

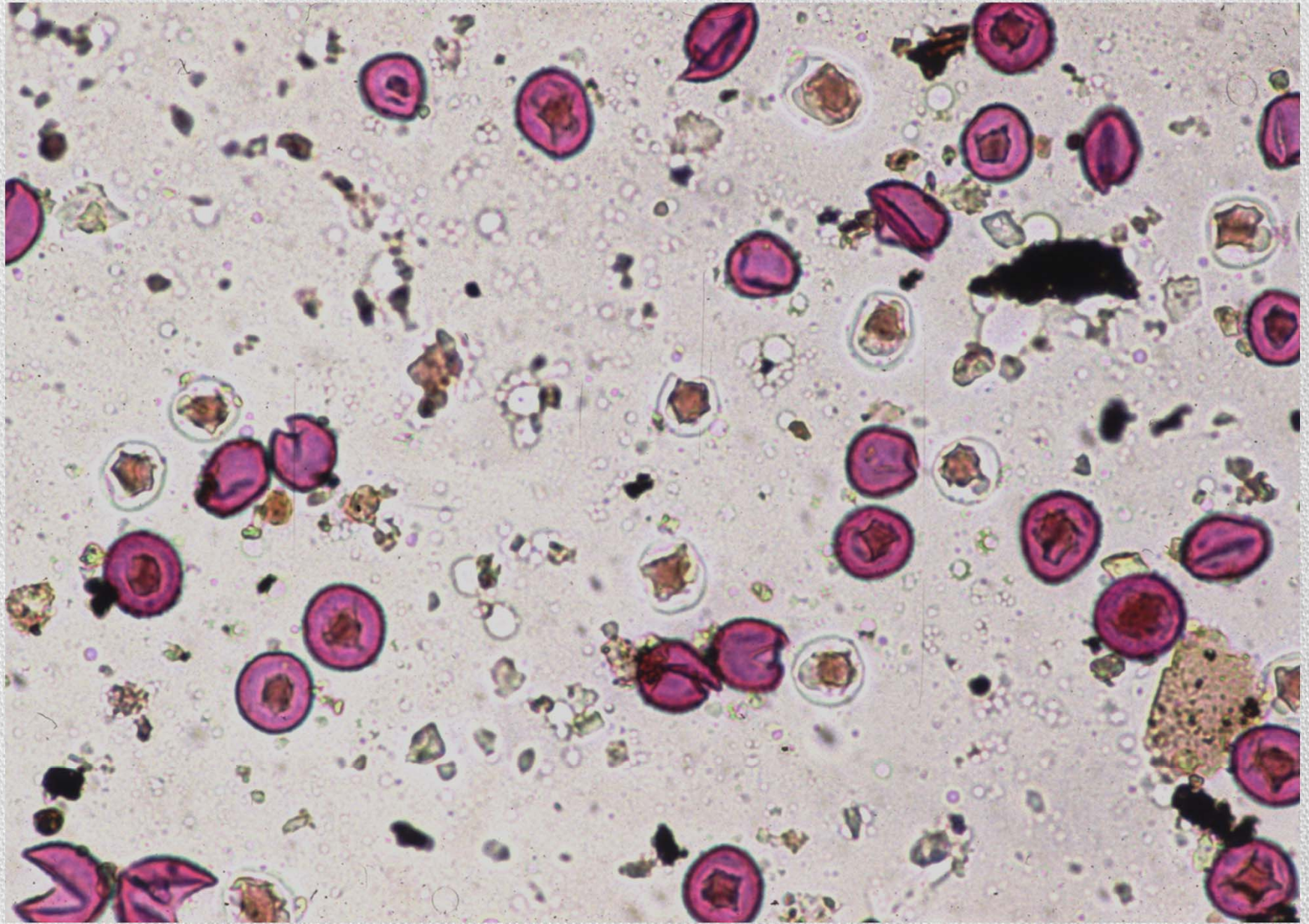
2012 HYSPIRI PRODUCTS SYMPOSIUM POLLEN ECOLOGY/PHENOLOGY

VQ5. Ecosystem and Human Health

Jeff Luvall
Marshall Space Flight Center

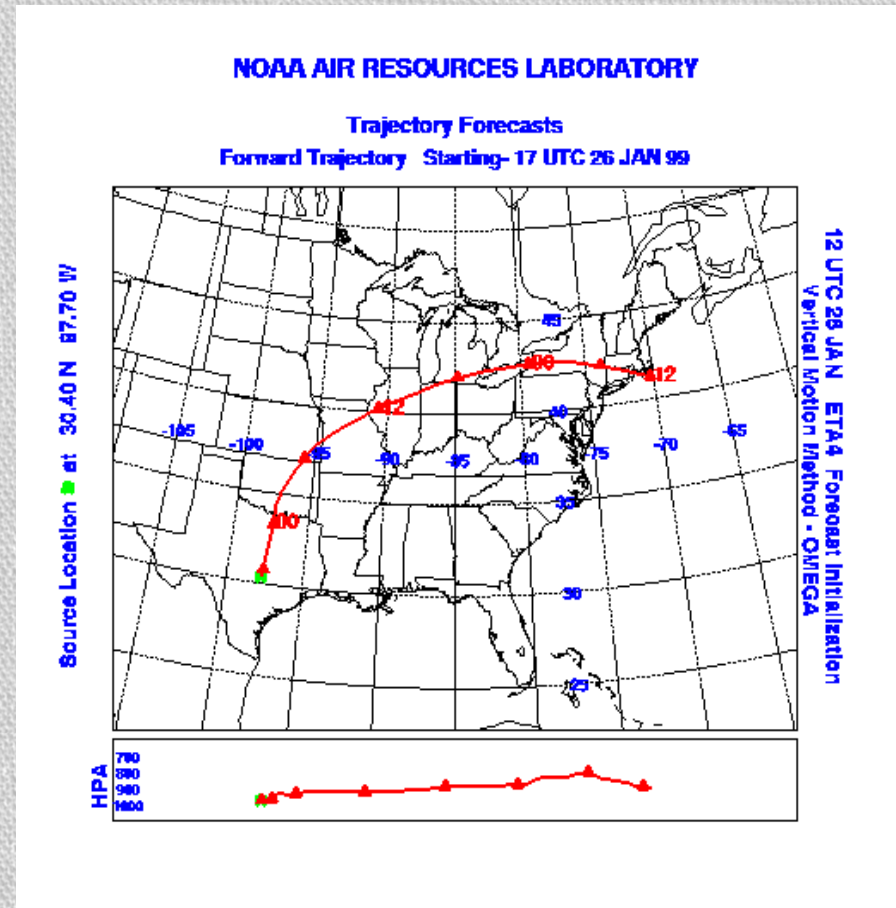






Continental Transport

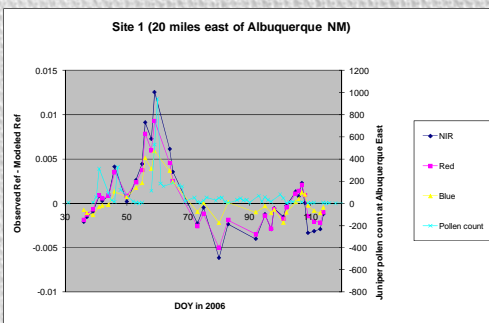
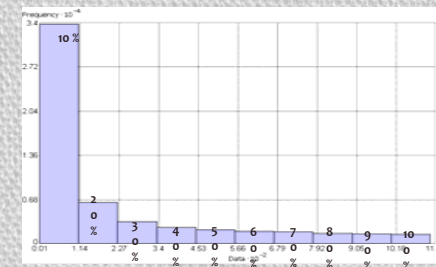
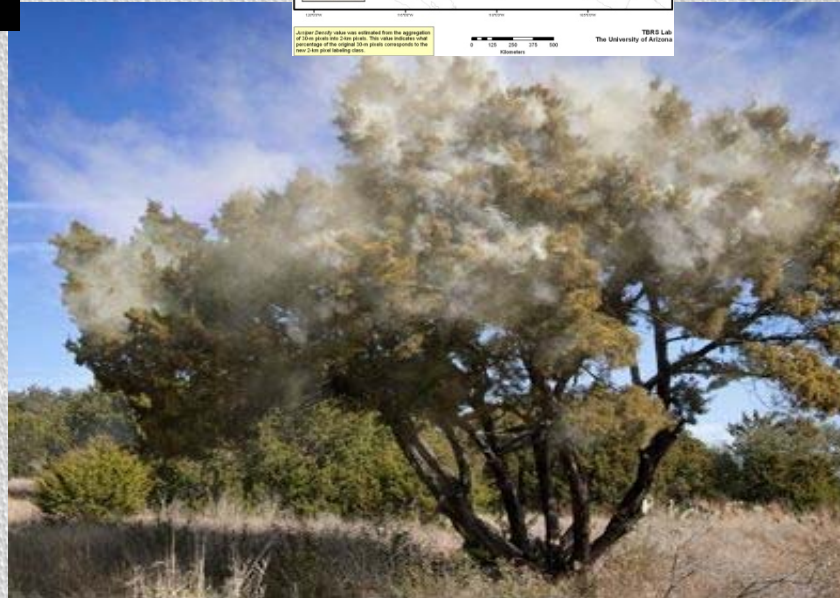
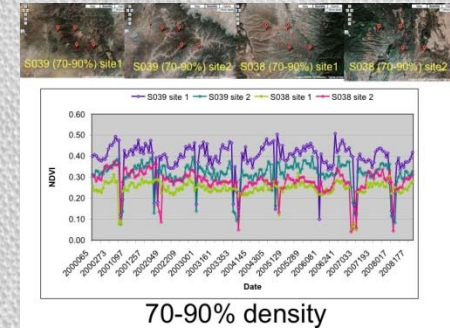
