



# **“Earth Grant”**

## **An Emerging Geospatial Partnership in Arizona?**

**Geospatial Panel:  
“Working Together with Space Grant”**

**Western Regional Space Grant Consortium  
Meeting**

**Rapid City, South Dakota  
September 27, 2003**



Arizona Remote  
Sensing Center



**Barron J. Orr**

**Arizona Geospatial Extension Specialist**

**Associate Director  
UA/NASA Space Grant Program**

**Tucson, Arizona**



THE UNIVERSITY OF ARIZONA,  
Cooperative Extension

*Taking the University to the People*



# How Does This Program Address the Space Grant Mission?

National Space Grant College  
and Fellowship Program



# GPS Would Have Saved Him...



<<<<<< not a GPS receiver

<<<<<< not a GPS receiver

*...isn't that Mike Drake after his dune buggy broke down?*

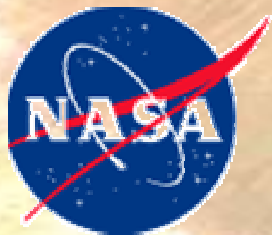


# **Space Grant Mission**

**... to expand opportunities for Americans to learn about and participate in NASA's aeronautics and space programs by supporting and enhancing science, and engineering education, research, and outreach programs. These programs integrate research with education to help build a diverse, scientifically literate citizenry and a well-prepared science, engineering and technology workforce.**



**In Arizona...**



**The goal is...**

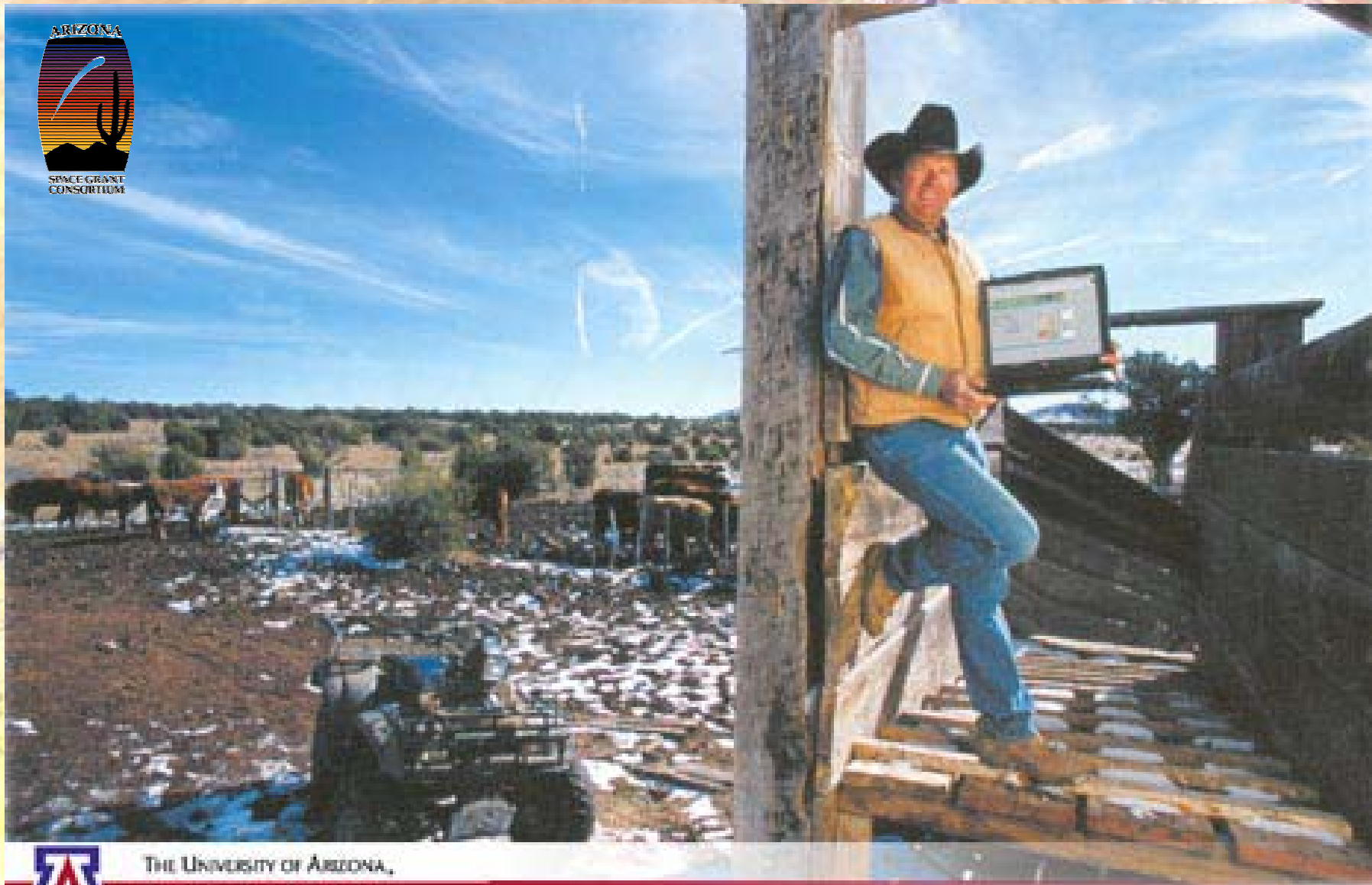
**...to bridge the gap  
between geospatial information  
research/technology and its use by  
every day people through  
seeds sown by NASA Earth Science,  
research and scholarship  
supported by Space Grant and  
extension facilitated by Land Grant.**



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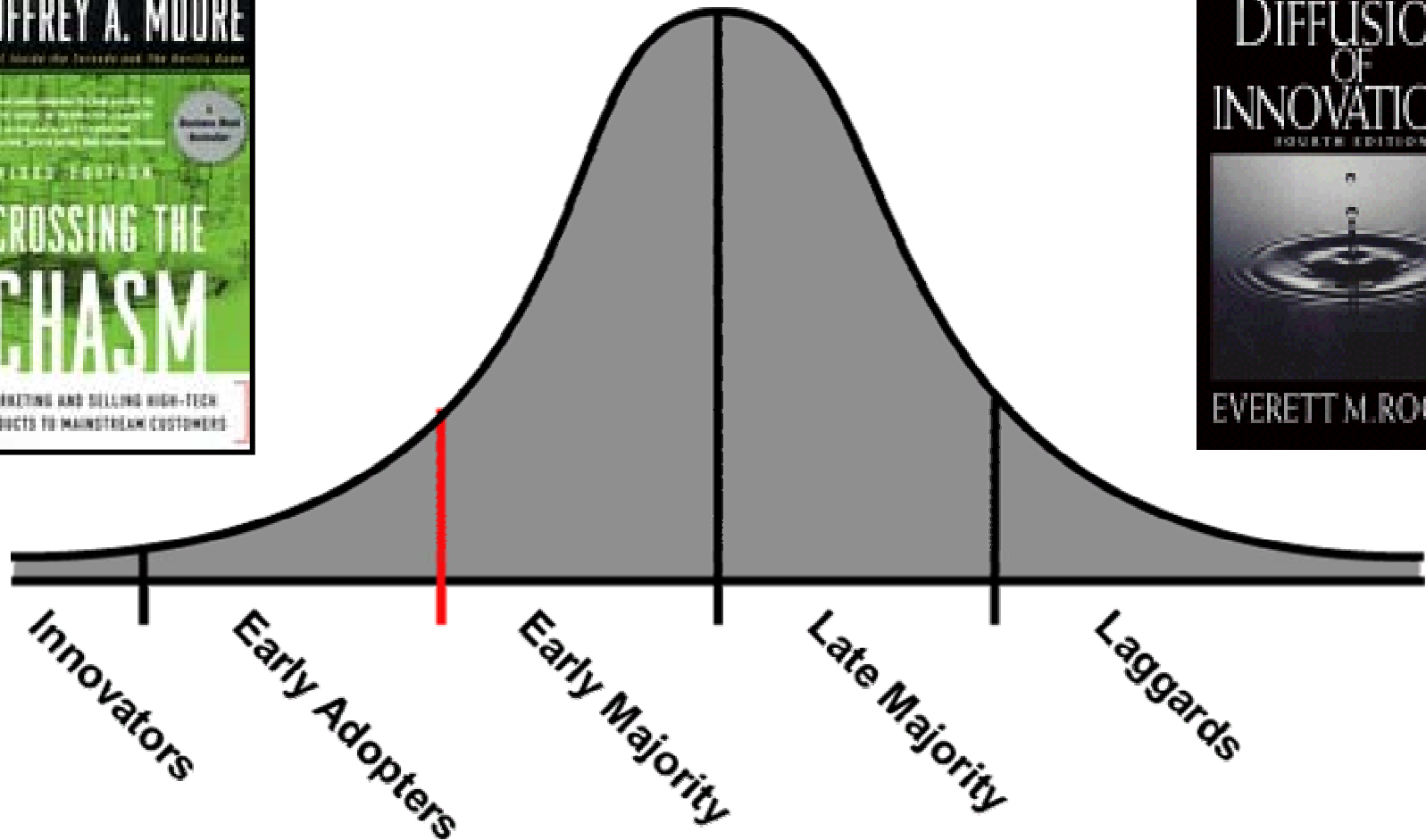
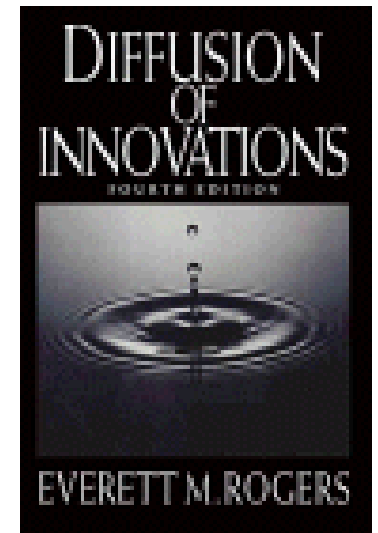
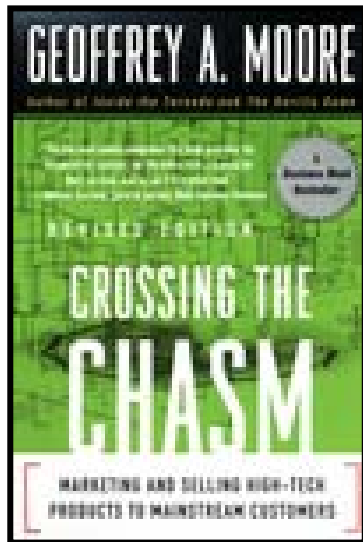
THE UNIVERSITY OF ARIZONA,  
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COLLEGE OF AGRICULTURE AND LIFE SCIENCES

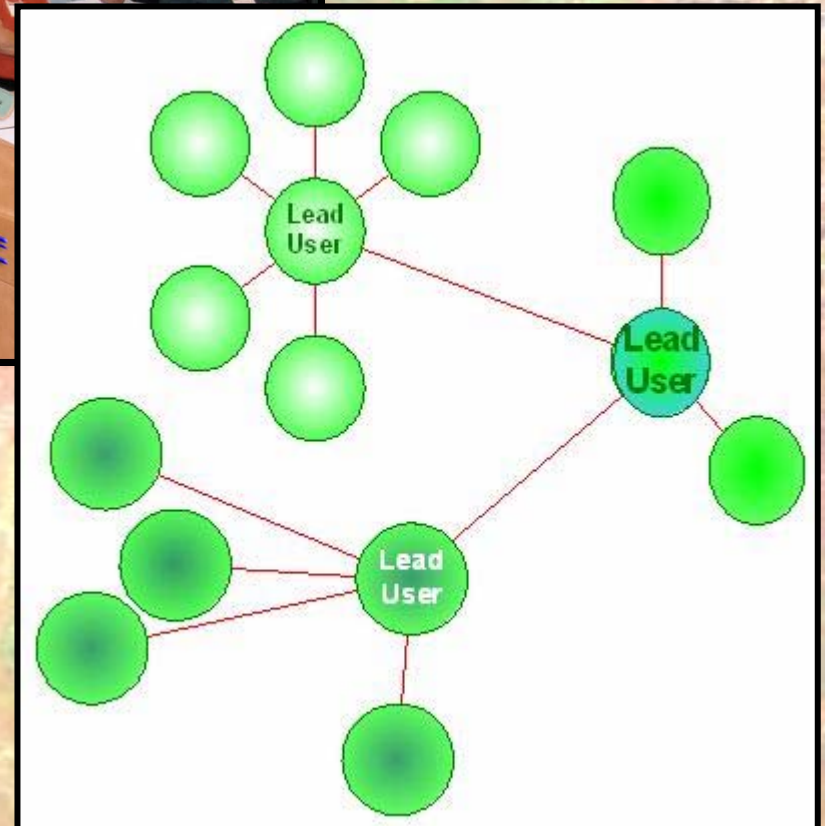
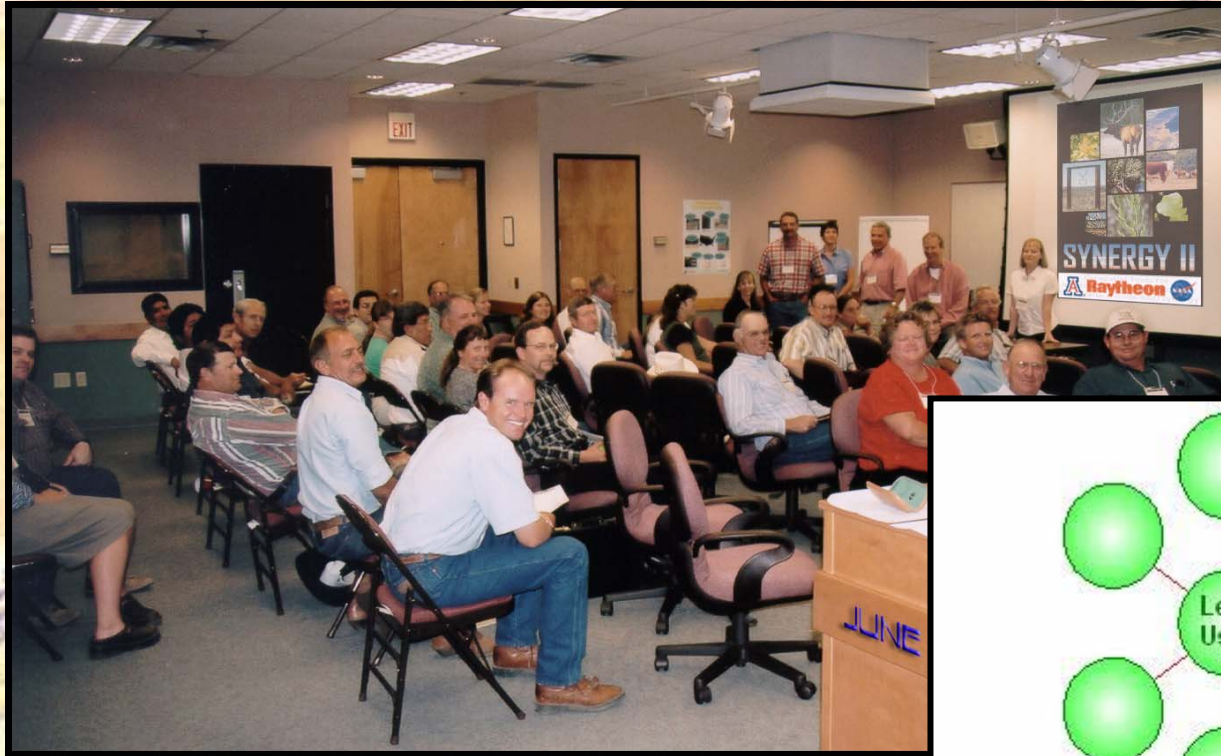
Photo by Tim Fuller

# Programmatic and Targeted

## *Diffusion & the Technology Adoption Life Cycle*



# Diffusion: "Early Adopters" Influence Others





# “High Tech—High Touch” Approach

Helping to Develop  
Decision Support  
Systems Locally

Interface

Models

Data

Users

Scientists

Feedback

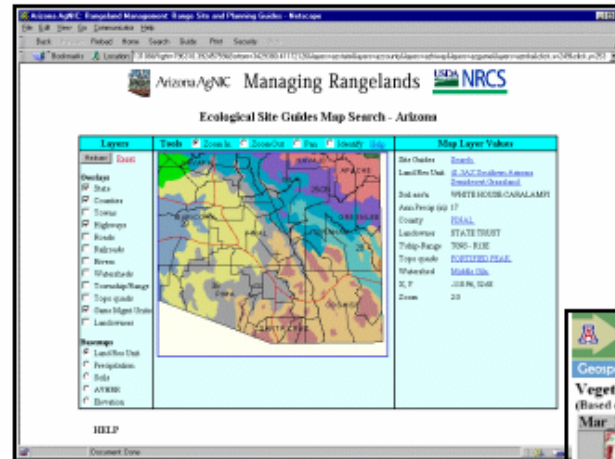
Training

## Interface

Product validation,  
dissemination and  
demonstration and  
knowledge exchange  
is accomplished  
through the Web  
and face-to-face.



<http://ag.arizona.edu/agnic/>



AgNIC Managing Rangelands developed  
by an interdisciplinary team at UA, is a  
comprehensive Web site on the ecology  
and management of Western rangelands.

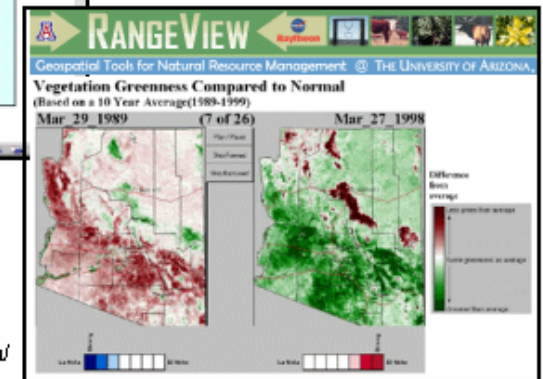
<http://rangeview.arizona.edu/>



<http://aria.arizona.edu/>

ARIA, developed at UA  
with funding from NASA,  
is a Web-based system for  
accessing regional digital  
image and map data.

