

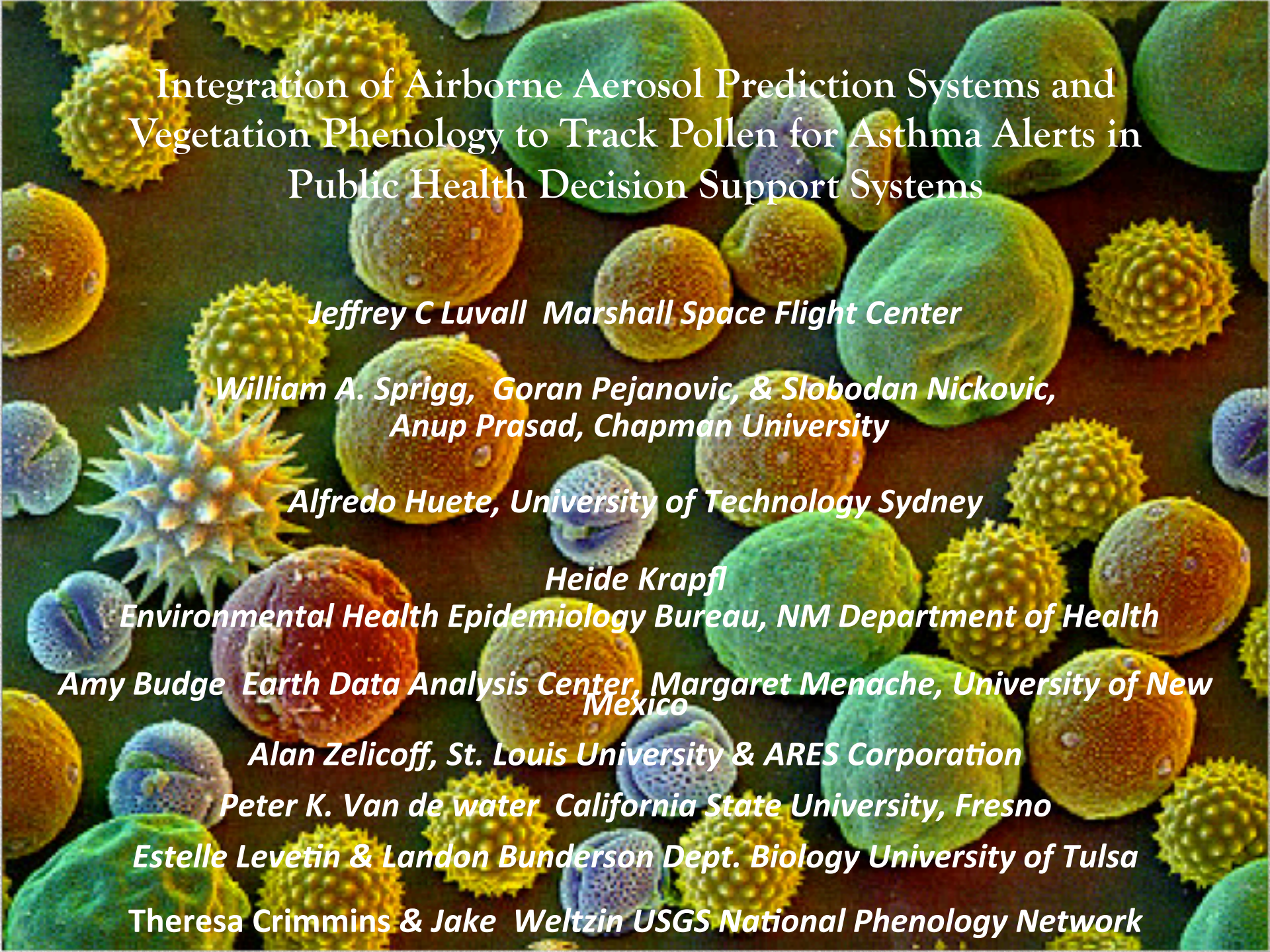
2012 HYSPIRI PRODUCTS SYMPOSIUM

POLLEN ECOLOGY/PHENOLOGY

VQ5. Ecosystem and Human Health

Jeff Luvall
Marshall Space Flight Center





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, Goran Pejanovic, & Slobodan Nickovic,
Anup Prasad, Chapman University***