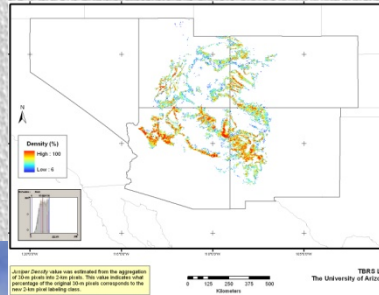
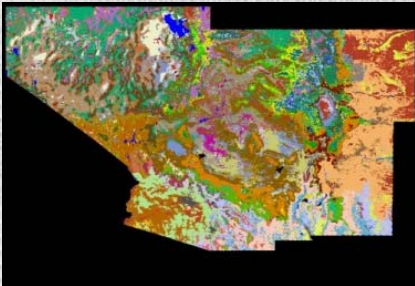
- Our Jan 26, 1999 forecast indicated that the “pollen has the potential to travel very long distances.”
- 27 Jan 99, Jim Anderson in London, Ontario reported atmospheric *Juniperus* pollen - 58 pollen grains/m³
- Trajectories show that the source of this pollen was Texas population of *Juniperus ashei*



Red Cedar Encroachment

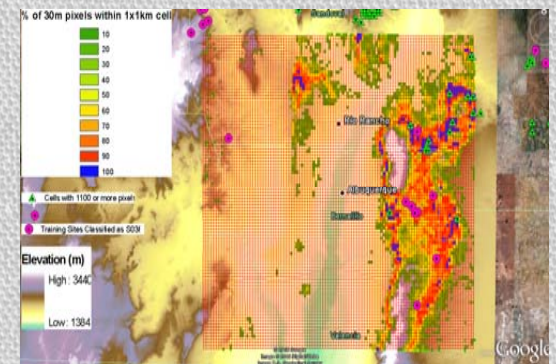
- Oklahoma has 17 million acres of prairie, shrub land, cross timbers forests and other forests
- 1950: 1.5 million acres with cedar problems
- 1985: 3.5 million acres with cedar problems
- 1994: 6.3 million acres with 50 trees/acre and 2.5 million acres with 250 trees/acre - 37% loss of native ecosystems
- 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

Report on Mapping /Phenology of Pollen Sources (Juniper)