Range View, developed at  
UA with funding from  
NASA/Ratheon, provides  
Web-based tools to assess  
vegetation dynamics.



# Two-way Knowledge Exchange: Training and Feedback



October 2002 Workshop: Natural Resource Managers from Government Agencies



# Assess User Needs

## Survey of Potential Government Agency Users

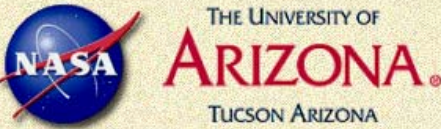
Netscape

File Edit View Go Window Help

Back Forward Reload Home Search Netscape Print Security Stop

Bookmarks Location: [http://great-sandy.arid.arizona.edu/nasa\\_survey/survey.html](http://great-sandy.arid.arizona.edu/nasa_survey/survey.html)

Search UofA Geospatial Exte Cooperative Ext NASA / NOAA Remote Sensing



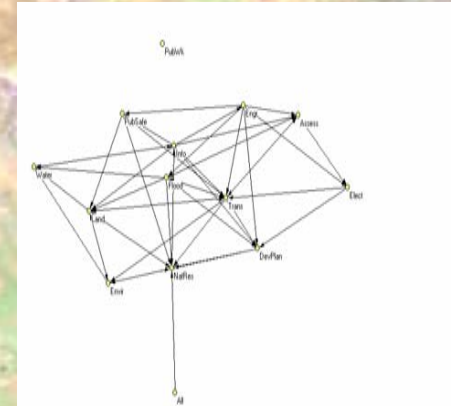
**PRODUCTS, SERVICES & DATA SETS YOU ARE USING**

---

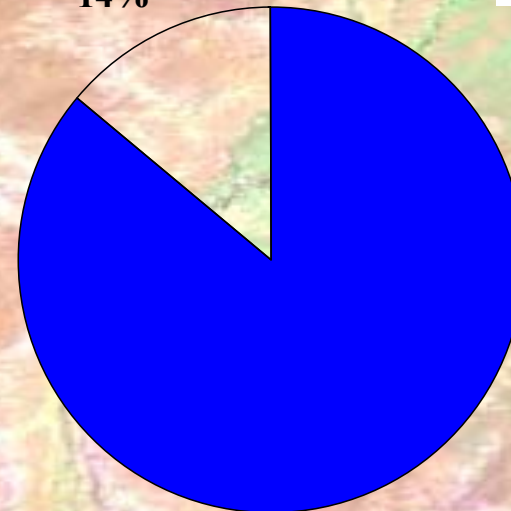
How frequently do you use the following products?

	Almost every day	Every week	Every month	Occasionally	Never
Land cover/Land use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transportation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydrology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elevation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cadastre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others (please specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Results:**



Don't  
14%



Share  
86%

***Sharing  
(data, ideas,  
etc.) greatly  
influences  
adoption.***

<http://aria.arizona.edu/slg/surveys/az/index.html>

(Feb-March, 2000 – conducted by A. Leung with guidance from M. Walendorf and C. Hutchinson, University of Arizona)



# Provide Easier Access to Local Data

Arizona Regional Image Archive - Netscape

File Edit View Go Window Help

Bookmarks Netsite: <http://aria.arizona.edu/> What's Related

A \* R \* I \* A

About

Images

Courses

Links

R&D

Arizona Regional Image Archive

Gallery [Sample images of Tucson, displayed with MrSID Image Server](#)  
[Tucson DOQQ](#), [Tucson TM](#), [Vail DOQQ](#), [US NDVI](#)

Outreach [NASA Space Grant Extension Specialist in Geospatial Technology](#)

Sponsors

THE UNIVERSITY OF  
**ARIZONA**  
TUCSON ARIZONA

Document: Done

ARIA - Map Search - Netscape

File Edit View Go Window Help

Back Forward Reload Home Search Netscape Print Security Stop

Bookmarks Location: [state&layers=azcounty&layers=azhighway&layers=aztmossusb.sid](#) What's Related

A \* R \* I \* A  
MAP SEARCH TOOL

Layers Tools Zoom In Zoom Out Pan Identify Help

Redraw Reset

Overlays

- State
- Counties
- Towns
- Highways
- Roads
- Railroads
- Rivers
- Streamflow gauges
- Watersheds
- Township/Range
- 1 degree grid
- 7.5' Topo quads
- 7.5' DEMs
- DOQQs
- Landsat path/row labels
- Landsat path/rows
- Game Mgmt Units
- Landowners
- Land Resource Unit

Search  
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DEM  
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Lanc  
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Ran  
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Soil  
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Resc  
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X, Y  
Zoo

Document: Done

<http://aria.arizona.edu/>




# Provide Easier Access to Applications








Earth, Water, Wind, and Fire - Microsoft Internet Explorer provided by ARSC

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail News RSS

Address <http://geospatial.arid.arizona.edu/ewwf/> Go

 THE UNIVERSITY OF ARIZONA,



## Earth, Water, Wind, and Fire

... a gateway to remote sensing and other geospatial applications for resource management

**About**  
Education  
Applications  
Research  
Data  
Outreach  
People  
Sponsors  
Search

Earth, Water, Wind and Fire is a cooperative, multi-disciplinary approach to providing researchers, educators, and the general public access to natural resource information and application tools created by various departments at the University of Arizona.

Earth, Water, Wind and Fire supports the land grant mission of the University of Arizona by providing a window to the various resources for research, education and outreach at the university. This gateway serves researchers, state, local and tribal government agencies, educators, students of all ages, and the general public.

This website provides access to educational resources, applications, research, and data in the disciplines of *water and watershed, weather and climate, soil and geology, fire, agriculture, range and forest, and wildlife.*

<http://geospatial.arid.arizona.edu/ewwf/>

Copyright Arizona Board of Regents, 2001-2003 | Last updated June 3, 2003  
Document located at <http://geospatial.arid.arizona.edu/ewwf/>  
Site designed and created by the Institute for the Study of Planet Earth  
and the Office of Arid Lands Studies

Internet

# Provide a Relevant Context

Rangelands of the Western U.S. - Microsoft Internet Explorer provided by ARSC

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address <http://rangelandswest.org/> Go

## Rangelands West

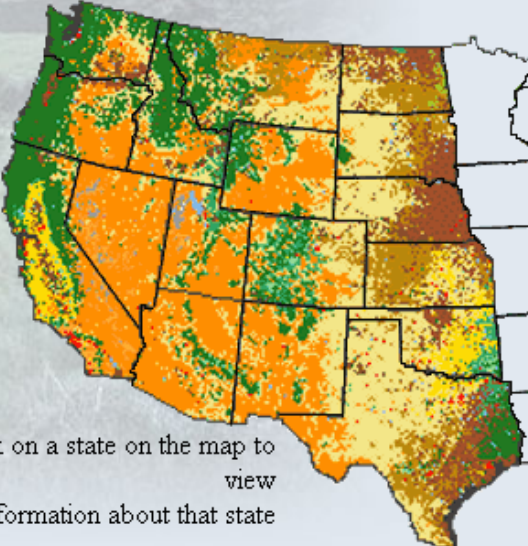
*A Western Rangelands Partnership delivering quality information, resources, and tools to improve management of western rangelands*

- ◆ [About this Site](#)
- ◆ [Introduction to Rangelands](#)
- ◆ [Rangeland Science and Management](#)
- ◆ [Policy Issues and Hot Topics](#)
- ◆ [Economics, Business, Marketing](#)
- ◆ [Education, Teaching, Careers](#)
- ◆ [General Resources](#)
- ◆ [Natural Resource Management Agencies](#)
- ◆ [Journal of Range Management](#)

Search:

More than one word? Separate by a space.  
Combine with:  AND or  OR

[Ask Questions](#) ◆ [Feedback](#)



Click on a state on the map to view information about that state

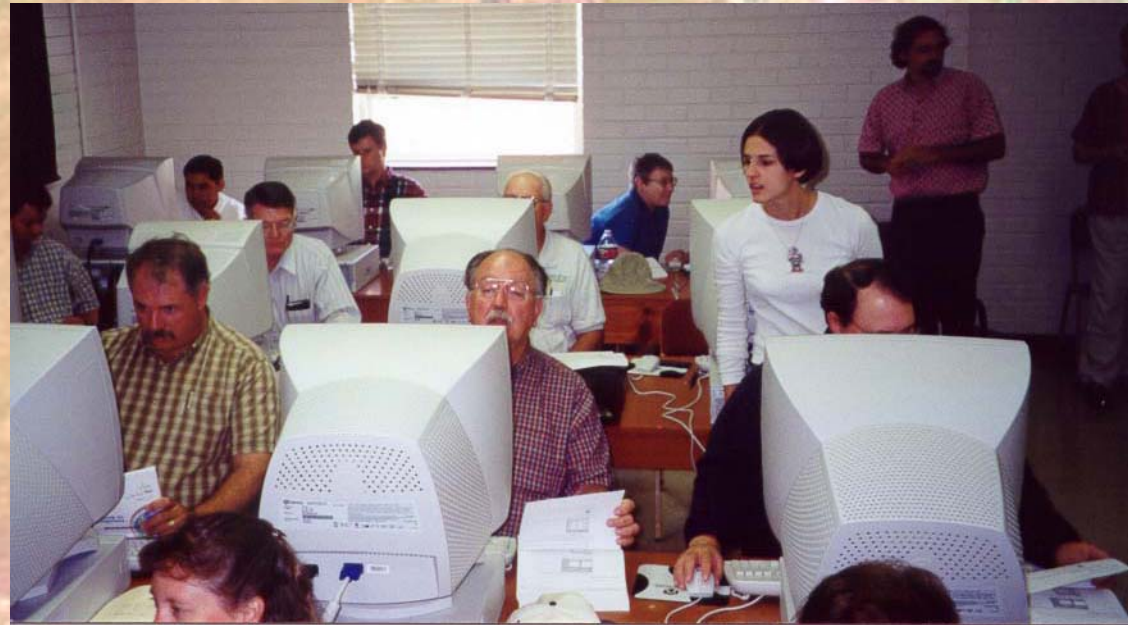
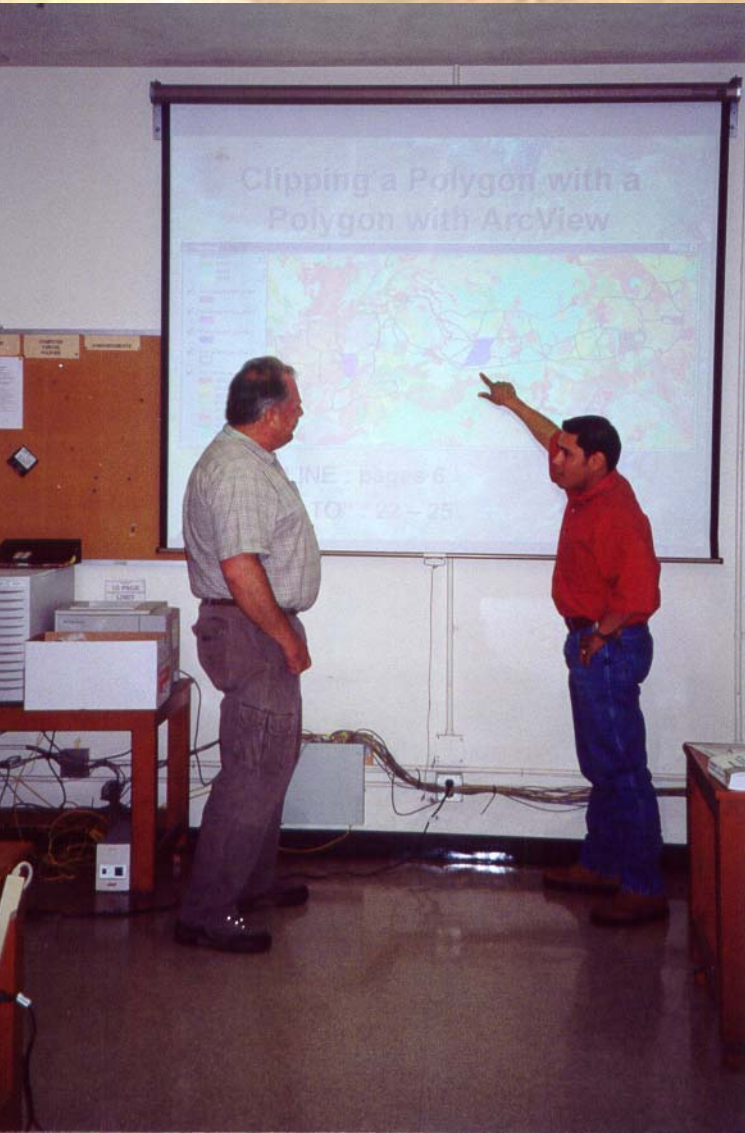
[Vegetation map legend](#)

<http://rangelandswest.org/>

Internet



# Train the Trainer, *then* the Clients

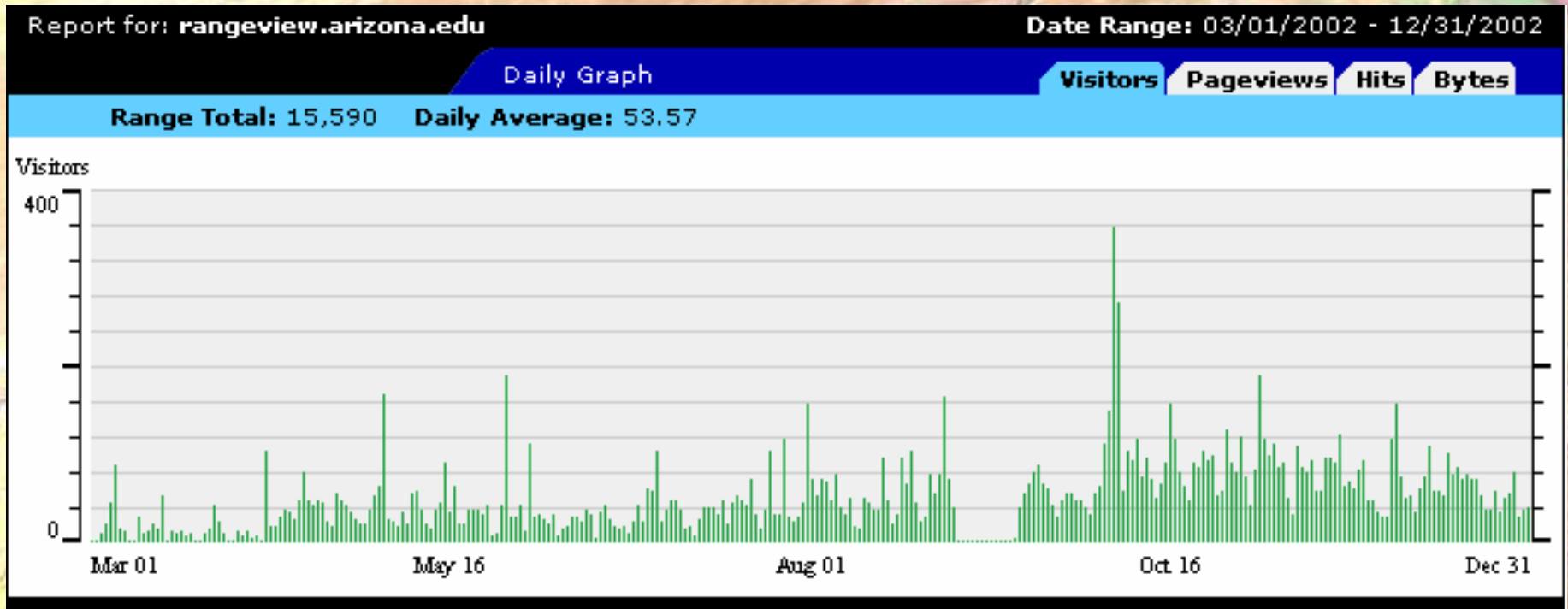




# Demonstration



# On-going Evaluation



This is an example of a quantitative evaluation metric  
(website usage statistics)



# Supporting Community Colleges



Geographic Information Systems Technician Certification -- MCC - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: [www.mc.maricopa.edu/dept/d10/gph/gistic/gistic.html](http://www.mc.maricopa.edu/dept/d10/gph/gistic/gistic.html) What's Related

## Geographic Information Systems Technician Certification Program (GISTC) at Mesa Community College

Beginning in early 2002, Mesa Community College will introduce a new GISTC Program. This program is designed to help students learn the fundamentals of the high technology field of Geographic Information Systems. All program components still pending final approval. While we wait for final approval MCC is already offering courses in GIS for enrollment. To see the current semsters offerings of classes please [click here.](#)