Alfredo Huete, University of Technology Sydney

Heide Krapfl

Environmental Health Epidemiology Bureau, NM Department of Health

Amy Budge Earth Data Analysis Center, Margaret Menache, University of New Mexico

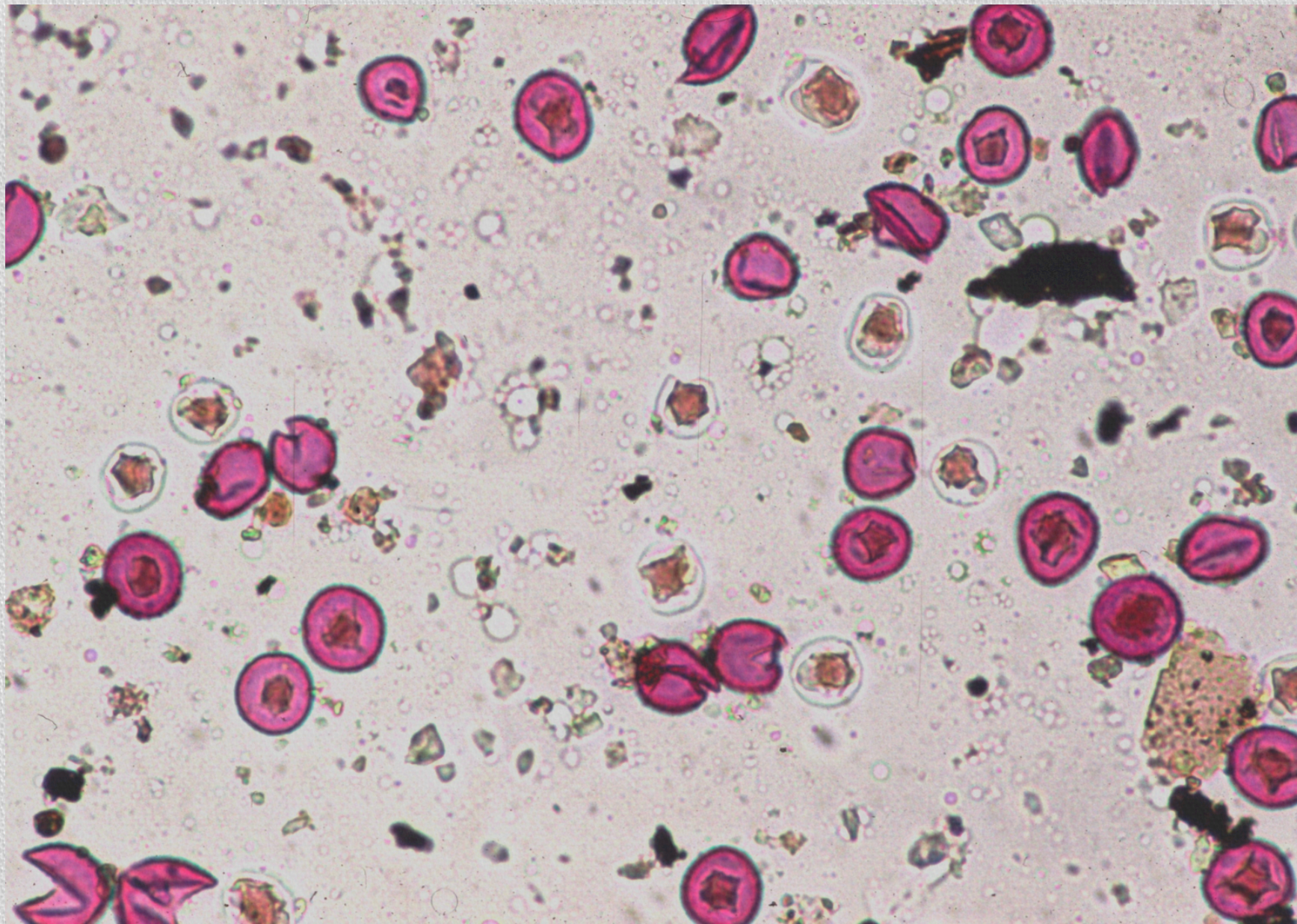
Alan Zelicoff, St. Louis University & ARES Corporation