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

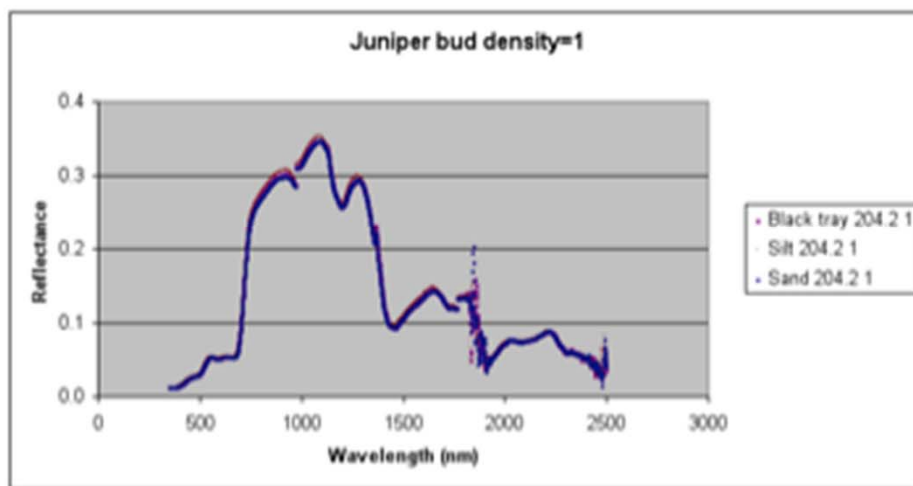
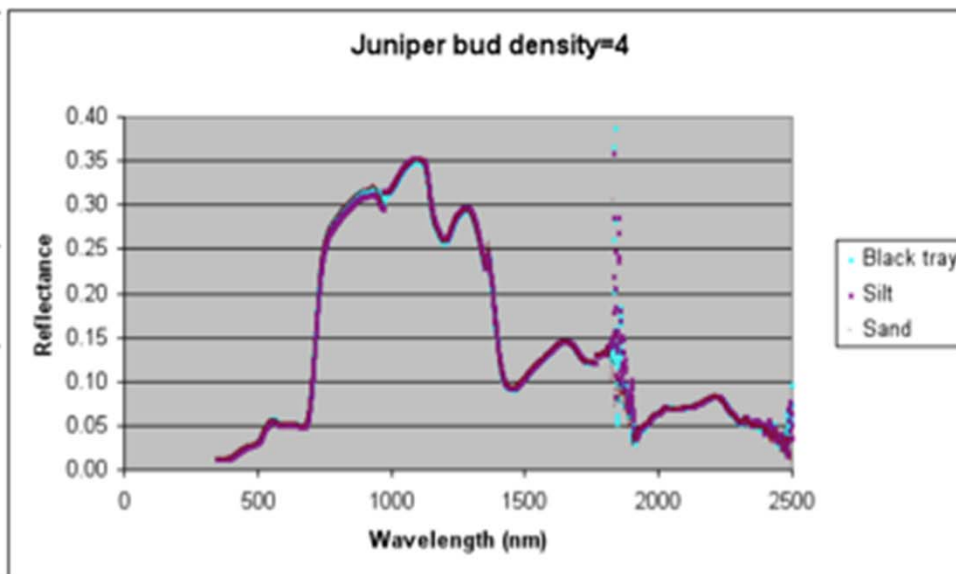
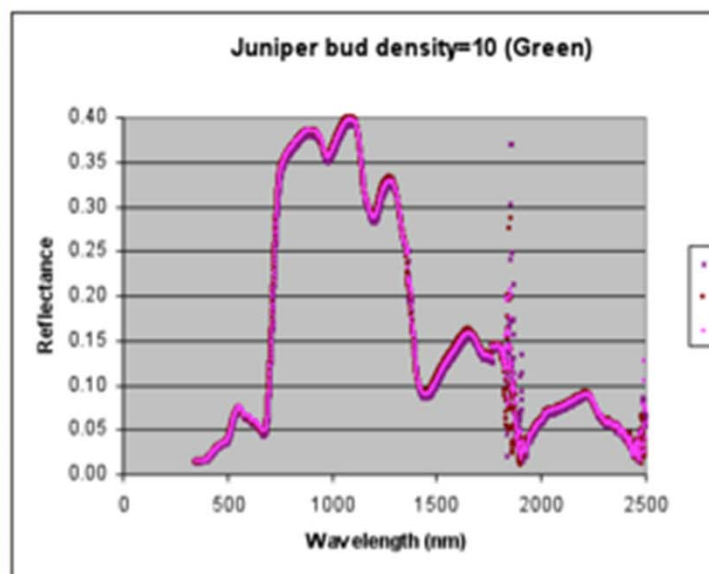
EDAC, Albuquerque, NM, February 20-21, 2011



Spectral characteristics of male juniper canopies at different bud density levels

