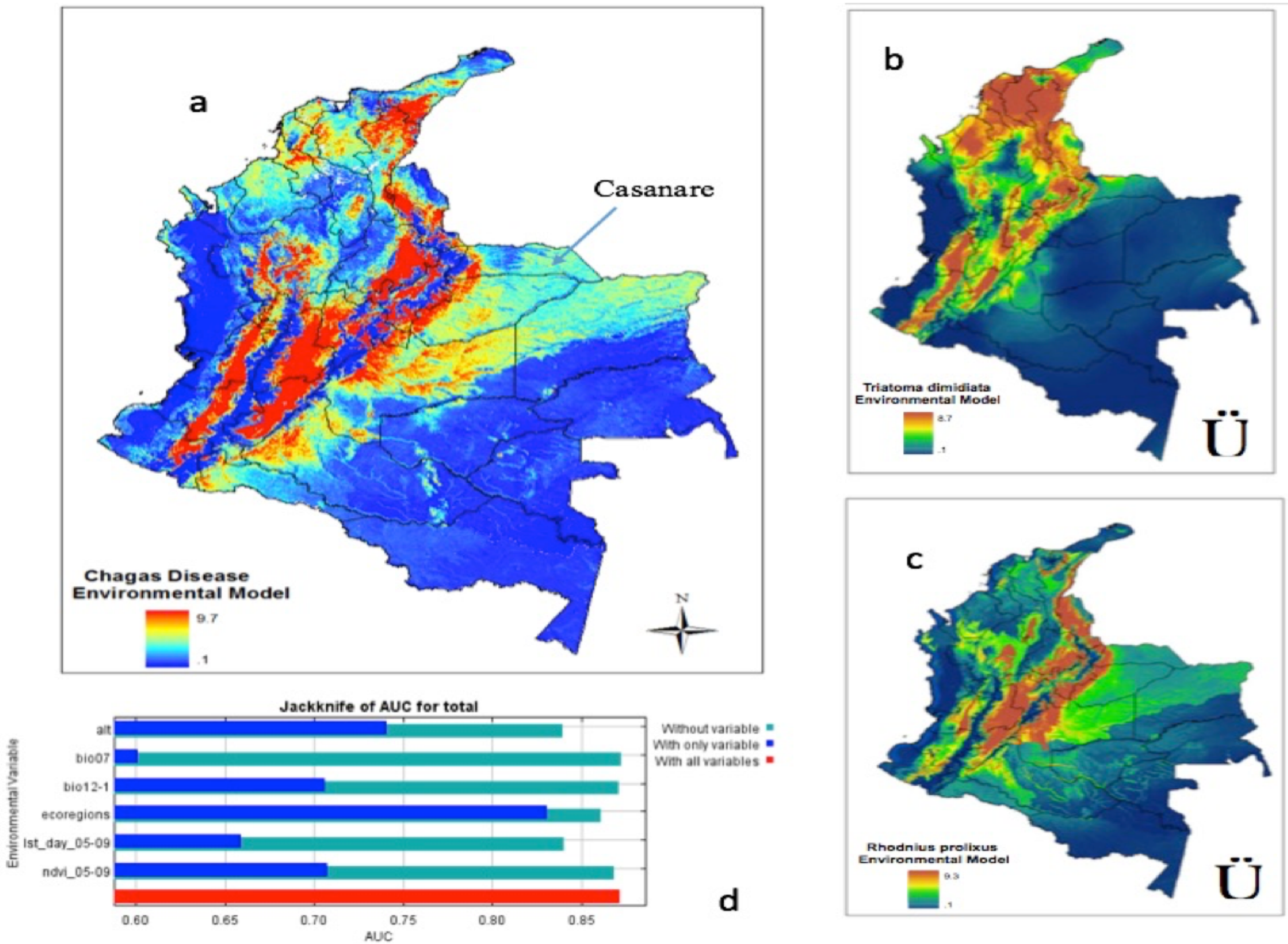

Figure 4. Maxent generated risk surfaces for Colombia generated from national scale data on Chagas disease (a) vector distribution (b, c). Note unique but overlapping geospatial ranges for Triatoma dimidiata and Rhodnius prolixus. Maxent generated Jackknife results (d) show the relative influence of the most significant environmental variables in producing probability map surfaces for Chagas disease.