Peter K. Van de water California State University, Fresno

Estelle Levetin & Landon Bunderson Dept. Biology University of Tulsa

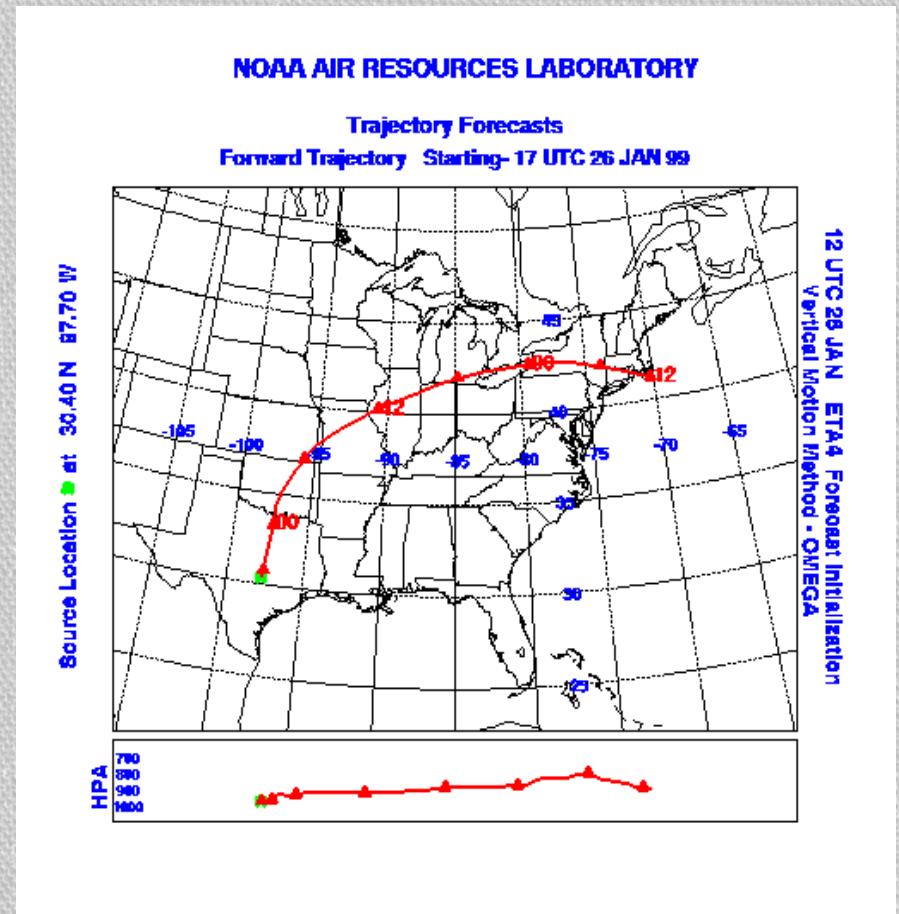
Theresa Crimmins & Jake Weltzin USGS National Phenology Network





Continental Transport

- Our Jan 26, 1999 our forecast indicated that the “pollen has the potential to travel very long distances.”
- 27 Jan 99, Jim Anderson in London, Ontario reported atmospheric *Juniperus* pollen - 58 pollen grains/m³
- Trajectories show that the source of this pollen was Texas population of *Juniperus ashei*