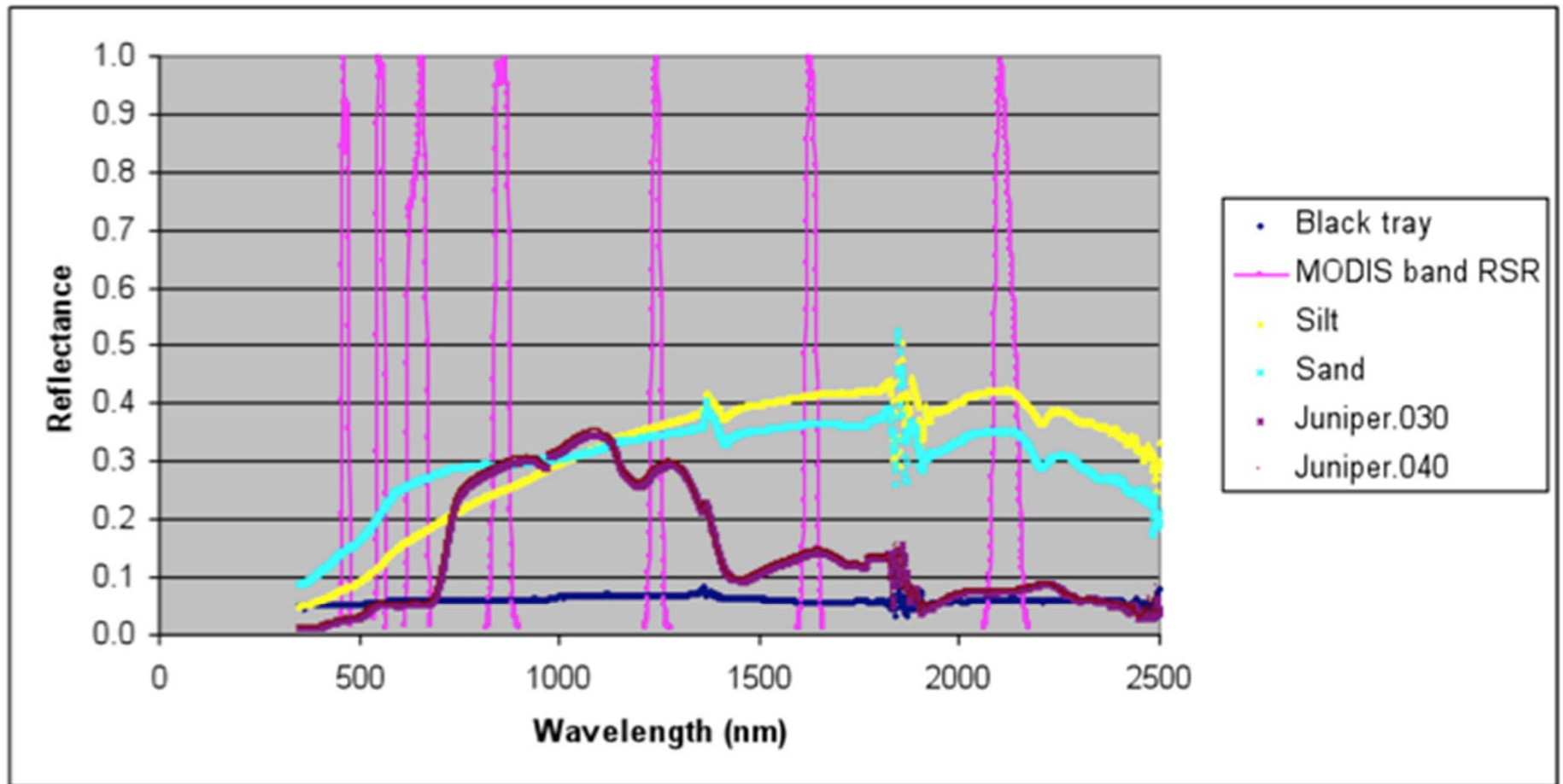


Spectral characteristics of male juniper canopies at different bud density levels