Document: Done



# Collaboration with Tribal Colleges

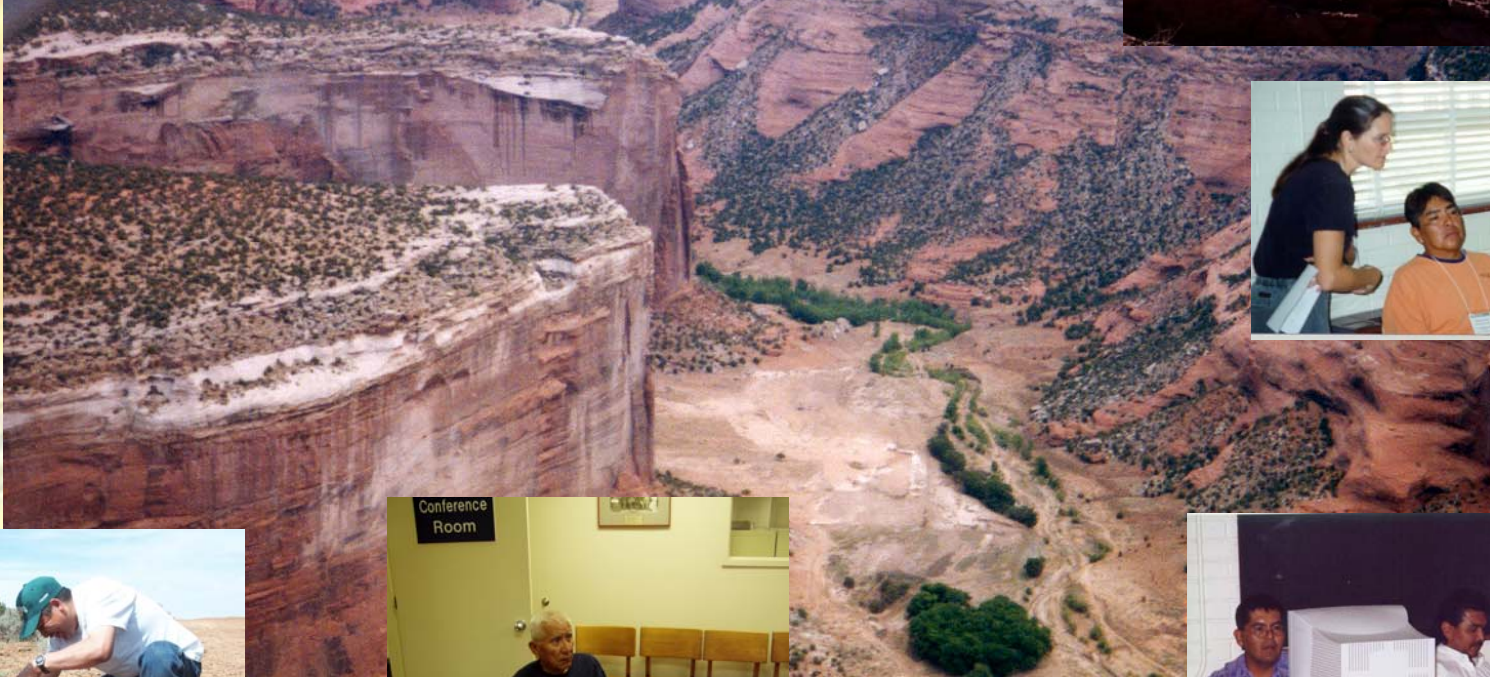


Ms. Casandra Manulito Kerkvliet  
Acting President, Diné College

**USDA Tribal Colleges Research Grants Program**



# Navajo Watershed Research Project





National Space Grant

Arizona  
Members & AffiliatesLocation,  
Contact, & Events

Bibliography

Grant Opportunities  
& Positions

Community Outreach

Graduate Fellowships

Undergrad Internships

Leading-Edge  
EngineeringCollege / University  
ProgramsNASA  
Technology to PeoplePrecollege  
Education / Training

# Precollege Mini-Grants

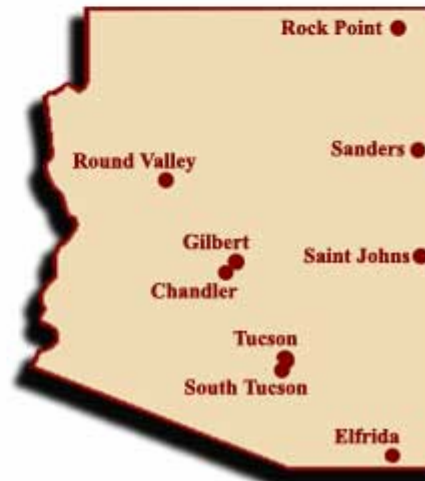


January 15, 2003:

The Arizona Space Grant Consortium and University of Arizona Cooperative Extension are pleased to announce the winners of our first statewide precollege mini-grants competition! We received an impressive group of proposals for creative programs and activities geared to inspire learning in science, mathematics and technology, which will benefit substantial numbers of students and educators across our state. Winning proposals are:

January 2003 Arizona Space Grant  
Consortium Mini-Grant Recipients

Program	Educator	School, district	City
<i>Distance Learning Squared</i>	Larry Langstaff	Hendrix Junior High, Mesa Unified School District	Chandler
<i>Rocketing into Space</i>	Curt Peters	Donaldson Elementary, Amphitheater School District	Tucson
<i>Model Rocketry Module of Science Mentoring Program</i>	Christine Tokarz	Rock Point Community School, Chale School District	Rock Point
<i>4-H GPS</i>	Elizabeth Sparks	University of Arizona/Pima County 4-H serving Amphitheater, Tucson Unified School District, a South Tucson charter school, Cesar Chavez Middle School, Parcuva-Yaqui and other Tucson community members	Tucson, South Tucson.
<i>4-H Aerospace</i>	Joyce L. Alves	UA Cooperative Extension, 4-H Youth Development Apache County	St. Johns, Round Valley and Sanders
<i>Earth's Wonders</i>	Ann English for nine teachers	Elfrida Elementary School, Elfrida District #12	Elfrida
<i>Linking Math and Science to the World Challenger Space Program</i>	Valerie Gresser	Oak Tree Elementary, Gilbert Unified School District	Gilbert
	Sandra Howell	Sierra Middle School, Sunnyside School District	Tucson



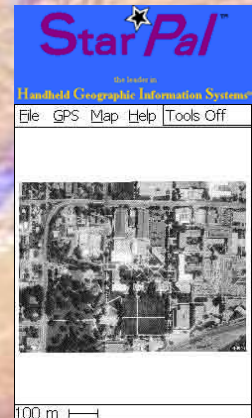
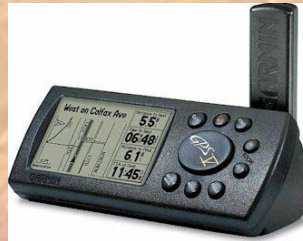
Leverage,  
Leverage,  
Leverage!



# Application-Specific, Ground-Up Approach

*As Close to “Turn Key” As Possible*

- Aerial photos/topos in background
  - Microsoft TerraServer
- GPS Receiver
  - Garmin V
- Handheld Computer
  - Compaq iPAQ 3800 or 3900 series
- GIS on the handheld
  - StarPal HGIS
- GIS on the desktop or laptop
  - ESRI ArcView (or HGIS for basic functions)





# Example: GPS/GIS Invasive Species Mapping Field Training



UA/NASA Space Grant Fellow Theresa Mau-Crimmins





# WALTER <http://walter.arizona.edu/> Exploring Wildfire Alternatives

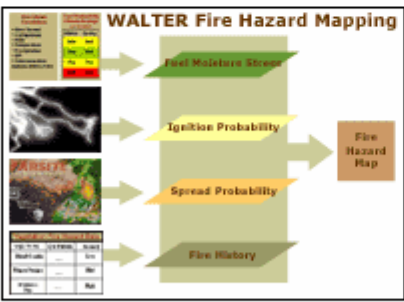
- Overview
- Fire
- Climate
- Society
- Tools
- Search

**Wildfire Alternatives (WALTER)** is an EPA Star Grant initiative that seeks to improve our understanding of the consequences of interactions between wildfire, climate and society. WALTER has set out to maximize advances in geospatial, analytical, as well as web delivery technology to provide access to the underlying interdisciplinary research, the resulting model, and educational materials.



[Catalina/Rincon](#) | [Chiricahua](#) | [Huachuca](#) | [Jemez](#)

*The model will produce fire risk maps for these four specific areas.*



Wildfire and climate managers, as well as researchers, acknowledge the power of mechanistic spatial models for tactical management, but have expressed a need for planning tools that would integrate the climate and human dimensions of wildfire behavior for strategic management. In response to this demand, the WALTER team is developing the first phase of an integrated model called Fire-Climate-Society (FCS-1).

### What's News

Dynamic Animation Tool



Updated Model Design

### Mark your calendar!

**October 16, 2003**

- Arizona Firewise Communities Workshop

## Fire-Climate-Society Modeling

Search Advanced Search



**Site Status:**  
Feedback form is now operational!  
[View site log for all changes](#)

An EPA STAR Grant Project • THE UNIVERSITY OF ARIZONA.



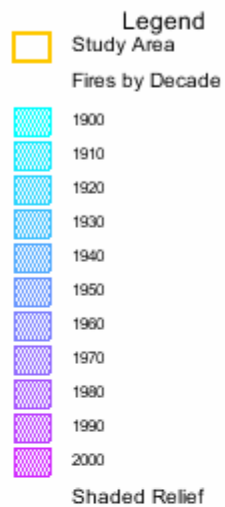
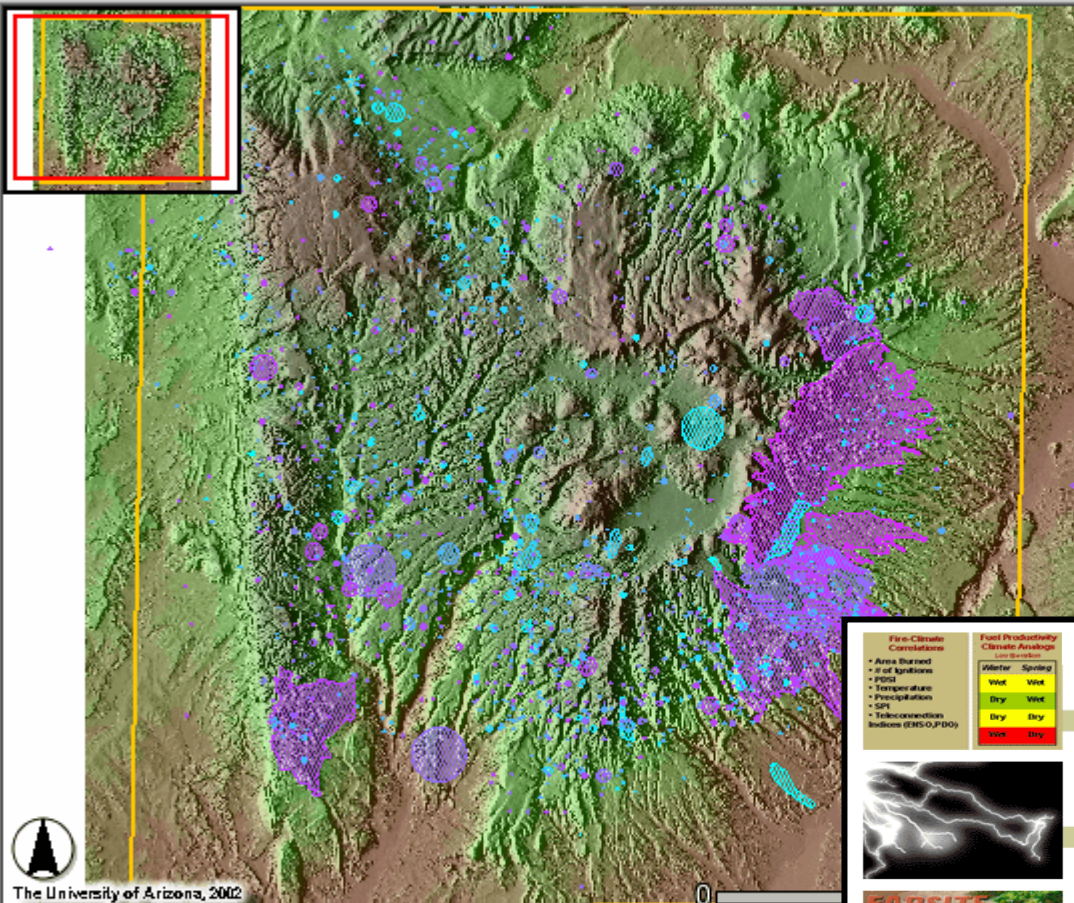
Send [comments or questions](#)  
© 2001 Arizona Board of Regents. Last updated: 8/7/2003 1:34:47 PM  
URL: <http://walter.arizona.edu/index.asp>

**HOT SPOT:** Arizona FIREWISE Communities Workshop to be held in Tucson, AZ October 16, 2003

Application-Specific,  
Space-Down Approach



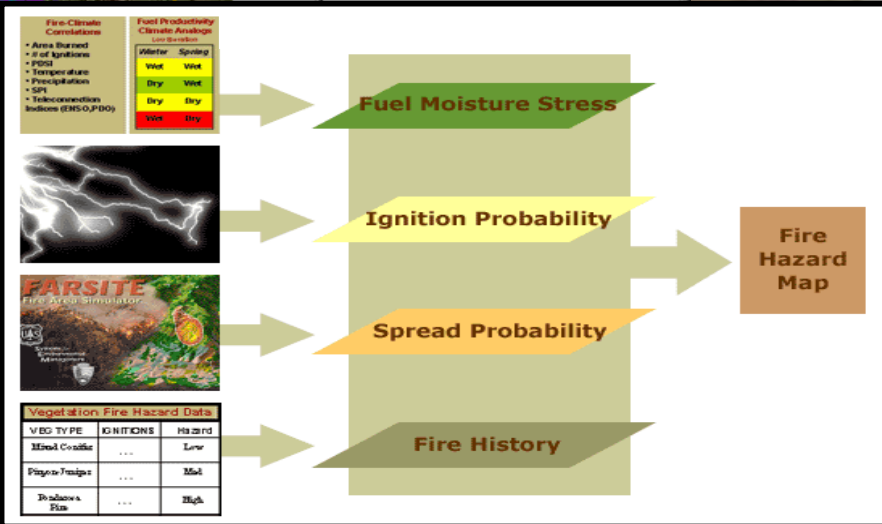
**WALTER** Fire History of the Jemez Mountains, NM refresh this window. [Back to Home](#)



The University of Arizona, 2002

**Fires by Decade**

FIRE_NAME	FIRES_REC0	FIRE_DATE	SIZE_CLASS	OLD_SIZE_C	ACREAGE	GIS_
Dome		1996-04-25	G		16575	1651
LA MESA		1977-06-16	G		15270	1419
Lummis		1997-06-29	F		1655	1667



Identify



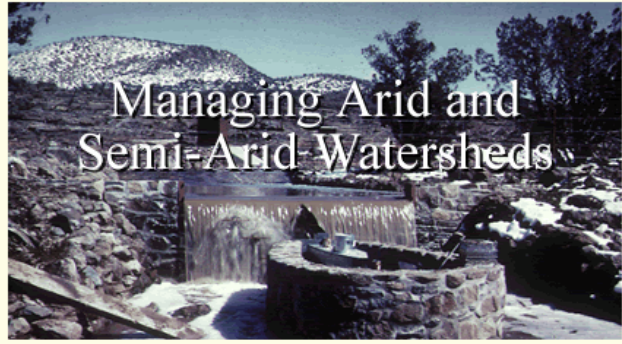


- About This Site
- AZ Watershed Program
- Central AZ Highlands
- Bibliography
- Images
- Research Data

- Watershed Basics
- For Kids and Teachers
- Related Links
- Feedback Form

  
Search

**Site Design**  
Michael Haseltine (UA)  
Dan Huebner (Flagstaff Lab, RMRS)



### Major Vegetation Types in the Southwestern United States

- Riparian Ecosystems
- Mixed Conifer Forests
- Grasslands
- Ponderosa Pine Forests
- Pinyon-Juniper Woodlands
- Chaparral Shrublands
- Semi-Desert Shrublands

**Provide Web-based Data  
Analysis, Visualization,  
and Spatial Tools**

**Watershed  
Management**





### Watershed Research and Education



- Home
- About
- Program
- Highlands
- Bibliography
- Images
- Basics
- Kids
- Links
- Feedback

#### Watershed:

Beaver Creek

#### Data Set:

Streamflow

Streamflow

- Su Sediment
- Precipitation (Gage)
- Precipitation (WS)
- Lo Temperature
- Humidity
- Range
- St Timber
- Documentation

Month Jan Year 1956

#### End date:

Month Dec Year 1990

#### Output format:

Table (10 lines)

Create Records



# Welcome to the Semi-Arid Watershed Database

The Semi-Arid Watershed Database was created to make over 25 years of data from the Beaver Creek Experimental Watershed Project, and other research watersheds, available to all members of the public as a teaching and decision making tool.