Red Cedar Encroachment

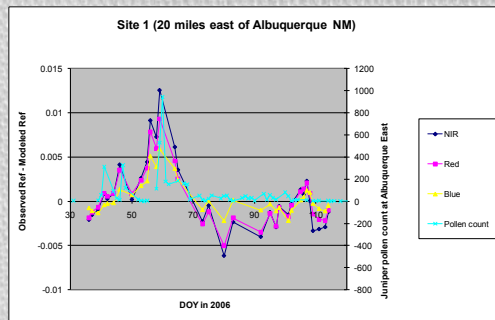
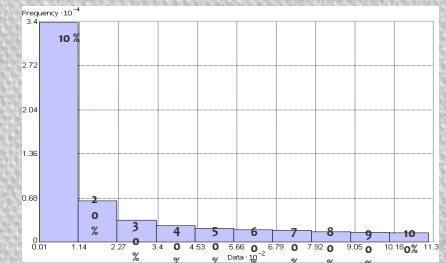
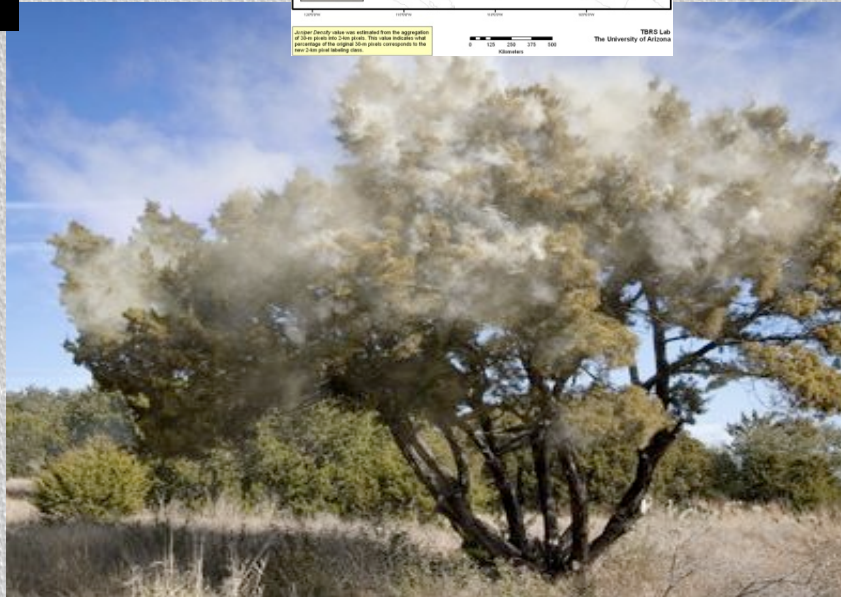
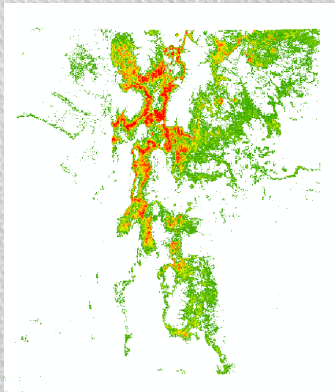
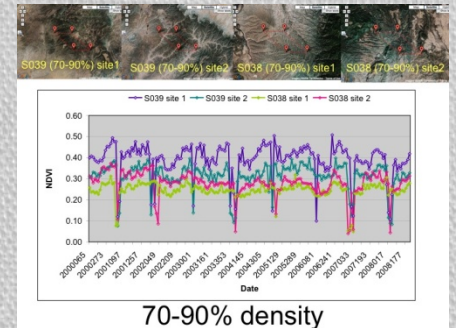
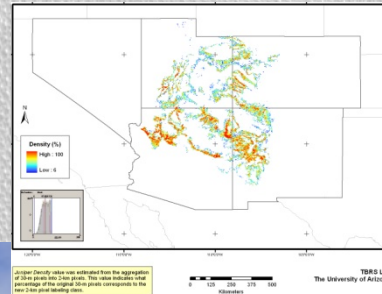
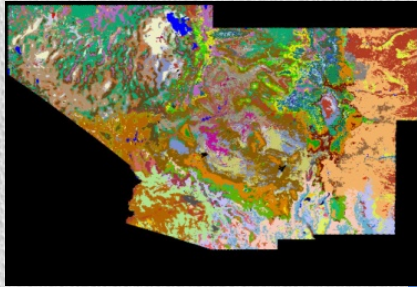
- Oklahoma has 17 million acres of prairie, shrub land, cross timbers forests and other forests
- 1950: 1.5 million acres with cedar problems
- 1985: 3.5 million acres with cedar problems
- 1994: 6.3 million acres with 50 trees/acre and 2.5 million acres with 250 trees/acre - 37% loss of native ecosystems
- 2001: 8.0 million acres with 50 trees/acre and 5.0 million acres with 250 trees/acre - this represented a 47% loss of native ecosystems
- 2013 projection: 12.6 million acres with 50 trees/acre and 8.00 million with 250 trees/acre

Air Sampling

- 6 Burkard samplers
- *Juniperus ashei*: OK and TX
- Nov 2009 to Jan 2010
- *J. monosperma* and *J. scopulorum*: New Mexico –
Feb to May 2010
- *J. pinchotii*: West Texas (&
SW OK) Aug to Nov 2010
- *J. ashei*: TX & OK – Dec
2010 to Feb 2011
- *J. monosperma* and *J. scopulorum*: New Mexico –
Feb

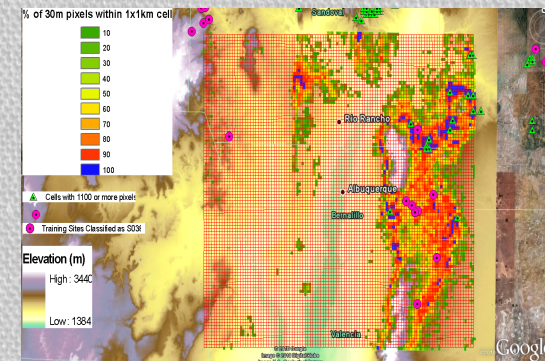


Report on Mapping /Phenology of Pollen Sources (Juniper)