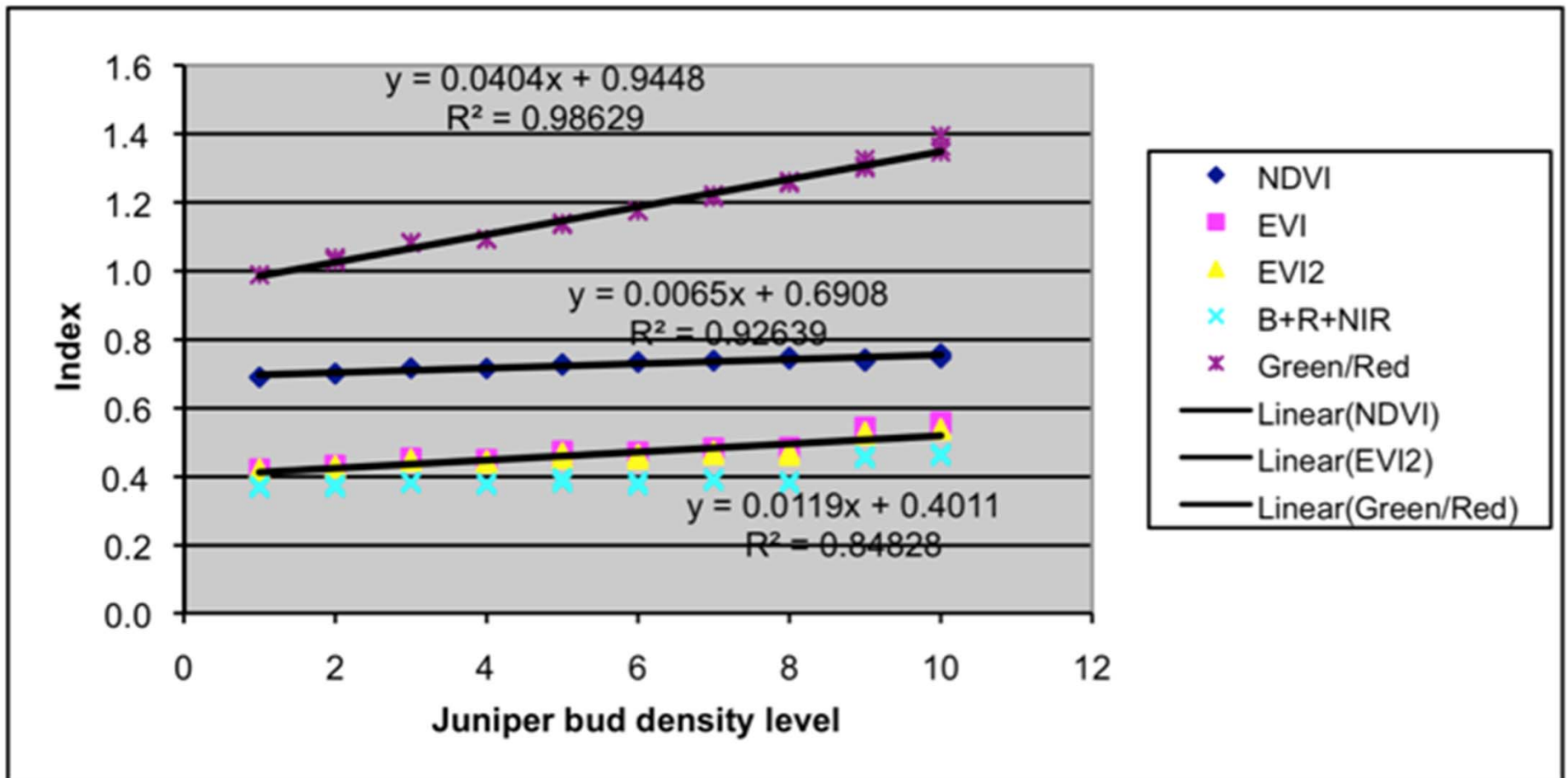


Density level	Bud density (g/m ²)
1	204.2
2	190.0
3	176.9
4	164.9
5	151.1
6	136.2
7	115.8
8	92.9
9	45.9
10	0.0