#### About the Beaver Creek study

The Beaver Creek Experimental Watershed was established in 1956 to study the influence of various vegetative manipulations of

#### How to use the database

Using the database is as easy as making choices in the *Data Access Form* on the left of this page, then clicking the *create records* button. A more detailed explanation of how to

<<< Long range monthly Humidity and Precipitation data

Create New Graph

Select data From the same Period for Comparison

Watershed: Beaver Creek Data Set: Precipitation (WS)

Subset: Monthly Location: Watershed 3

Logarithm Plot  Overlay Plot  
 Line  Area  Bar

Add Data to Graph

Select data From the Other Period for Comparison

Watershed: Beaver Creek Data Set: Select Data set

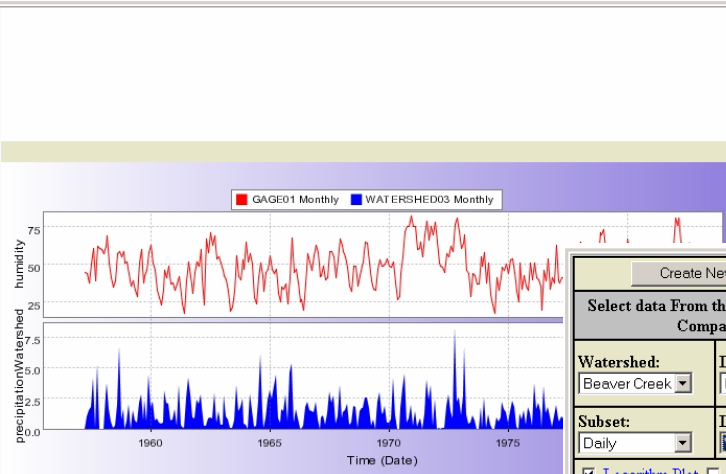
Subset: Monthly Location: Select Location

Start date: Month Jan Year 1956

End date: Month Dec Year 2000

Logarithm Plot  
 Line  Area  Bar

Create Records



Create New Graph

Select data From the same Period for Comparison

Watershed: Beaver Creek Data Set: Precipitation (WS)

Subset: Daily Location: Watershed 12

Logarithm Plot  Overlay Plot  
 Line  Area  Bar

Add Data to Graph

Select data From the Other Period for Comparison

Watershed: Beaver Creek Data Set: Select Data set

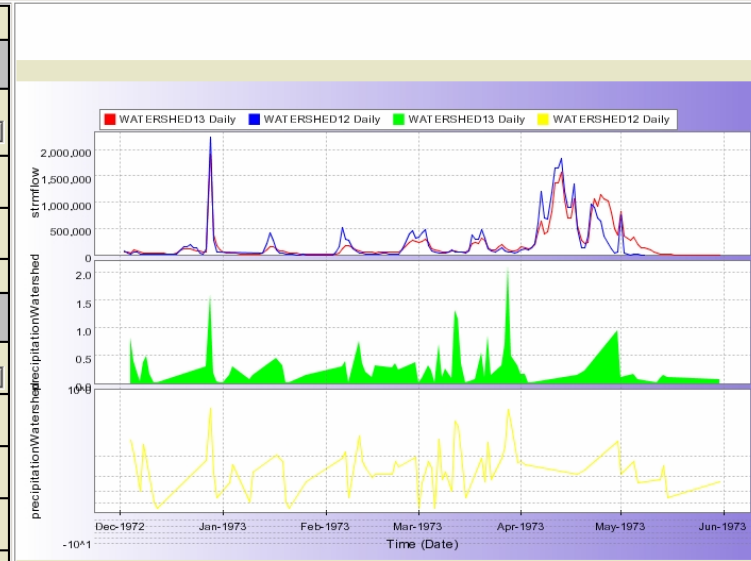
Subset: Monthly Location: Select Location

Start date: Month Jan Year 1956

End date: Month Dec Year 2000

Logarithm Plot  
 Line  Area  Bar

Create Records



# New Graphing Functionality

Create New Graph

Select data From the same Period for Comparison

Watershed: Beaver Creek Data Set: Streamflow

Subset: Daily Location: Watershed 8

Logarithm Plot  Overlay Plot  
 Line  Area  Bar

Add Data to Graph

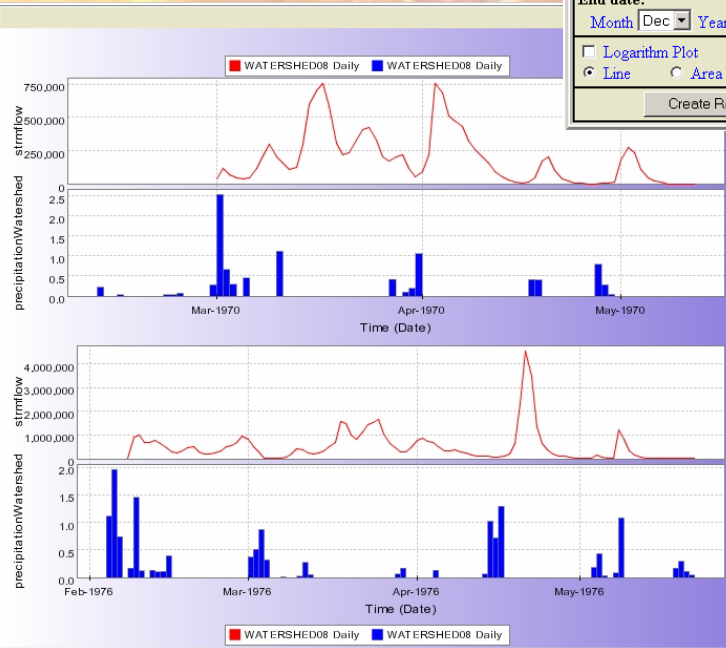
Select data From the Other Period for Comparison

Watershed: Beaver Creek Data Set: Precipitation (WS)

Subset: Daily Location: Watershed 8

Logarithm Plot  Overlay Plot  
 Line  Area  Bar

Add Data to Graph



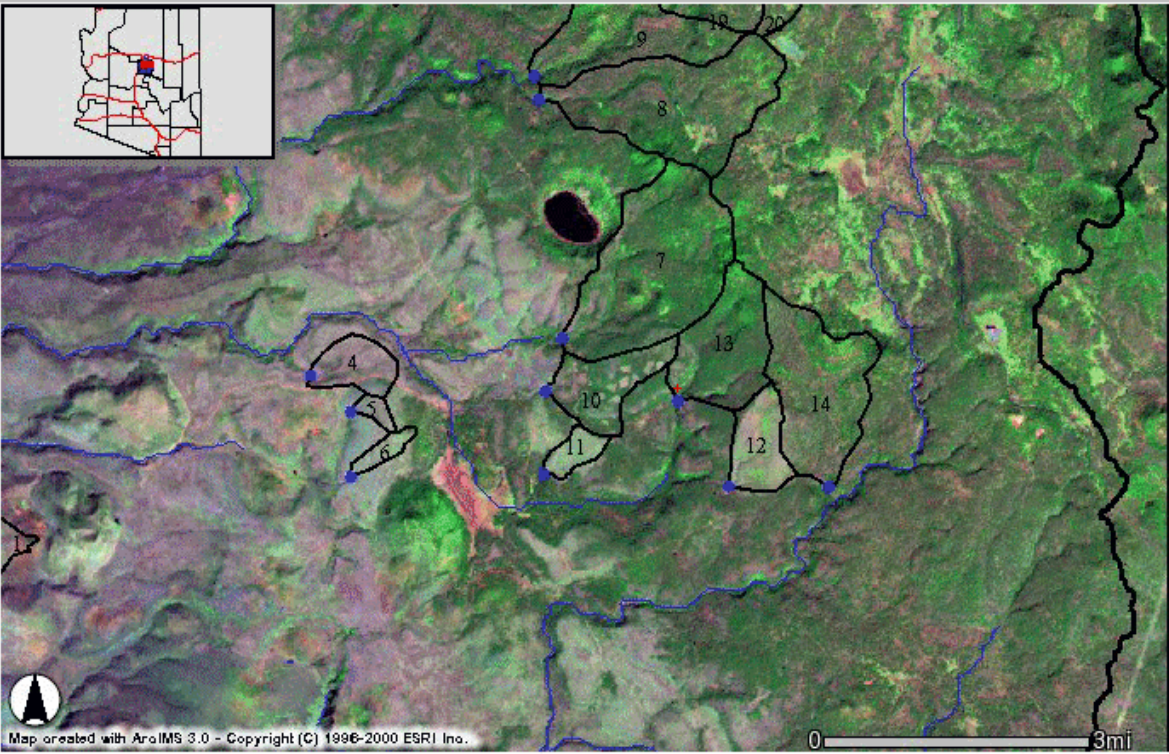
^^^

Daily Stream Flow data overlaid comparison between Treatment (ws12) and Control (ws13), with Precipitation data as reference

<<< "Before" & "After" comparison (ws 08 treated 1973), plotting Precipitation and Stream Flow



# Beaver Creek Streamflow



Flagstaff Lab

### Layers

- Visible
- Towns
  - Stream gauges
  - I-17
  - Roads
  - Streams
  - Treatments
  - Watersheds
  - Basin
  - Boundary
  - Landsat TM
  - Dem
  - Shaded relief

Refresh Map

Help

### Introduction

Streamflow data have been collected since 1957 for 20 watersheds that contribute to the Wet Beaver Creek drainage in central Arizona. As part of a hydrologic study vegetation was thinned by mechanical or chemical treatments in several of the watersheds at various times.

To view these data use the **Identification** or **Select** tools to choose one or more watersheds, then follow the links in this window to view

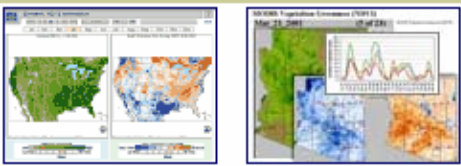
Zoom In






The RangeView website provides applications for viewing, animating, and analyzing satellite imagery in order to monitor vegetation dynamics through time and across landscapes. RangeView is simple to use and valuable for natural resource managers, land owners, educators, and researchers.

**Tools**



[Dynamic Animation](#)    [View All Tools](#)

**Getting Started**



[Exercises](#) - learn the tools  
[Which tool should I use?](#)  
[Application: V Bar V Ranch](#)  
[Tips for New Users](#)

**Reports & Analysis**


- [Vegetation](#)
- [Wildlife](#)
- [Annual Reports](#)
- [Presentations & Activities](#)

**Educational**

- [Tutorials](#)
- [Movies](#)
- [Remote Sensing Basics](#)
- [Site Glossary](#)

**Links**



**NASA**

- [About the Project](#)
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**What's New**

- Oct 3-4 wkshop for Agency Personnel
  - [Invitation](#)
  - [Logistics](#)
- July 22 image added to tools
- [RangeView fact sheet \(pdf\)](#)
- [Perceptions on Wildlife survey](#)

Last updated 7/30/03

**Make Satellite Imagery Operational**

**Vegetation Monitoring**

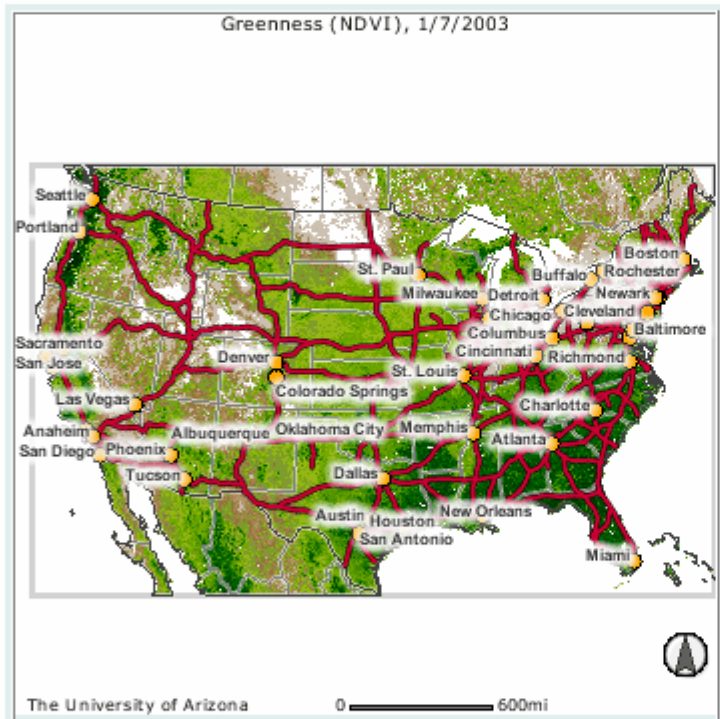


**Dynamic NDVI Animation - Preview** ?

Pan 
  ZoomOut 
  ZoomIn 
 Zoom To: Choose a State or Region 
 [Home](#)



Layer Name	Turn on/off
(Resolution) Layer	Label
Cities (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blocks	<input type="checkbox"/>

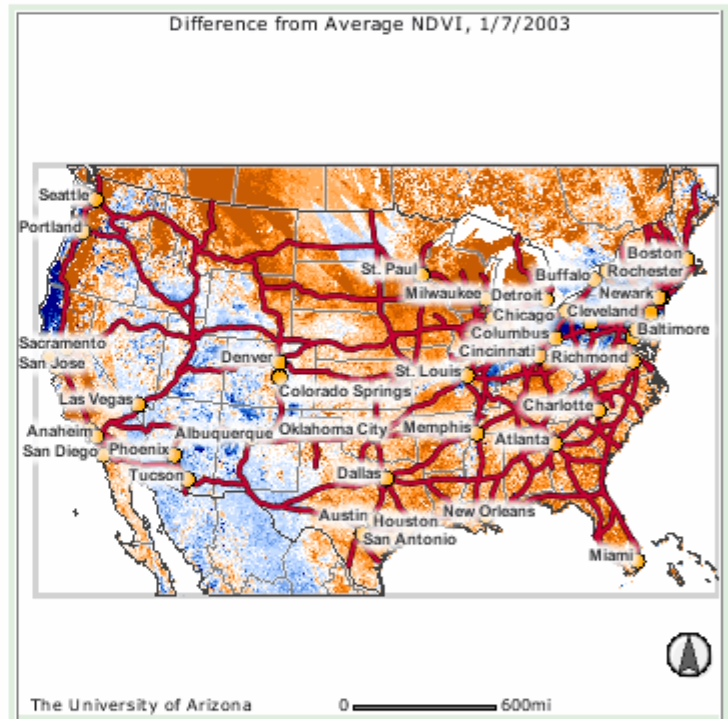


Low **Vegetation Greenness** High

Data type: Greenness (NDVI)

Year: 2003

Refresh



Less Green **NDVI Difference From Average** Greener

Data type: Difference from Average NDVI

Year: 2003

Animate

NDVI Dynamic Animation Tool - Microsoft Internet Explorer provided by ARSC

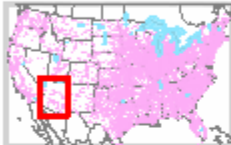
File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail News RSS

Address http://rangeview.arizona.edu/dynam/launch.asp

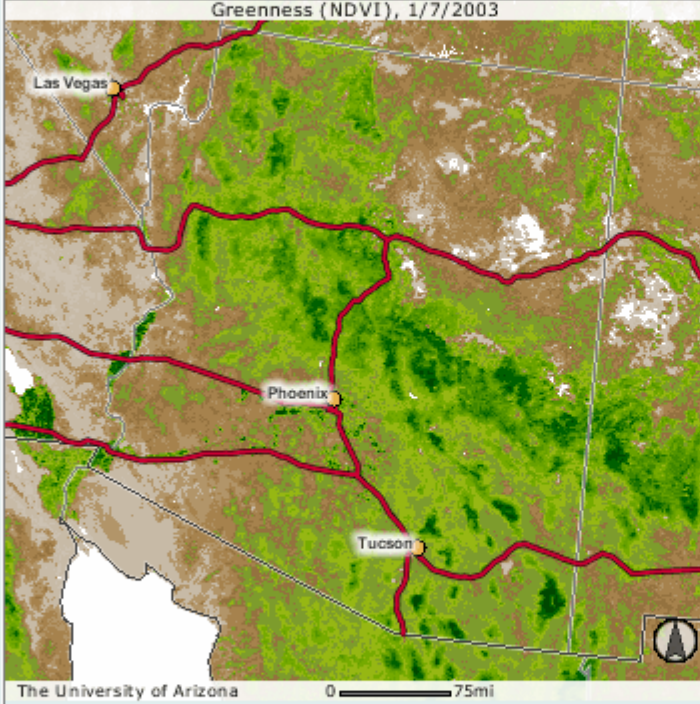
## Dynamic NDVI Animation - Preview

Pan
  ZoomOut
  ZoomIn
 Zoom To: 
[Home](#)



Layer Name	Turn on/off
(Resolution)	Layer Label
Cities (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blocks	<input type="checkbox"/> <input type="checkbox"/>

**Greenness (NDVI), 1/7/2003**



The University of Arizona 0 75mi

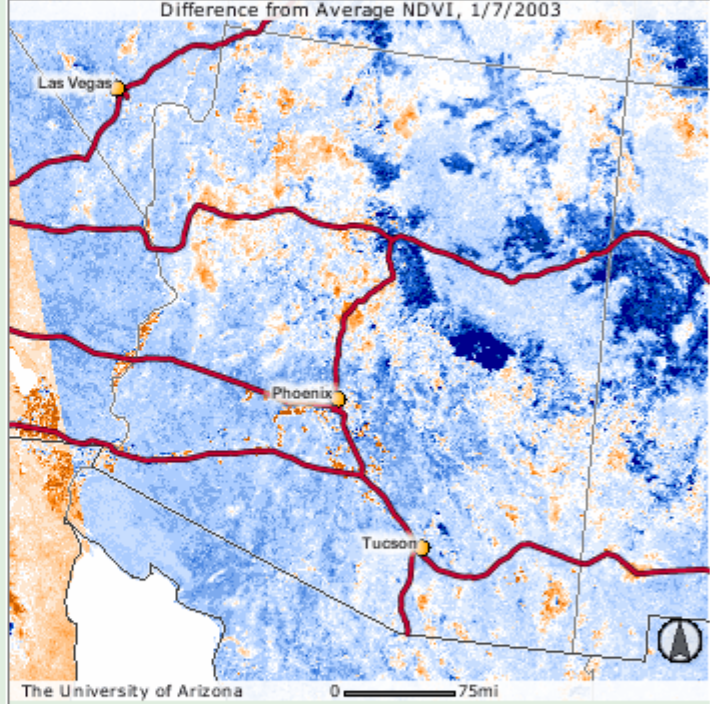
**Vegetation Greenness**

Low  High

Data type:

Year:

**Difference from Average NDVI, 1/7/2003**



The University of Arizona 0 75mi

**NDVI Difference From Average**

Less Green  Greener

Data type:

Year:

Done Internet

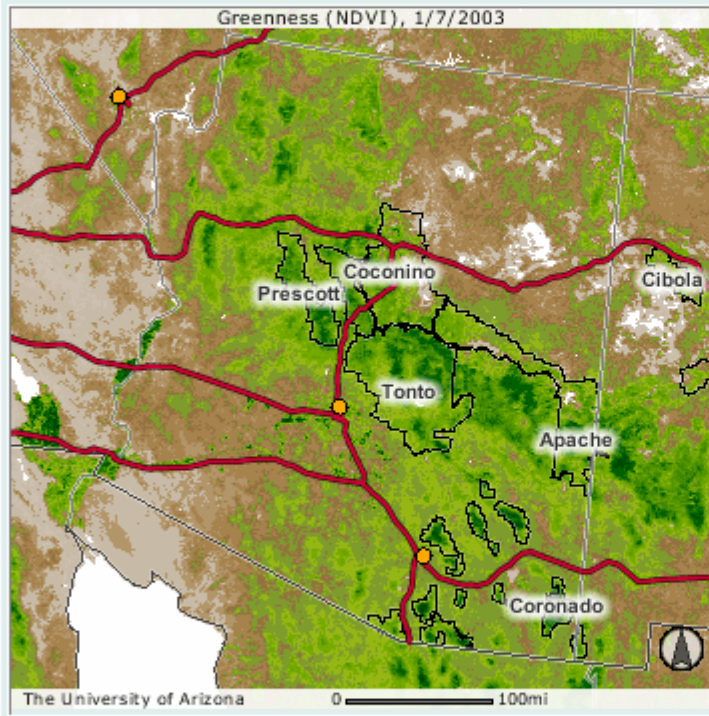


**Dynamic NDVI Animation - Preview** ?

Pan 
  ZoomOut 
  ZoomIn 
 Zoom To: Choose a State or Region
[Home](#)