Guillermo Ponce
Alfredo Huete
Zhangyan Jiang
Ramon Solano
*University of Arizona

EDAC, Albuquerque, NM, February 20-21, 2011

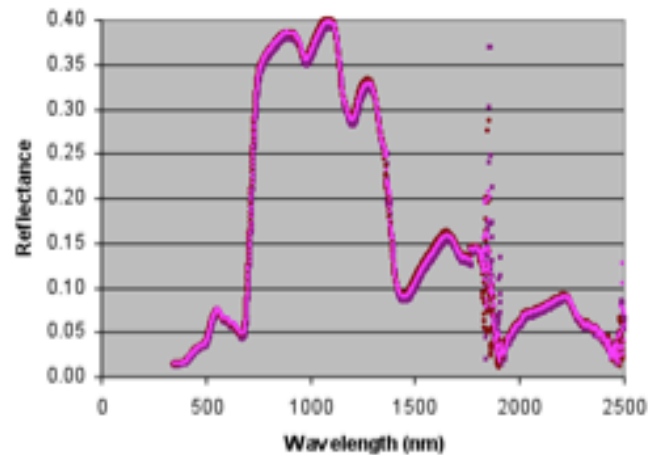


Spectral characteristics of male juniper canopies at different bud density levels

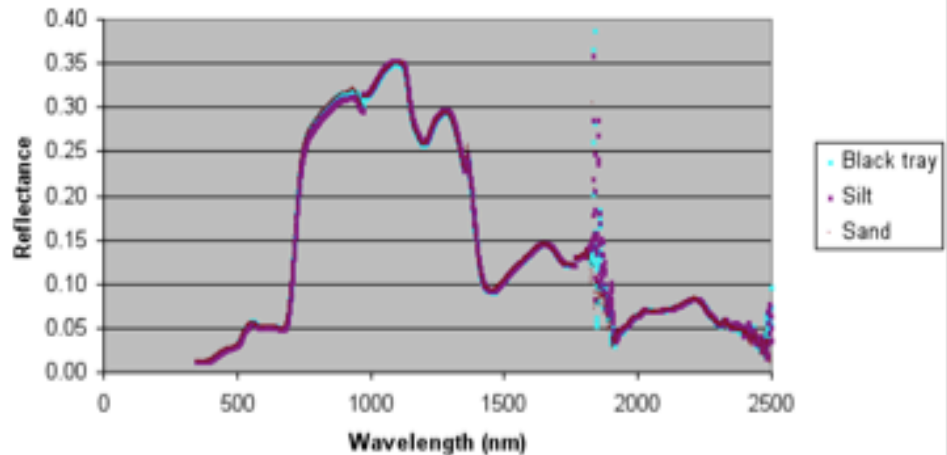


Spectral characteristics of male juniper canopies at different bud density levels

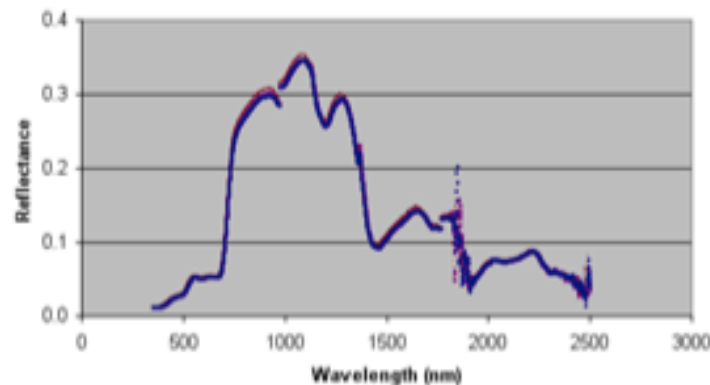
Juniper bud density=10 (Green)