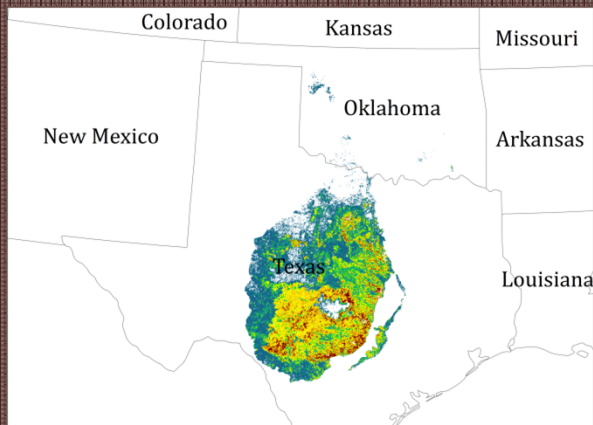
Convolve to the hyperspectral data to MODIS sensor broad bandpasses



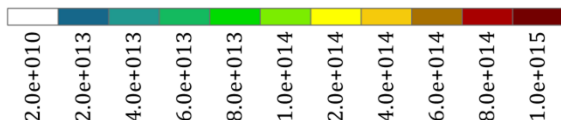
Relationships between spectral indices and juniper bud density levels



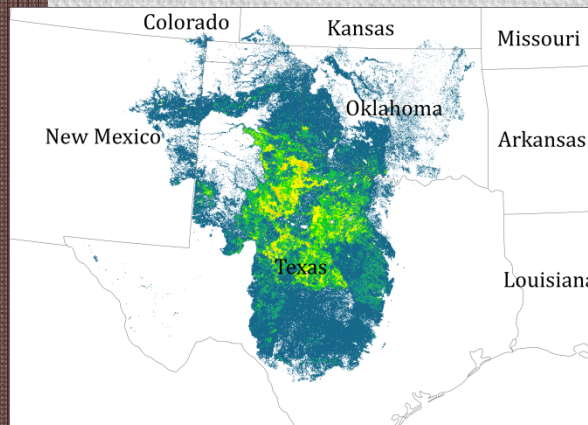
Juniper Ashei



Pollen Count at Source



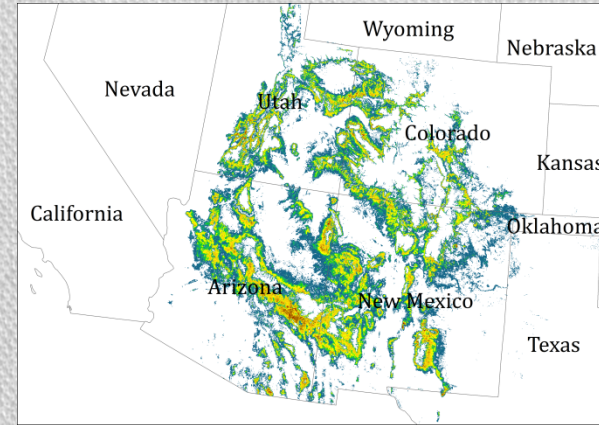
Juniper Pinchotii



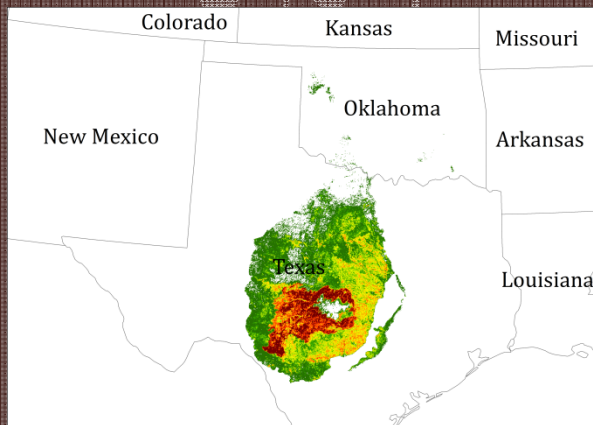
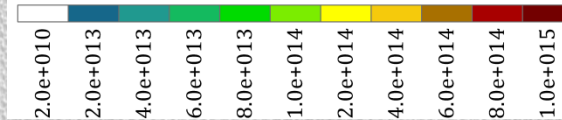
Pollen Count at Source