Malone, J. B. 2005. Biology-based mapping of vector-borne parasites by Geographic Information Systems and Remote Sensing. Parassitologia 47:27–50.

pagepress

Geospatial Health

Health Applications in Geospatial Science

Università degli Studi di Napoli Federico II

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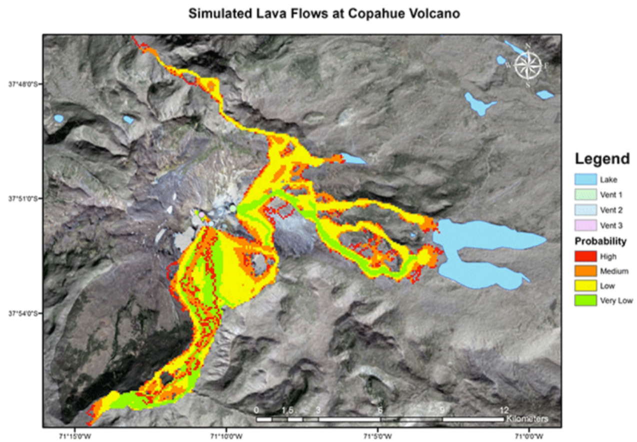
Geospatial Health is the official journal of the International Society of Geospatial Health (www.GnosisGIS.org).

The journal was founded in 2006 at the University of Naples Federico II by Giuseppe Cringoli, John B. Malone, Robert Bergquist and Laura Rinaldi. The focus of the journal is on all aspects of the application of geographical information systems, remote sensing, global positioning systems, spatial statistics and other geospatial tools in human and veterinary health. The journal publishes two issues per year.

Announcements

https://geospatialhealth.net/index.php/gh/index

Andes Mountains Disasters

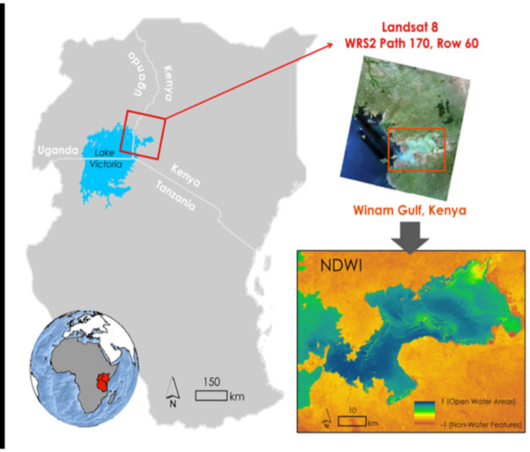


Utilizing NASA Earth Observations to Model Volcanic Hazard Risk Levels in Areas Surrounding the Copahue Volcano in the Andes Mountains

LOCATION

Marshall Space Flight Center

Lake Victoria Water Hyacinth



Spatio-Temporal Analysis of Lake Victoria Water Hyacinth and Algal Blooms Using NASA Earth Observations for Improved Water Management