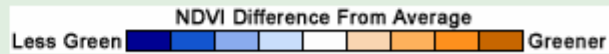
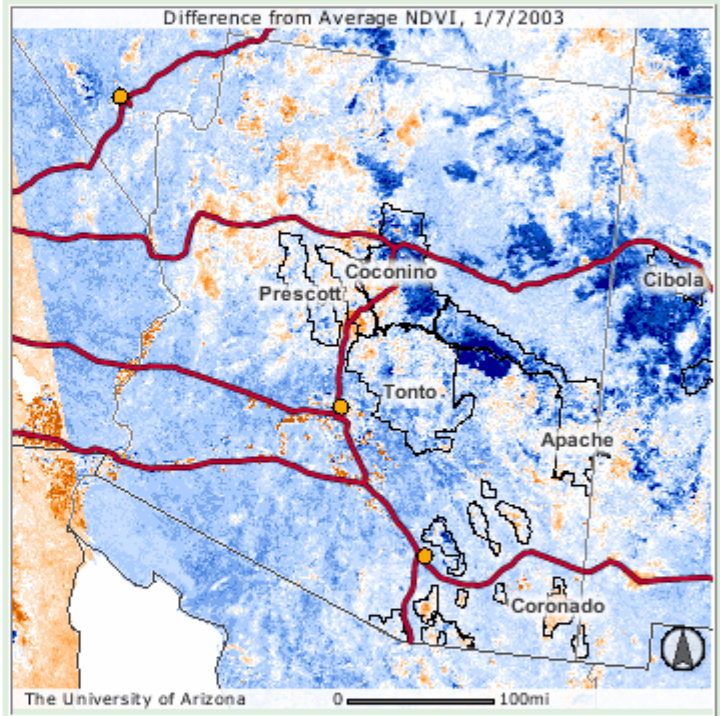
Layer Name	Turn on/off
(Resolution) Layer	Label
Cities (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blods	<input type="checkbox"/> <input type="checkbox"/>



Data type: Greenness (NDVI)

Year: 2003

Refresh



Data type: Difference from Average NDVI

Year: 2003

Animate

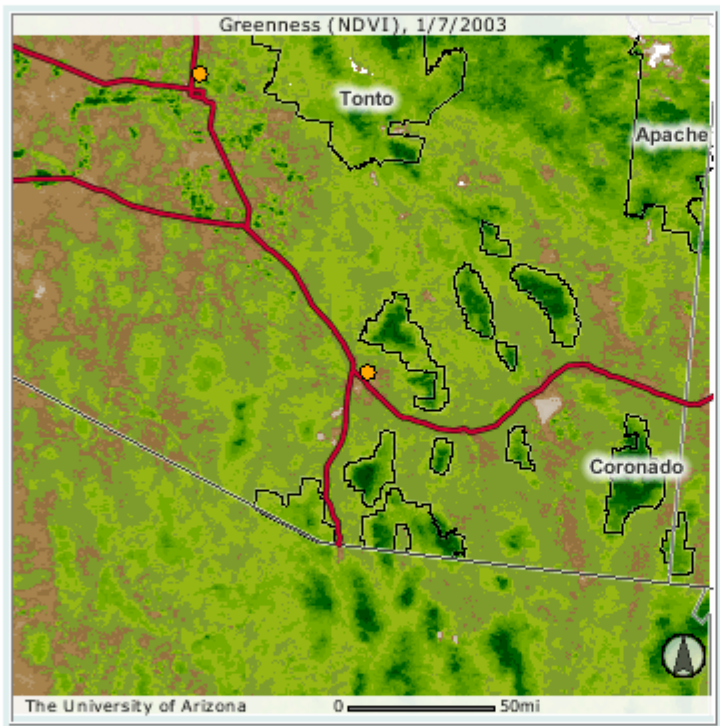
**Dynamic NDVI Animation - Preview** ?

Pan 
  ZoomOut 
  ZoomIn 
 Zoom To: Choose a State or Region

[Home](#)



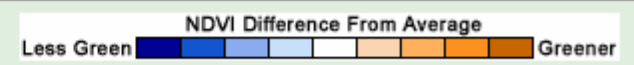
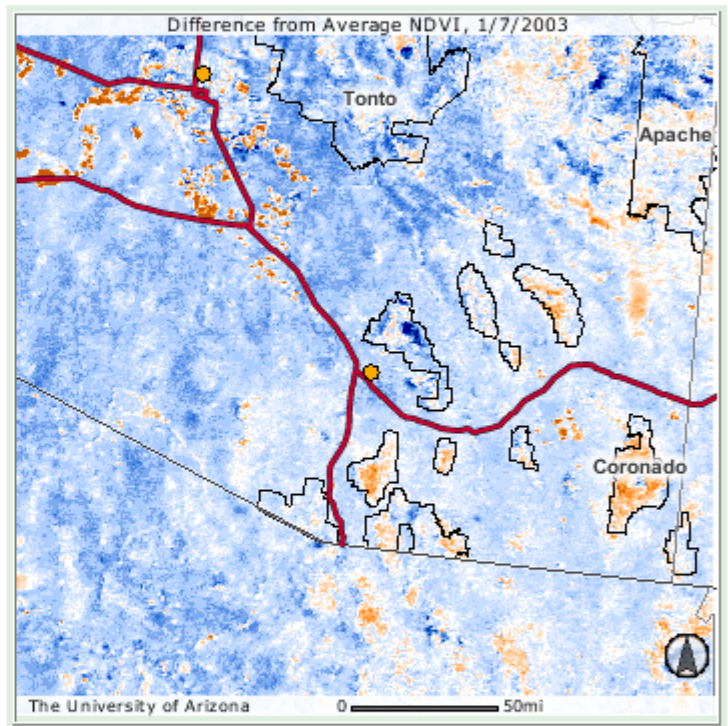
Layer Name	Turn on/off
(Resolution) Layer	Label
Cities (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input type="checkbox"/> <input type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Grid	<input type="checkbox"/> <input type="checkbox"/>



Data type: Greenness (NDVI)

Year: 2003

Refresh



Data type: Difference from Average NDVI

Year: 2003

Animate



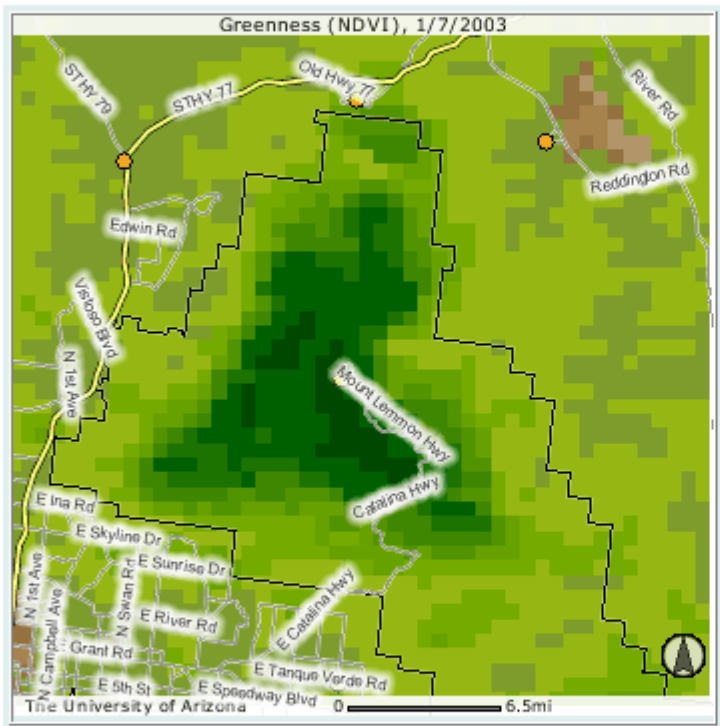
**Dynamic NDVI Animation - Preview** ?

Pan 
  ZoomOut 
  ZoomIn 
 Zoom To: Choose a State or Region

[Home](#)

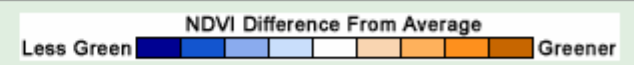
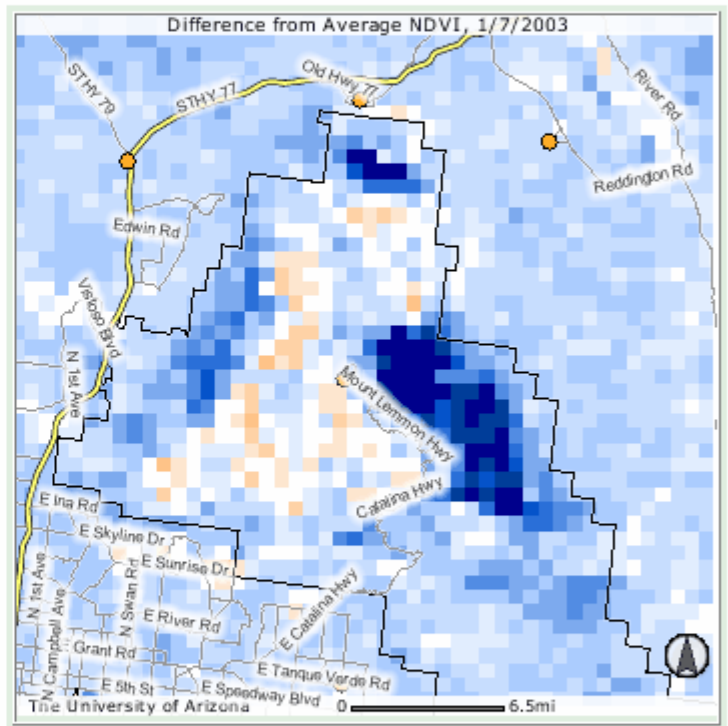


Layer Name	Turn on/off
(Resolution) Layer Label	
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Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input type="checkbox"/> <input type="checkbox"/>
Contours (100m)	<input type="checkbox"/> <input type="checkbox"/>
Lakes (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blods	<input type="checkbox"/> <input type="checkbox"/>



Data type: Greenness (NDVI) [v]  
Year: 2003 [v]

Refresh



Data type: Difference from Average NDVI [v]  
Year: 2003 [v]

Animate

NDVI Dynamic Animation Tool - Microsoft Internet Explorer provided by ARSC

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Address http://rangeview.arizona.edu/dynam/launch.asp Go

**Dynamic NDVI Animation - Preview** ?

Pan ZoomOut ZoomIn Zoom To: Choose a State or Region Home

Layer Name	Turn on/off
(Resolution) Layer	Label
Cities (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Contours (500m)	<input type="checkbox"/> <input type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Lakes (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blods	<input type="checkbox"/> <input type="checkbox"/>

**Vegetation Greenness**

Data type:

Year:

Refresh

**NDVI Difference From Average**

Data type:

Year:

Animate

Done Internet



NDVI Dynamic Animation Tool - Microsoft Internet Explorer provided by ARSC


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Address <http://rangeview.arizona.edu/dynam/launch.asp> Go

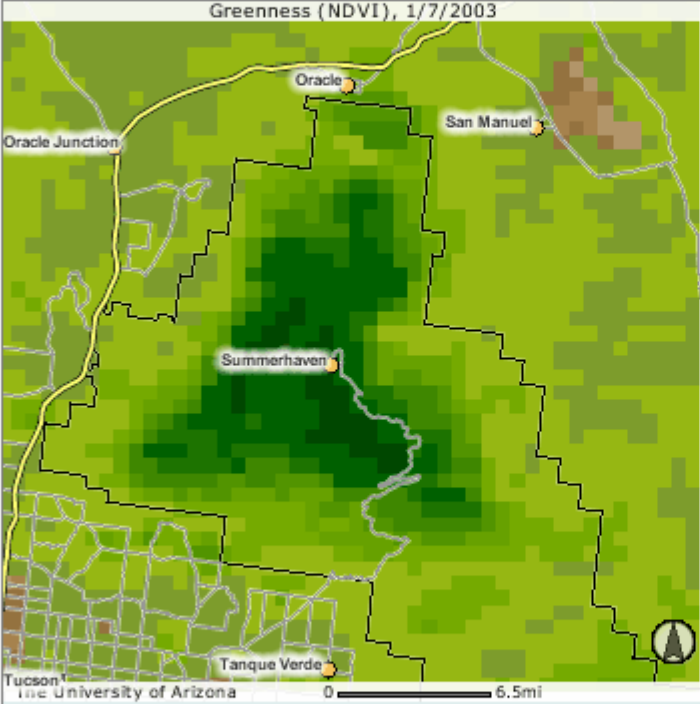
## Dynamic NDVI Animation - Preview

Pan
  ZoomOut
  ZoomIn
 Zoom To: 
[Home](#)



Layer Name	Turn on/off
(Resolution) Layer	Label
Cities (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Contours (500m)	<input type="checkbox"/> <input type="checkbox"/>
Contours (100m)	<input type="checkbox"/> <input type="checkbox"/>
Lakes (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blods	<input type="checkbox"/> <input type="checkbox"/>

**Greenness (NDVI), 1/7/2003**



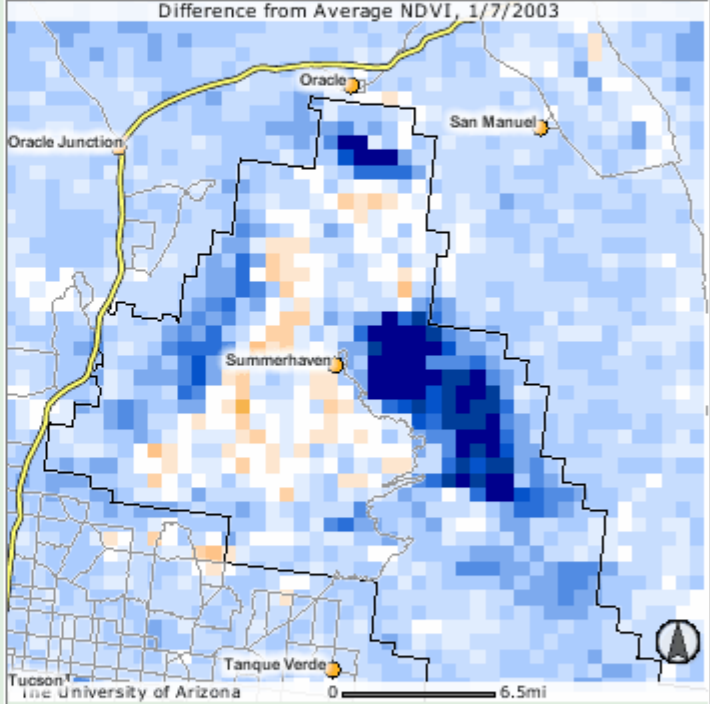
**Vegetation Greenness**

Low  High

Data type:

Year:

**Difference from Average NDVI, 1/7/2003**



**NDVI Difference From Average**

Less Green  Greener

Data type:

Year:

Internet



## Processing the Requested Animation

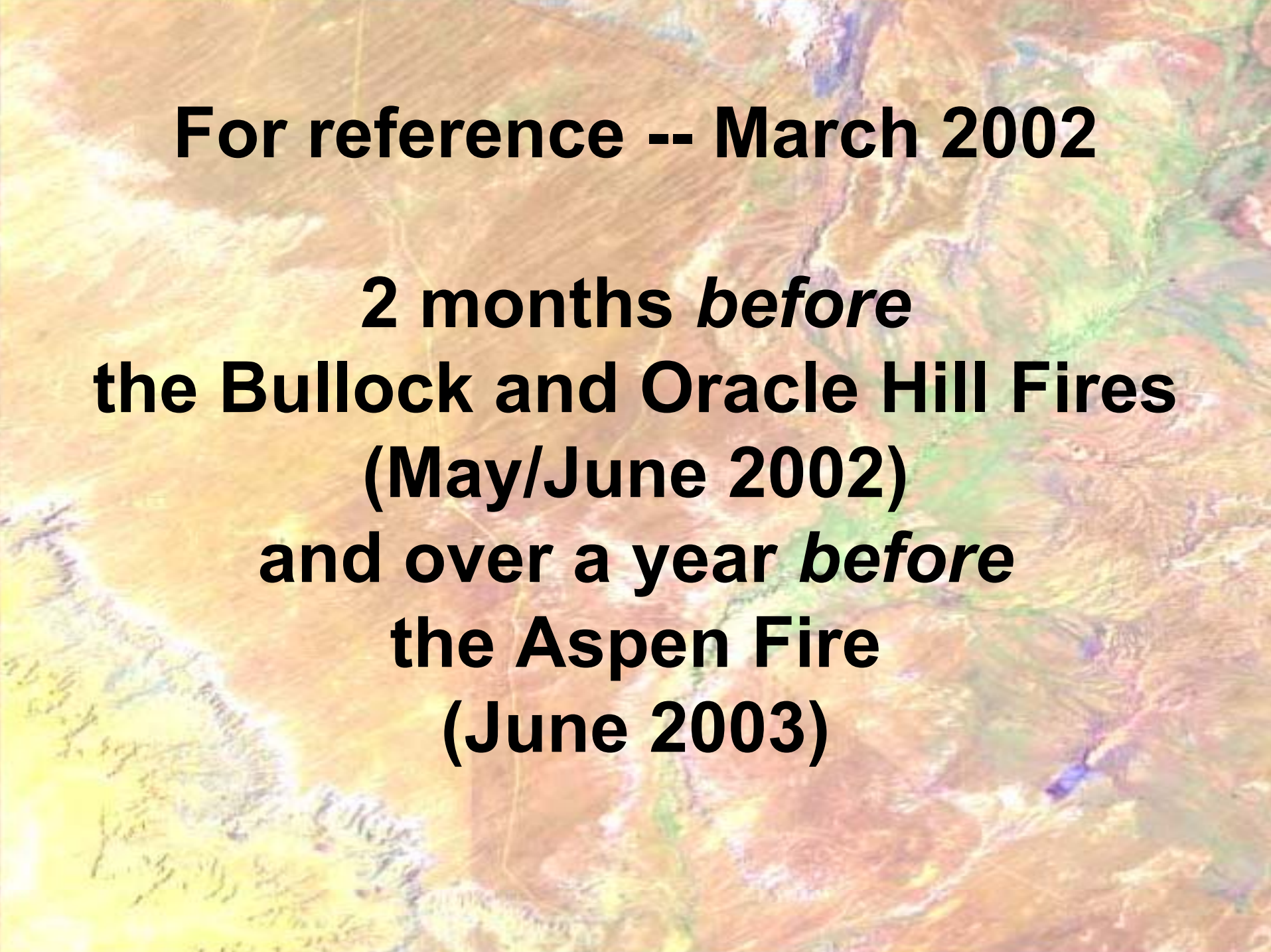


**This will take some time ...**

Capturing Animation Request;  
Querying the Database;  
Setup Maps;  
Rendering Animation:

- Frame 1 (4%),
- Frame 2 (8%),
- Frame 3 (12%),
- Frame 4 (15%),
- Frame 5 (19%),
- Frame 6 (23%),
- Frame 7 (27%),
- Frame 8 (31%),
- Frame 9 (35%),
- Frame 10 (38%),
- Frame 11 (42%),
- Frame 12 (46%),
- Frame 13 (50%),
- Frame 14 (54%),
- Frame 15 (58%),
- Frame 16 (62%),
- Frame 17 (65%),
- Frame 18 (69%),
- Frame 19 (73%),
- Frame 20 (77%),
- Frame 21 (81%),



An aerial photograph of a mountainous region, likely in the Sierra Nevada. The terrain is rugged with various shades of brown, tan, and green. A prominent feature is a large, irregularly shaped area of lighter, yellowish-brown color, which is a fire scar. This scar is located in the lower-left quadrant of the image. The surrounding forested areas are in various stages of regrowth, with some appearing as darker green and others as lighter, more sparse vegetation. The overall scene is a mix of natural beauty and the aftermath of a major wildfire.