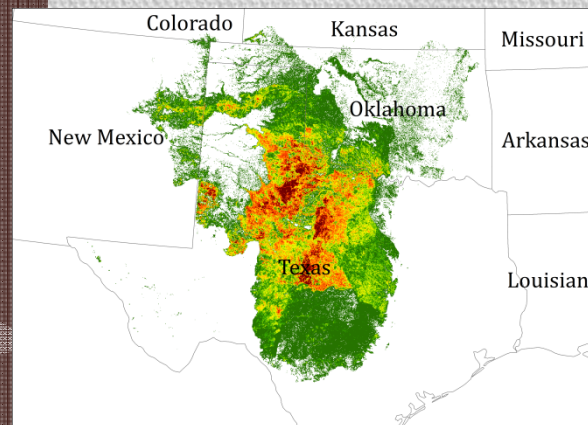
Juniper Monosperma & Scopulorum



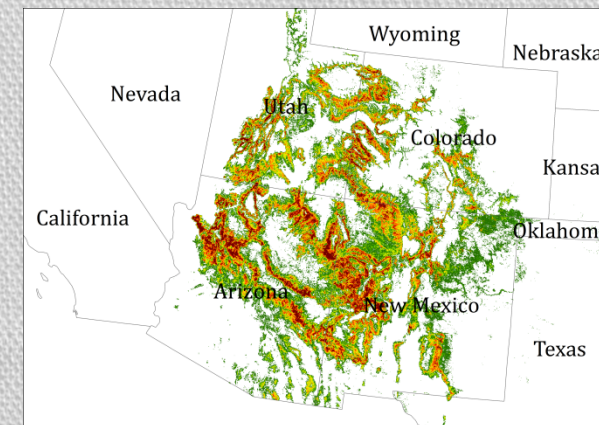
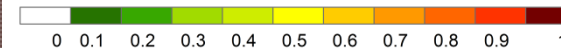
Pollen Count at Source



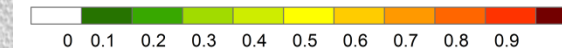
GAP derived Juniper distribution



GAP derived Juniper distribution



GAP derived Juniper distribution



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

USA National Phenology Network



Photo credits

What is the USA-NPN?

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.



What is phenology?

Phenology is the study of the timing of recurring plant and animal life cycle events, or **phenophases**, such as leafing and flowering of plants, maturation of agricultural crops, 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

Join us!

We are looking for volunteers to help us monitor some 200 plant species found across the United States. This effort will eventually expand to include animals and physical phenomena, such as bird migrations and ice out on ponds. Please explore our website to learn more about USA-NPN. Better yet, click "Observe" to join us!



Announcements

Coming soon! The NPN Wildlife Phenology Program

Co-Founder of NPN
Receives Top Honor

Shenandoah National Park
Phenology Project

New! The USGS National
Climate Change & Wildlife
Science Center

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Phenology in the News

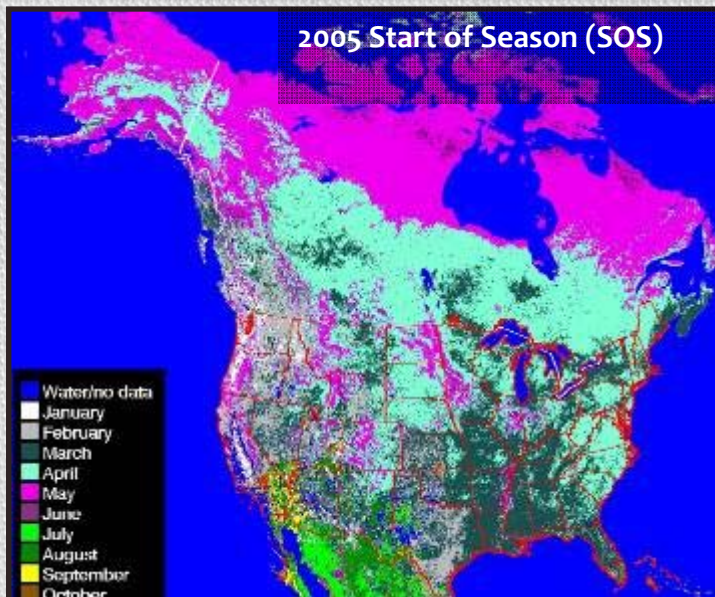
[phenology - Google News](#)

[Citizen scientists' notes document affects of climate change - Kansas City Star 2009-02-08, 2:15:11](#)

[Feds seeking endangered](#)

www.usanpn.org

Land-surface Phenology Program



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