Juniper bud density=4

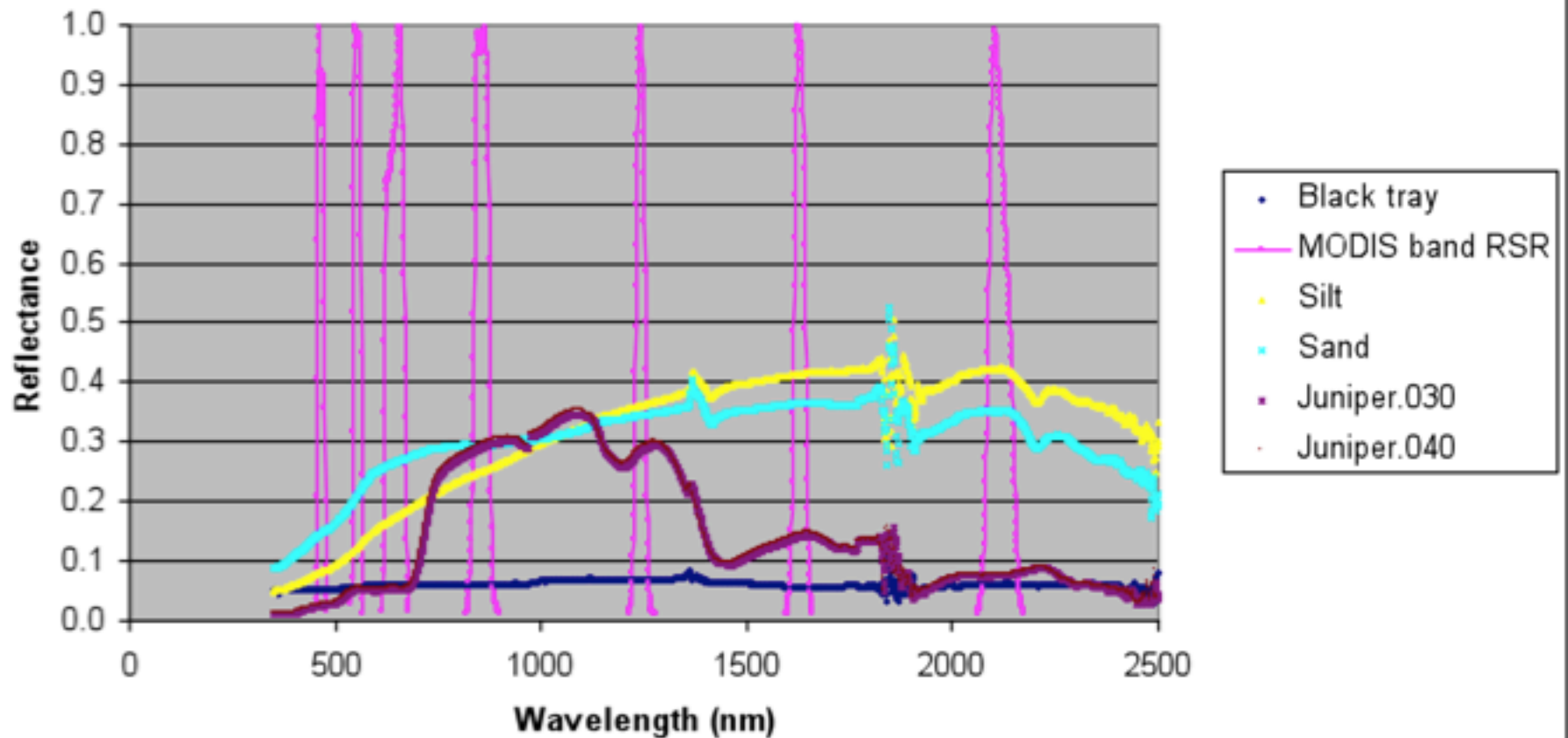


Juniper bud density=1

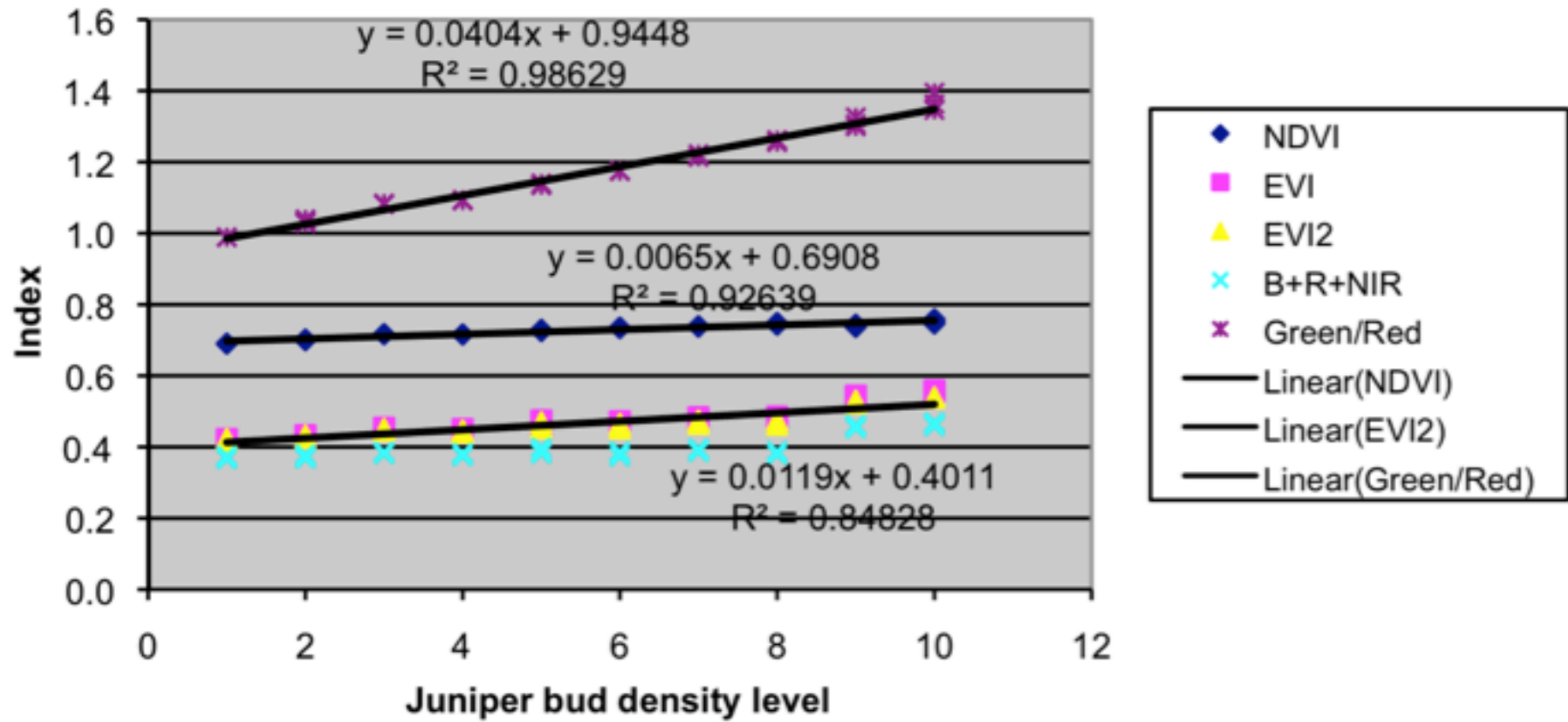


Density level	Bud density (g/m ²)
1	204.2
2	190.0
3	176.9
4	164.9