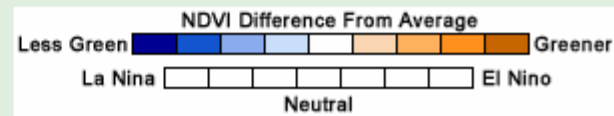
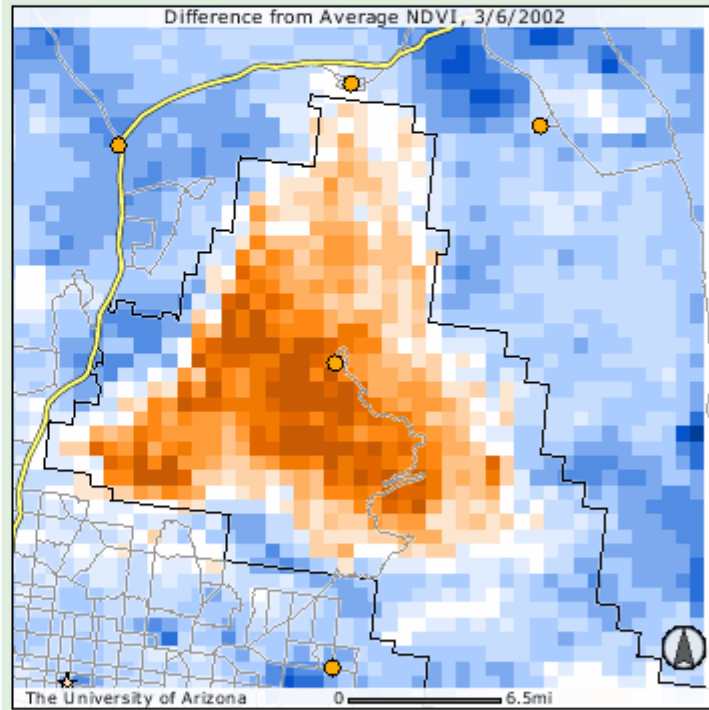
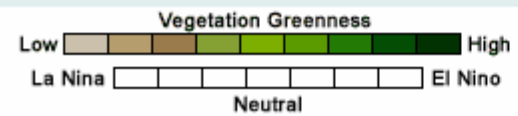
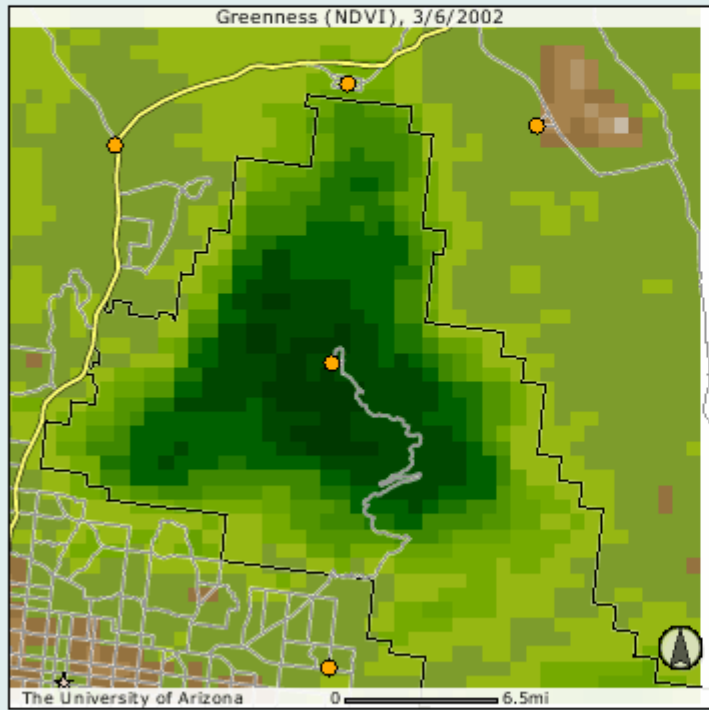
**For reference -- March 2002**

**2 months *before*  
the Bullock and Oracle Hill Fires  
(May/June 2002)  
and over a year *before*  
the Aspen Fire  
(June 2003)**

# Dynamic NDVI Animation

Navigation controls: Play, Stop, Previous, Next, Speed, Refresh, Repeat, and a text input field. A yellow **Back** button is also present.

Jan Feb **Mar** Apr May Jun Jul Aug Sep Oct Nov Dec





An aerial photograph of a mountainous landscape. The terrain is covered in dense forest, with a prominent fire scar visible in the lower-left quadrant. The fire scar is a large, irregularly shaped area where the forest has been destroyed, appearing as a lighter, brownish-yellow color. The surrounding forest is a mix of green and brown, indicating different types of vegetation or perhaps the progression of the fire. The overall scene is a natural, rugged environment.

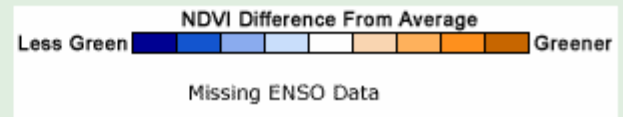
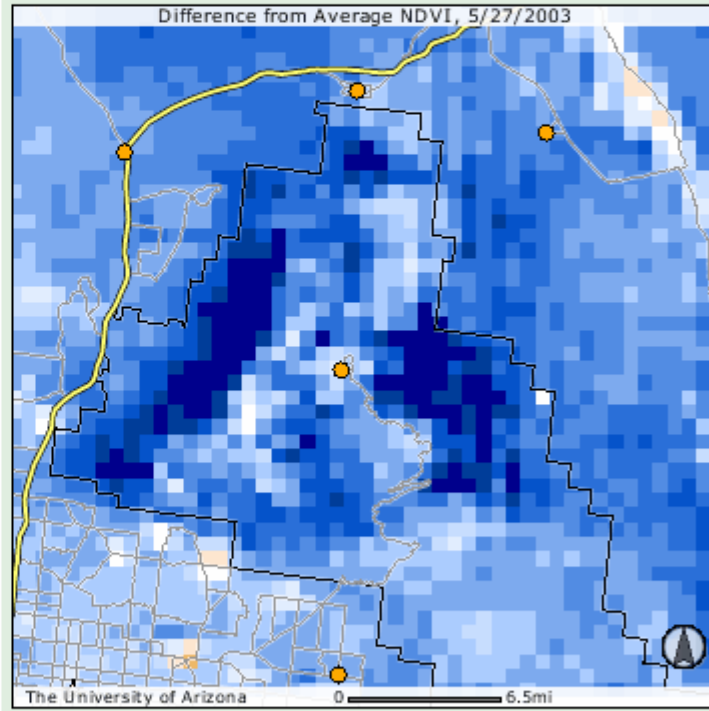
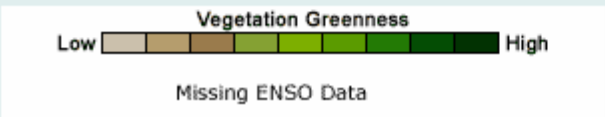
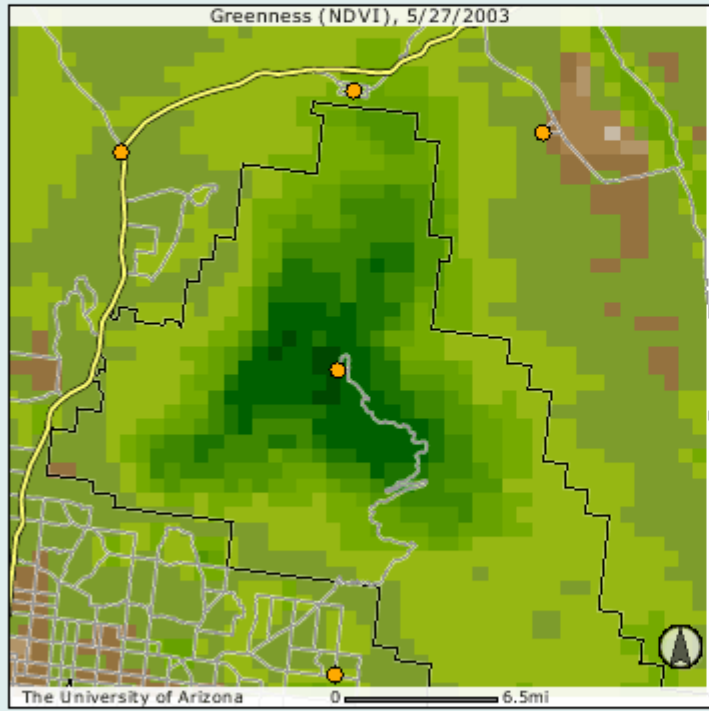
# **Aspen Fire 2003**

**(time-series animation begins  
in May 2003 – the fire hits in  
late June)**

# Dynamic NDVI Animation

Navigation controls: Play, Stop, Previous, Next, Speed, Repeat, Back

Jan Feb Mar Apr **May** Jun Jul Aug Sep Oct Nov Dec





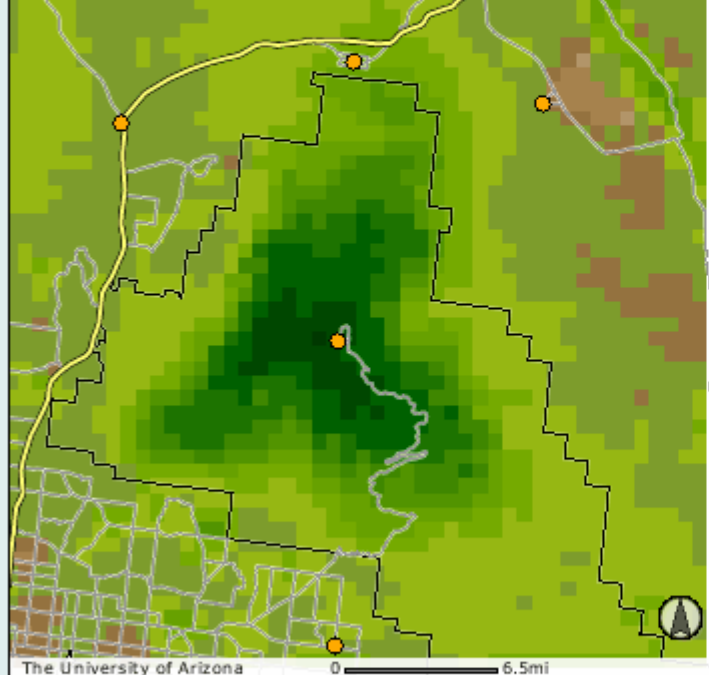


# Dynamic NDVI Animation

Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), and other playback buttons.

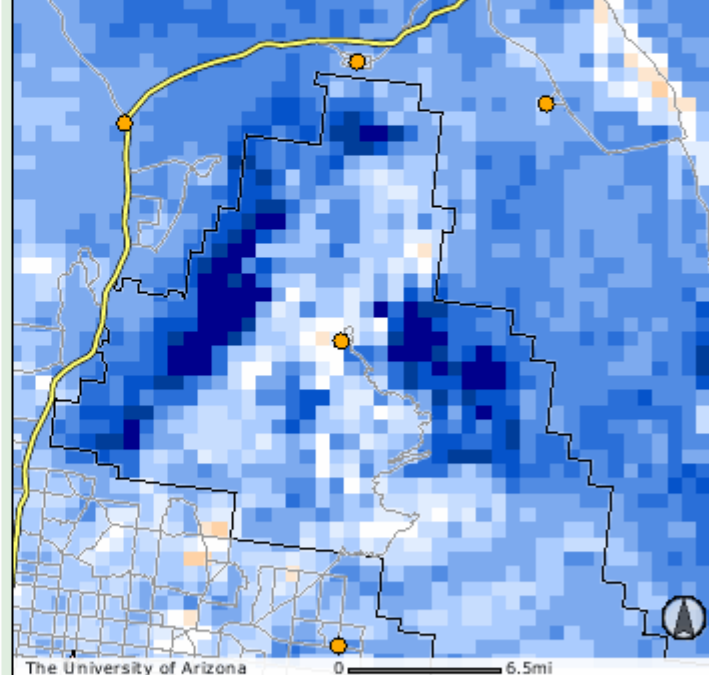
- Jan Feb Mar Apr May **Jun** Jul Aug Sep Oct Nov Dec

Greenness (NDVI), 6/10/2003



**Vegetation Greenness**  
Low [Color Scale] High  
Missing ENSO Data

Difference from Average NDVI, 6/10/2003



**NDVI Difference From Average**  
Less Green [Color Scale] Greener  
Missing ENSO Data



# Dynamic NDVI Animation

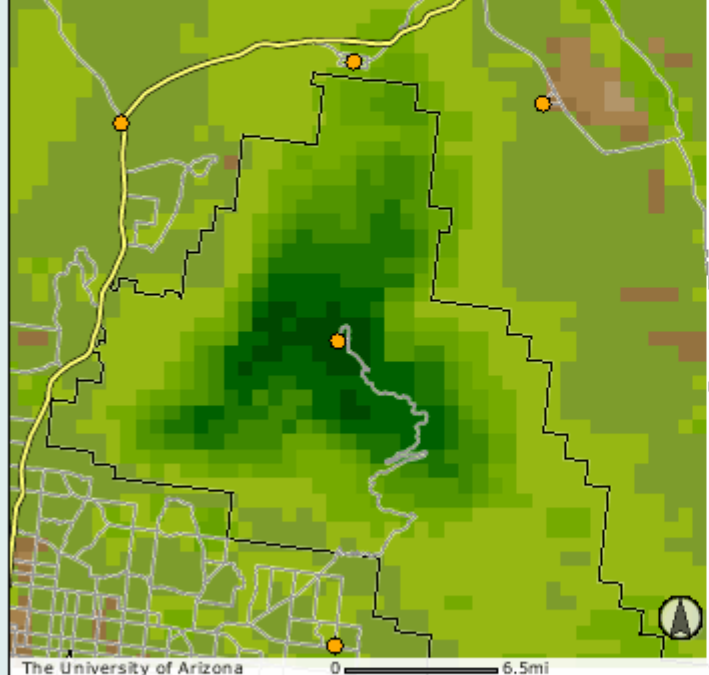


Navigation controls: Play/Pause, Stop, Previous, Next, Speed (SPEED), Repeat, Refresh, and a text input field.