LOCATION

NASA Marshall Space Flight Center

HyspIRI Application TM

Application Question	Application Concept	Application Measurement Goals	Applied Sciences Category	Potential Host Agency	Mission Data Product	Projected Mission Performance	ARL	Ancillary Measurements
How do we schedule water releases & determine availability for irrigation use?	The major pathway of water transport in the hydrologic cycle is evapotranspiration(ET). ET is difficult to measure directly for large areas and determination of ET relies on a combination of models and surface parameterizations. Accurate determination of surface temperatures is critical in model parameterizations.	Spatial variability of landscape elements necessaite fine spacial resolution measurements ~ 60m. Repeat measurements of approximately 5 days are required to constrain ET models.	Water Management Agriculture	Western Governors Association 1600 Broadway Suite 1700 Denver, CO 80202 303 623-9378 Sebal North America 1772 Picasso Avenue Suite E Davis, California Phone: (530) 757 9200	Surface temperature	Measure surface temperature within 0.5 K , 60 m resolution and 5 day repeat cycle.	9	SEBAL, other ET models, agricultural crop indentification/management info, stream flow, ppt, soils
productivity of the intercoastal waters & barrier islands, e.g. Monitoring Gulf Mexico - spawning cycles, migration, land-use, productivity.	Characterize the physical, chemical, and biological status of coastal and estuarine environments and ecosystems.	fine spacial resolution measurements ~ 60m. Repeat measurements of approximately 5 days are required for enviromental measurements. 19 days for hyperspectral vegetation mapping/physological status.	Ecological Forcasting	national Seashore Maththew Johnson, matthew_w_johnson@nps.gov (228) 230 4139.	Hyperspectral radiance measurements & surface temperatures	within 0.5 K , 60 m resolution and 5 day repeat cycle. Provide hyperspectral radiance measurements at 60 m resolution on a 19 day repeat cycle.	6	Ecosystem structural & functional measurments, hydrolab water chemistry measurements,
How does surface water temperature affect manatee migration	Characterize patterns and trends in fine spacial scale river, estuarine, and near coastal water temperatures.	30-60m spatial resolution, 3-5 day thermal measurements (0.5K). At least 1 nightime measurement within the 3-5 dya window.	Ecological Forcasting	Dauphin Island Sea Lab Ruth Carmichael rcarmichael@disl.org. (251) 861 7555	Surface temperature	Measure surface temperature within 0.5 K , 60 m resolution and 5 day repeat cycle	6	Bouy temperatures
What are the abiotic environmental factors are important in determining the distribution of disease-causing vectors and their life-cycles?	Research!America's global health program advocates for funding and policies that spur research to develop vitally important global health technologies.	Spatial variability of landscape elements necessaite fine spacial resolution measurements ~ 60m. Repeat measurements of approximately 5 days are required for enviromental measurements. 19 days for hyperspectral vegetation mapping/physological status	Public Health	Alexandra FrankAlexandra Frank Senior Program Manager, Global Health R&D Advocacy Research!America 703-739-2577 (main) 571-482-2707 (direct)	Hyperspectral radiance measurements & surface temperatures	Measure surface temperature within 0.5 K , 60 m resolution and 5 day repeat cycle. Provide hyperspectral radiance measurements at 60 m resolution on a 19 day repeat cycle.	6	Assimilations driven by observational data LDAS and satellite-derived meteorological forcing data, parameter datasets, and assimilation observations, including:Precipitation from TRMM, and GPM Land Cover Type from HyspIRI Soil Moisture from AMSR-E (where applicable), SMAP and HyspIRI. Terrestrial Water Storage from GRACE and GRACE II. Surface temperature, Vegetation Fraction/ Leaf Area Index, and canopy physiology from HyspIRI. Topography from SRTM. Epidemiological surveys of targed diseases. Vector population sampling & testing for disease organism.

Mission Applications Value

The Earth Observer | March - April 2007 | Volume 19, Issue 2

Earth Science Highlights from Fall AGU Meeting

Charlotte Griner, NASA Goddard Space Flight Center, clgriner@earthlink.net
Alan Ward, NASA Goddard Space Flight Center, award@sesda2.com

Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors

Co-convenors: *Dale A. Quattrochi; Jeffrey C. Luvall [NASA Marshall Space Flight Center (MSFC)]; Simon J. Hook [Jet Propulsion Laboratory]; Martha Anderson [U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) Hydrology and Remote Sensing Laboratory]*