5	151.1
6	136.2
7	115.8
8	92.9
9	45.9
10	0.0

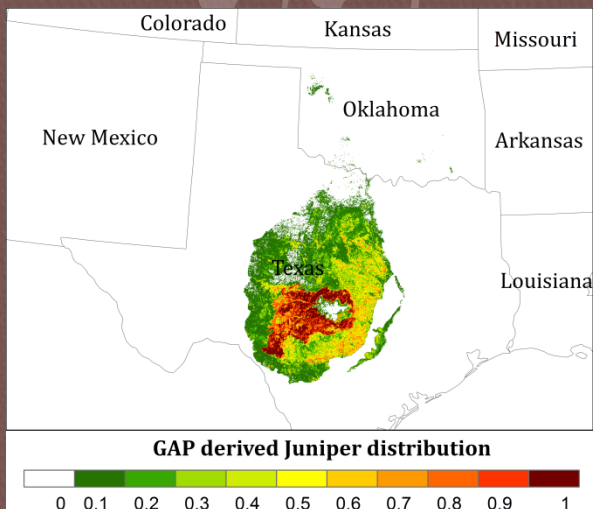
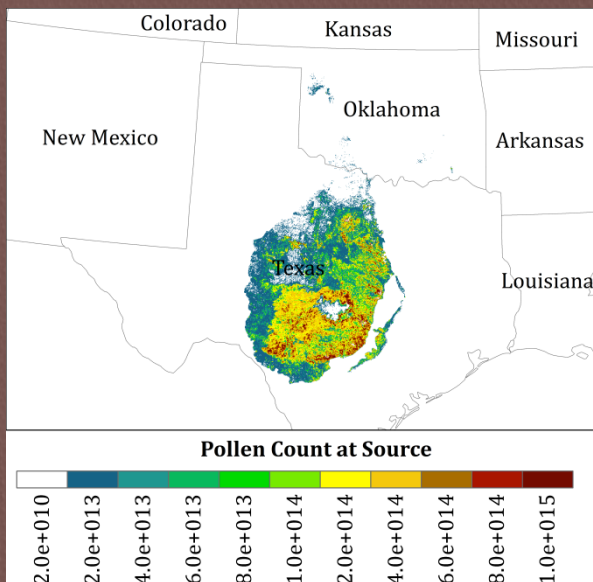
Convolve to the hyperspectral data to MODIS sensor broad bandpasses