[Back](#)

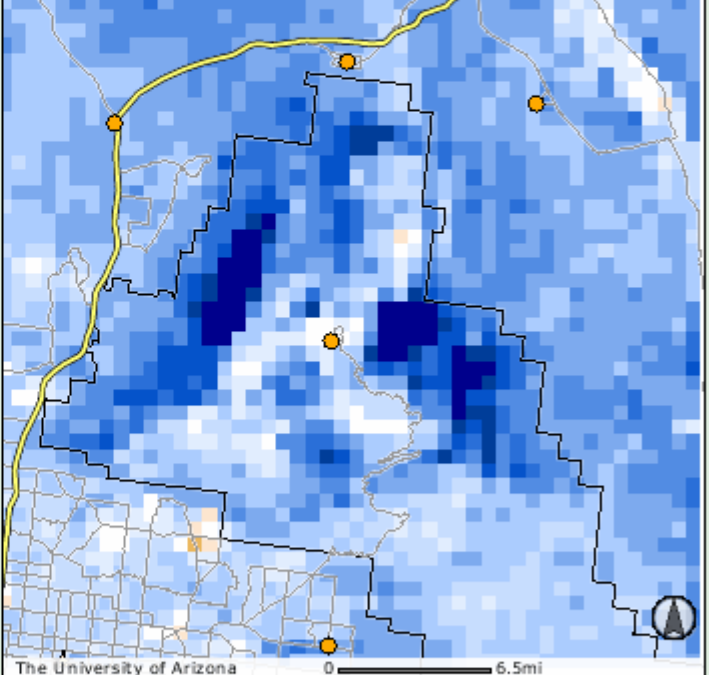
- Jan
- Feb
- Mar
- Apr
- May
- Jun**
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

Greenness (NDVI), 6/24/2003



**Vegetation Greenness**  
Low [Color scale from light to dark green] High  
Missing ENSO Data

Difference from Average NDVI, 6/24/2003

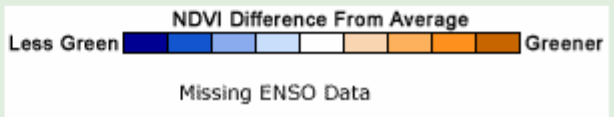
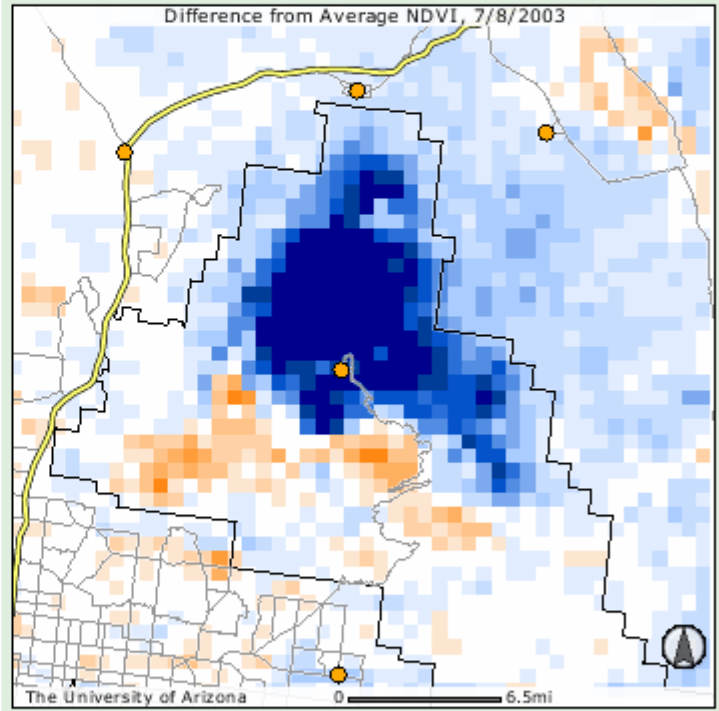
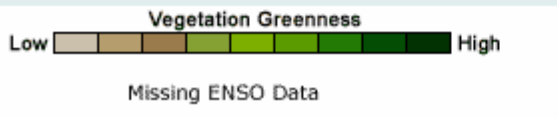
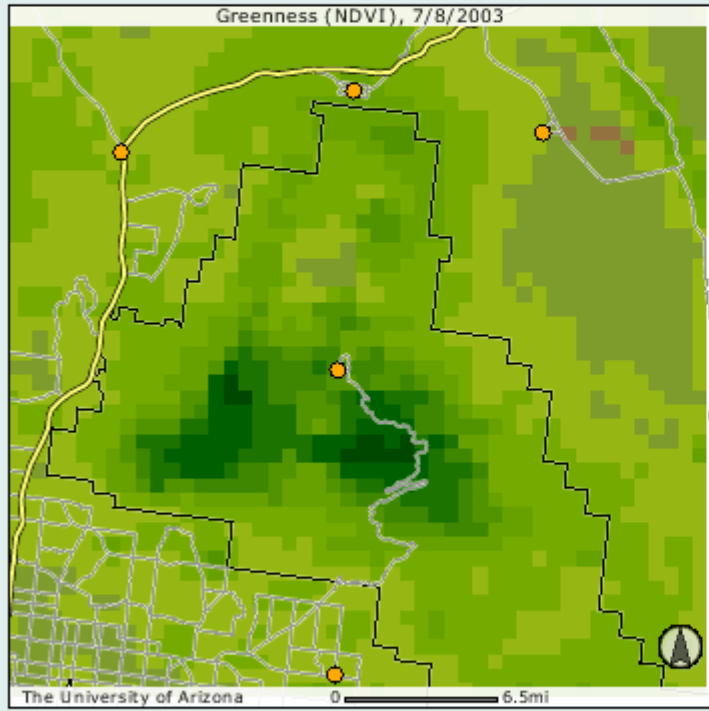


**NDVI Difference From Average**  
Less Green [Color scale from dark blue to light blue] Greener [Color scale from light blue to orange]  
Missing ENSO Data



**RANGE VIEW** Dynamic NDVI Animation ? Back

Jan Feb Mar Apr May Jun **Jul** Aug Sep Oct Nov Dec

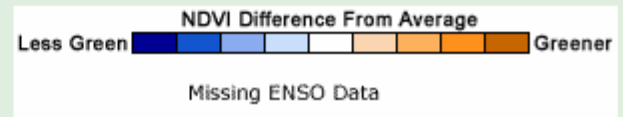
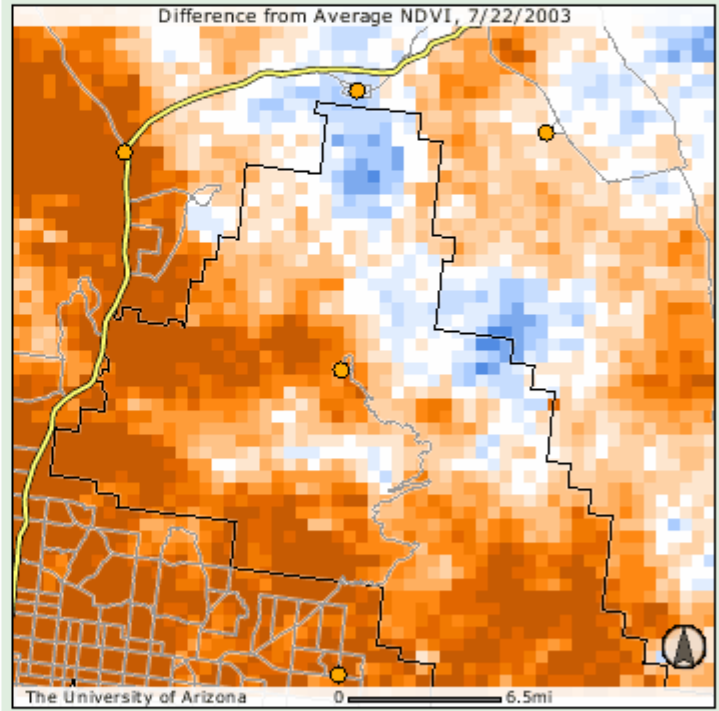
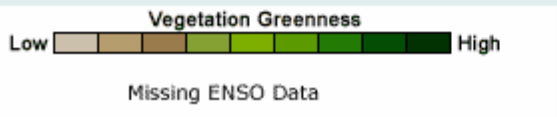
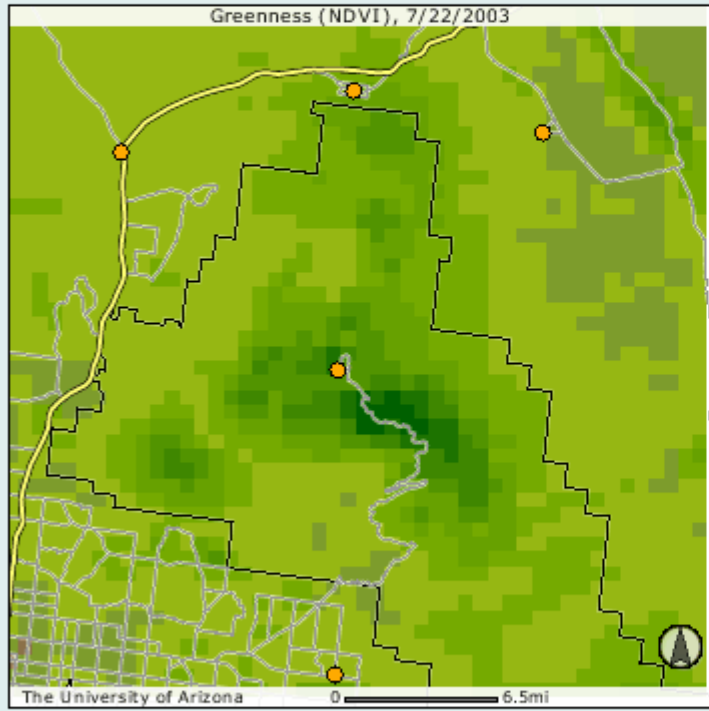




# Dynamic NDVI Animation

Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), Repeat, Refresh, and a time input field.

- Jan Feb Mar Apr May Jun **Jul** Aug Sep Oct Nov Dec



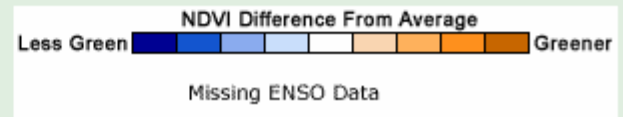
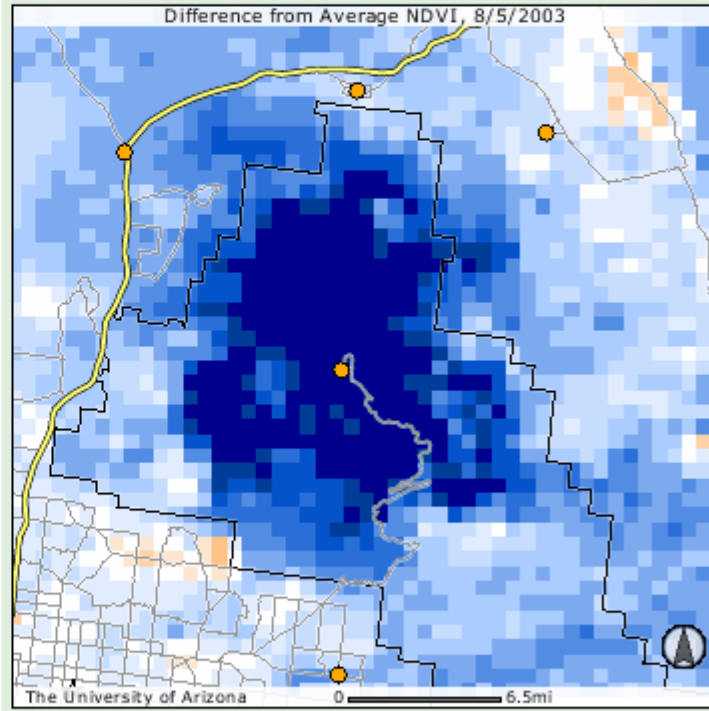
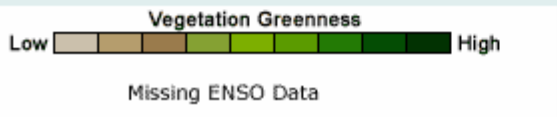
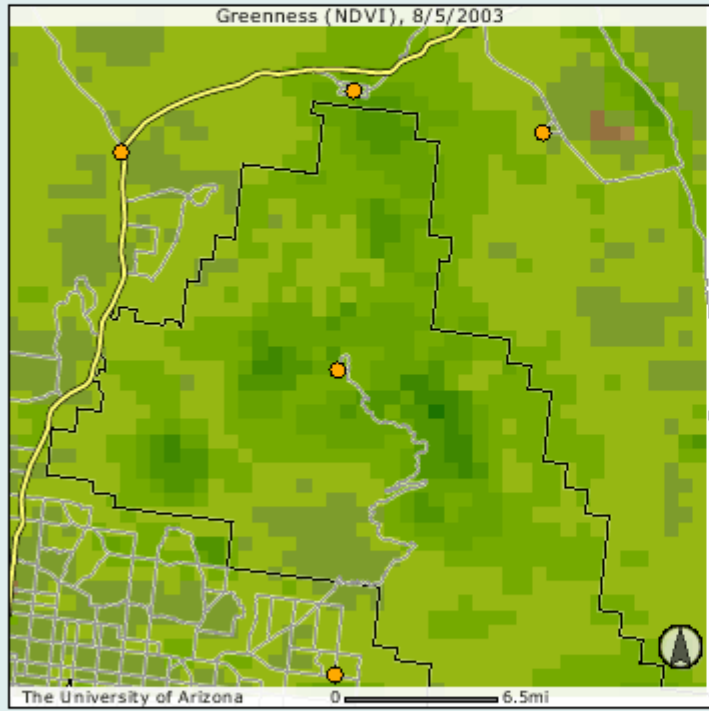




# Dynamic NDVI Animation

Navigation controls: Play/Pause, Stop, Previous, Next, Speed (SPEED), and other playback buttons.

- Jan Feb Mar Apr May Jun Jul **Aug** Sep Oct Nov Dec



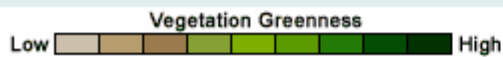
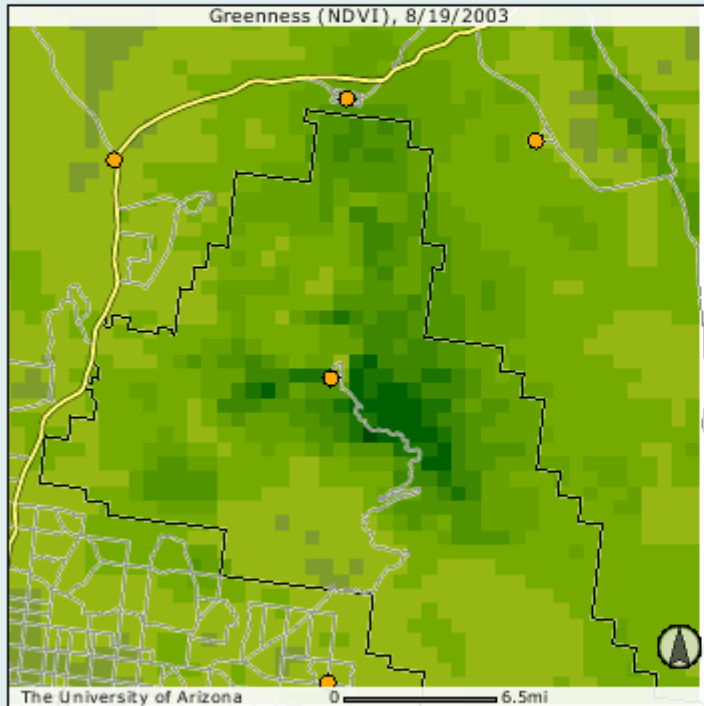


# Dynamic NDVI Animation

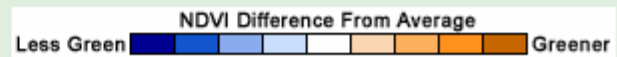
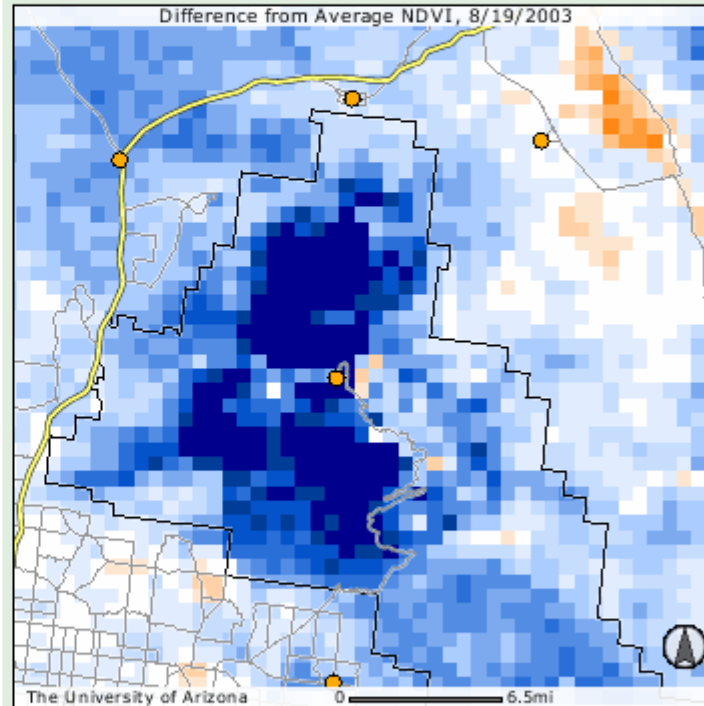


Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), and other playback buttons.

Jan Feb Mar Apr May Jun **Aug** Sep Oct Nov Dec



Missing ENSO Data



Missing ENSO Data

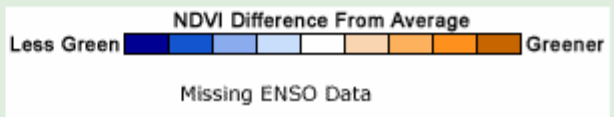
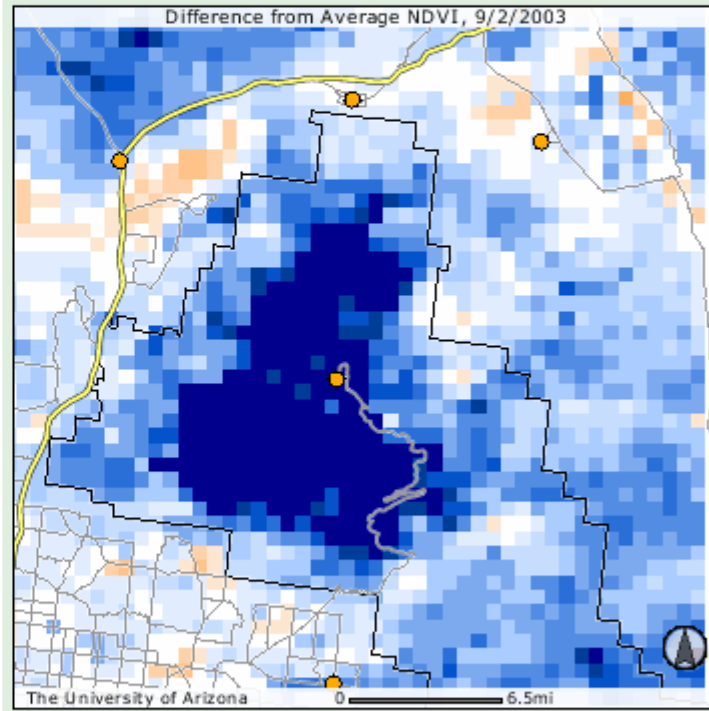
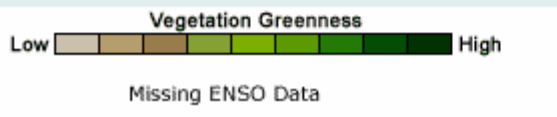
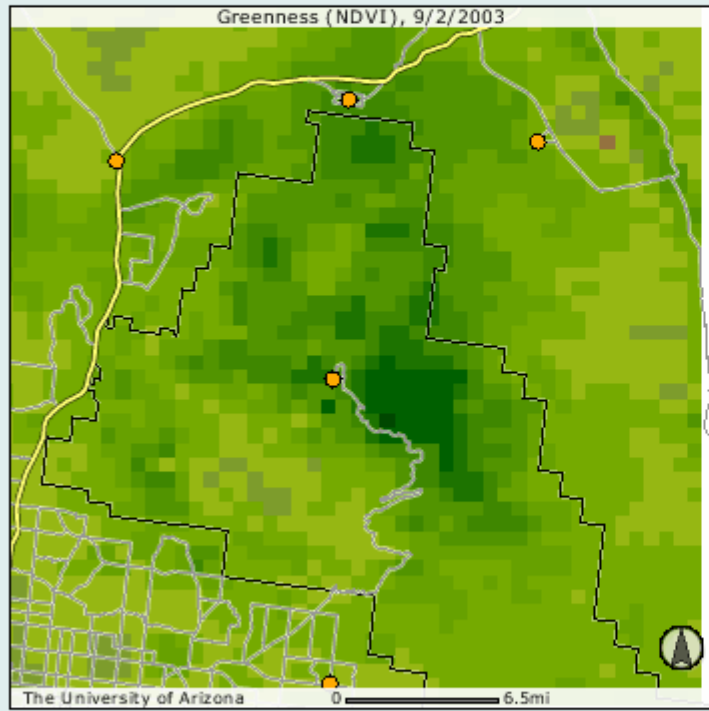