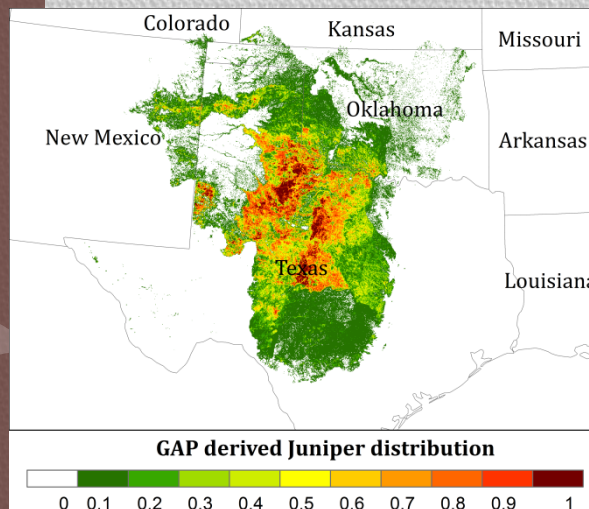
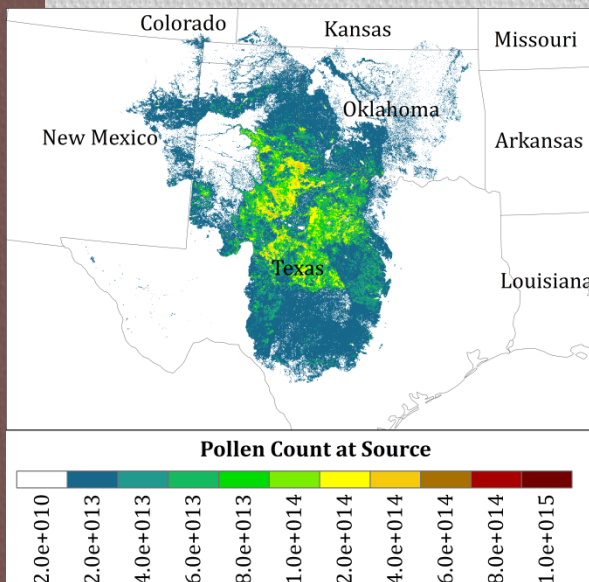
Relationships between spectral indices and juniper bud density levels



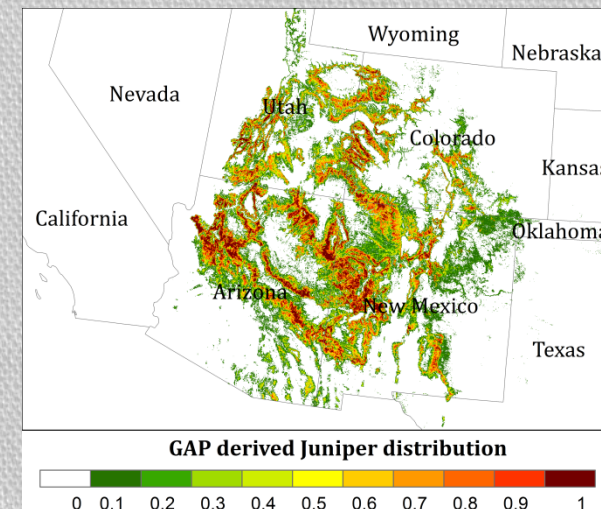
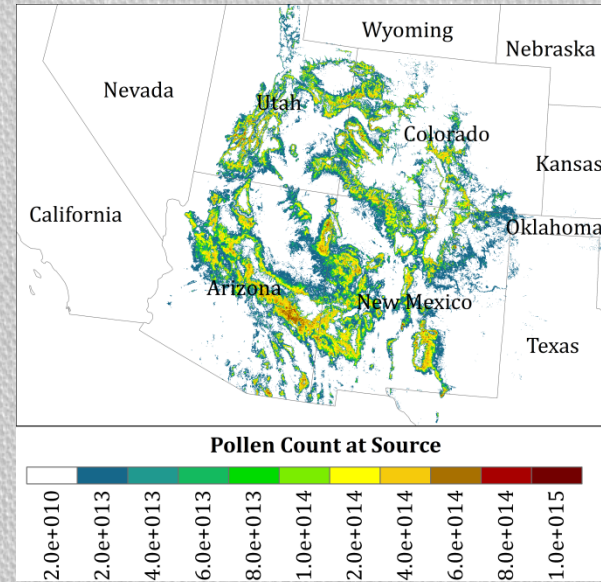
Juniper Ashei



Juniper Pinchotii



Juniper Monosperma & Scopulorum



Spatial resolution: ~1 km (990 m)



A new data resource—a national network of integrated phenological observations across space and time

Key Goal

Understand how plants, animals and landscapes respond to environmental variation and climate change



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!



Featured Projects



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?](#)
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- [Interested in creating a partnership?](#)
- [An educator?](#)
- [Interested in finding data to use?](#)
- [A media outlet?](#)

Land-surface Phenology Program



- Scaling of in-situ observations
- Validation of remote imagery
- Development of standards
- Information & data clearinghouse
- Research directions and priorities