# Dynamic NDVI Animation

Navigation controls: Play, Stop, Previous, Next, Speed, Back

Jan Feb Mar Apr May Jun Jul Aug **Sep** Oct Nov Dec



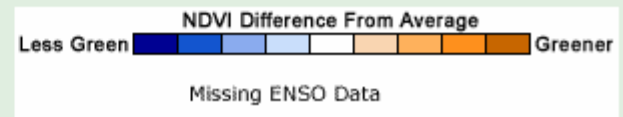
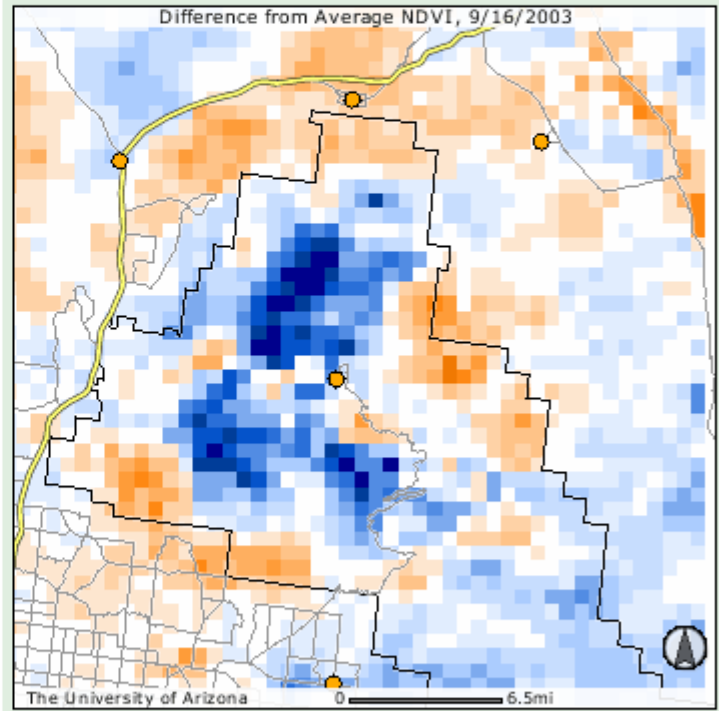
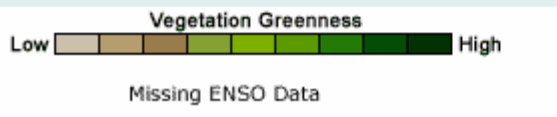
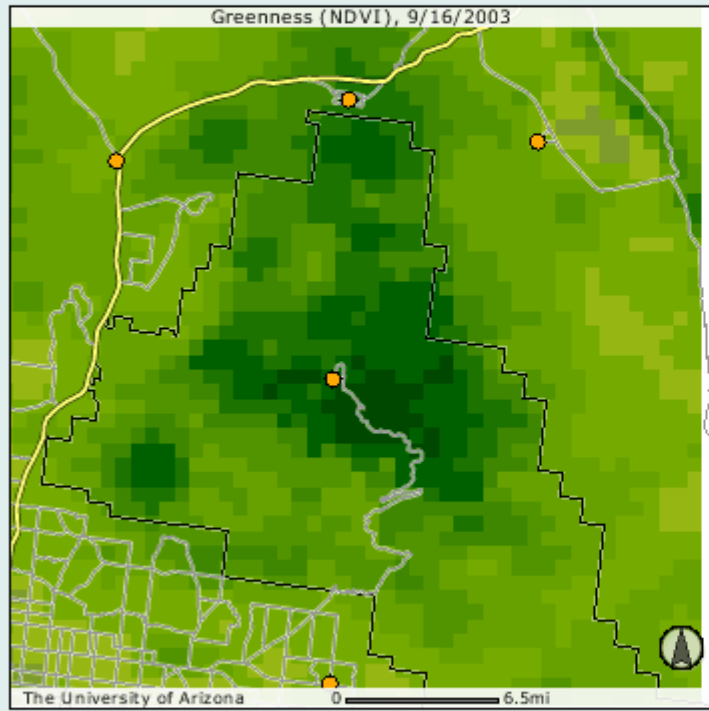


# Dynamic NDVI Animation



Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), and other playback buttons.

Jan Feb Mar Apr May Jun Jul Aug **Sep** Oct Nov Dec





# Thank You!

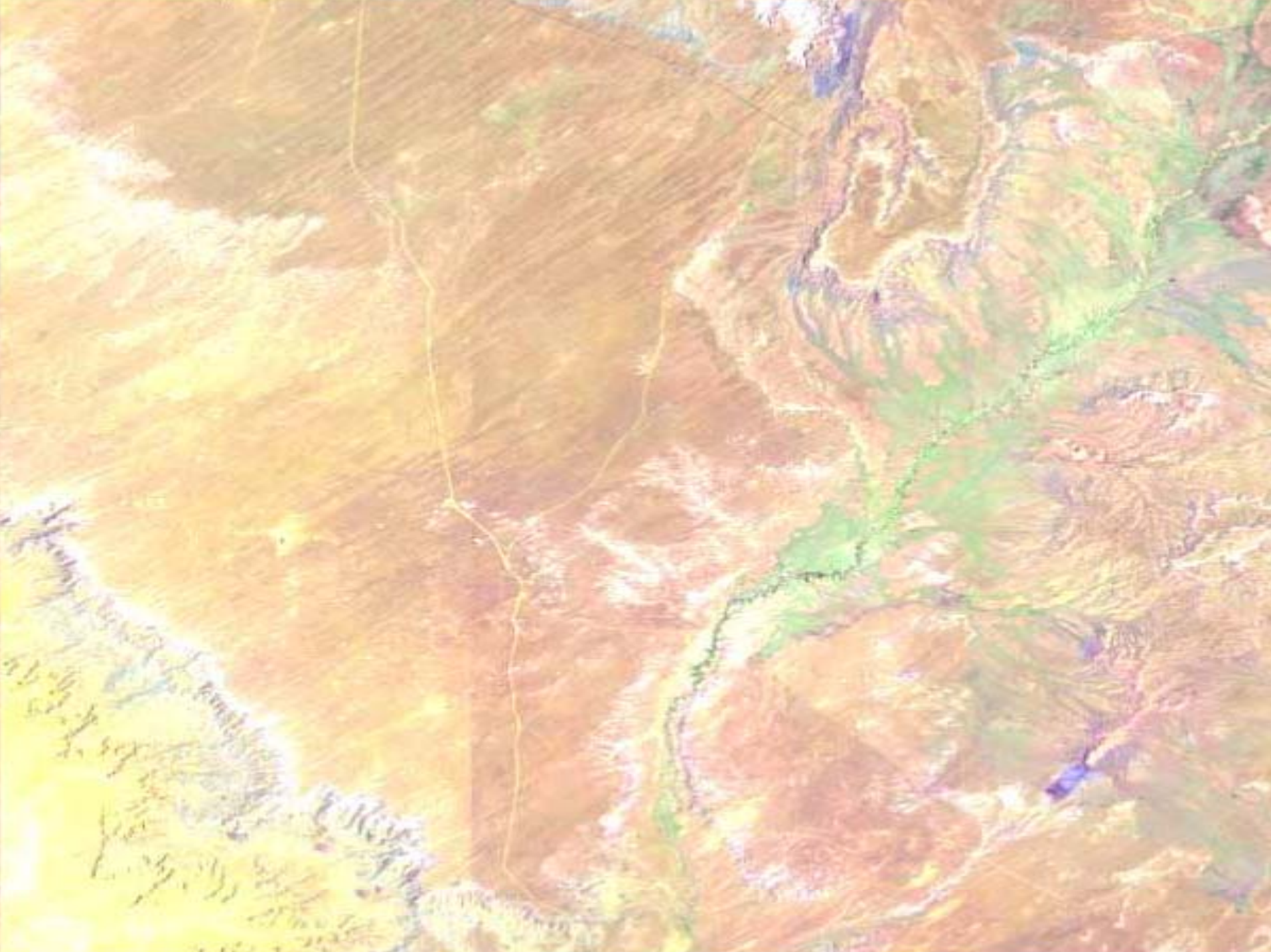
**Barron J. Orr**

Assistant Professor & Geospatial Extension Specialist

520-626-8063

[barron@ag.arizona.edu](mailto:barron@ag.arizona.edu)







An aerial photograph of a mountainous landscape, likely in the Black Hills region. The terrain is rugged with various shades of green, yellow, and brown, indicating different vegetation types and elevations. The text is overlaid on the image.

# **Vegetation Trends in 2002 and 2003 (June-September)**

**Rapid City area,  
Black Hills National Forest, and  
Badlands National Park**

**Dynamic NDVI Animation - Preview** ?

Pan 
  ZoomOut 
  ZoomIn 
 Zoom To: 
[Home](#)



Layer Name	Turn on/off
(Resolution) Layer Label	
Cities (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate	
Highways (Low)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blods	<input type="checkbox"/>



**Vegetation Greenness**

Data type:

Year:



**Vegetation Greenness**

Data type:

Year:



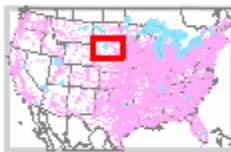
NDVI Dynamic Animation Tool - Microsoft Internet Explorer provided by ARSC

File Edit View Favorites Tools Help

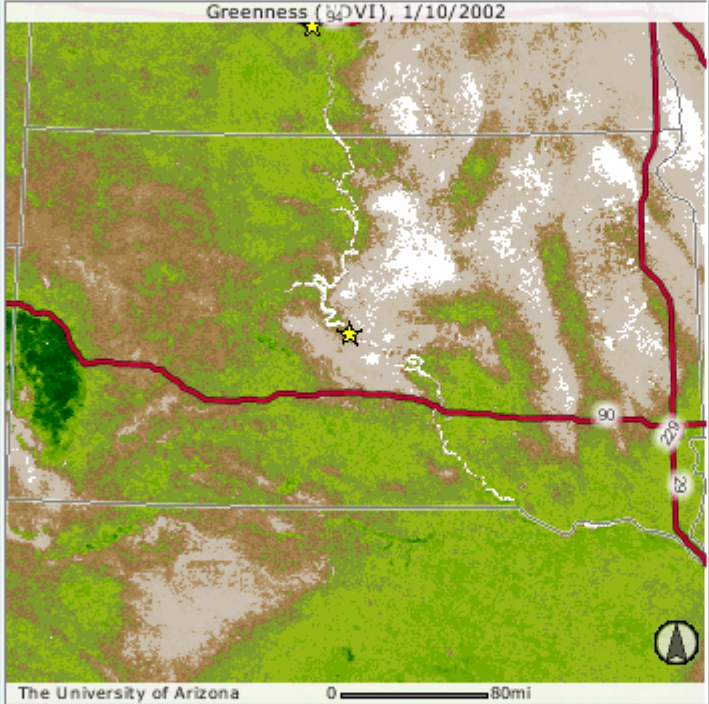
Address <http://geodiva.arid.arizona.edu/rv/dynam/launch.asp>

## Dynamic NDVI Animation - Preview

Pan
  ZoomOut
  ZoomIn
 Zoom To: 
[Home](#)

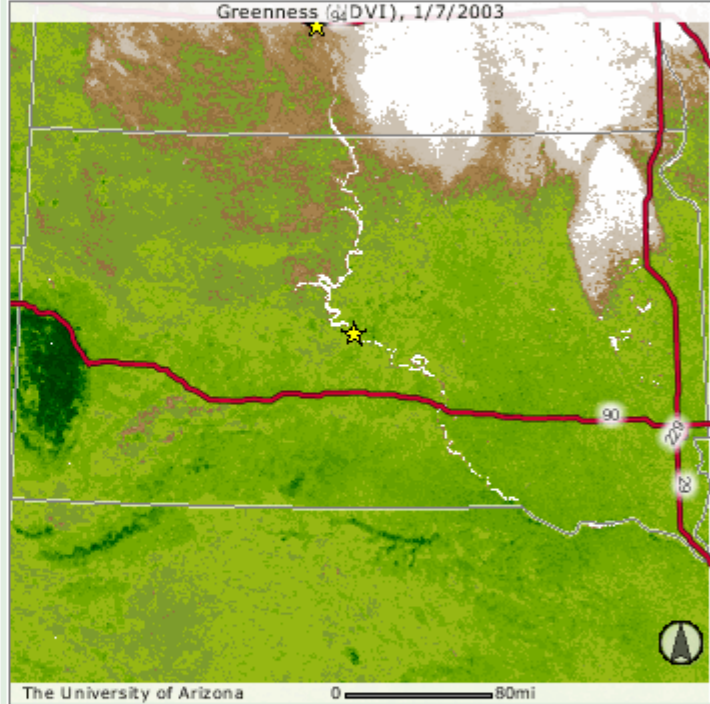


Greenness (NDVI), 1/10/2002



The University of Arizona 0 80mi


Greenness (NDVI), 1/7/2003



The University of Arizona 0 80mi

Layer Name	Turn on/off
(Resolution) Layer	Label
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Cities (Medium)	<input checked="" type="checkbox"/> <input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Interstate Highways	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (Low)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Roads (High)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (500m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Contours (100m)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Lakes (Low)	<input type="checkbox"/> <input type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/> <input type="checkbox"/>
Urban Areas	<input type="checkbox"/> <input type="checkbox"/>
10 Degree Lat/Long Blocks	<input type="checkbox"/> <input type="checkbox"/>


**Vegetation Greenness**

Low  High

Data type:

Year:

**Vegetation Greenness**

Low  High

Data type:

Year:

Done Internet

# Dynamic NDVI Animation - Preview



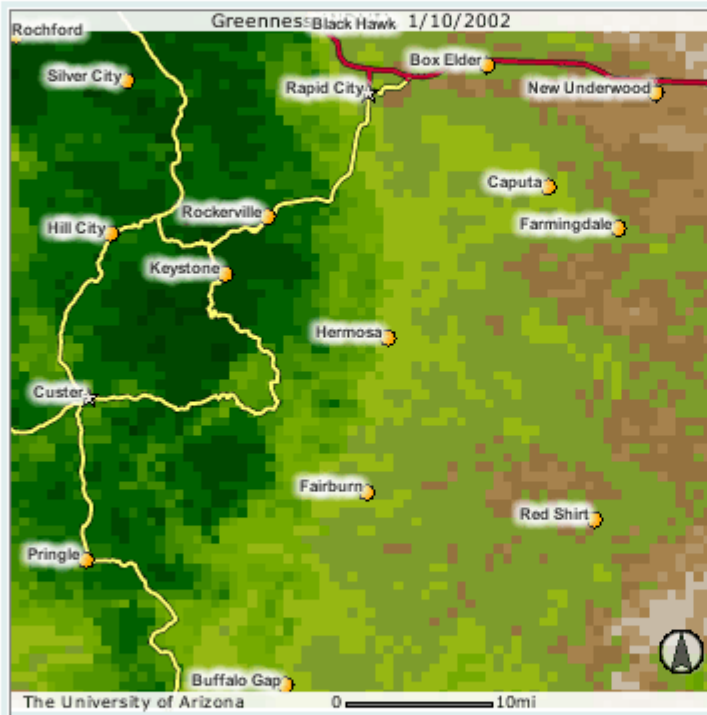
Pan
  ZoomOut
  ZoomIn
 Zoom To:

[Home](#)



Layer Name Turn on/off

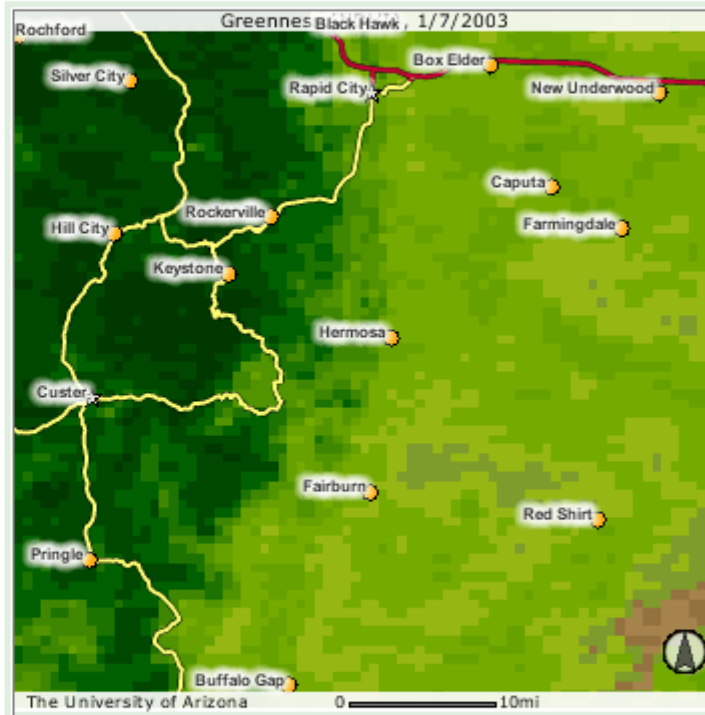
(Resolution)	Layer	Label
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Cities (Medium)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cities (High)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Interstate Highways (Low)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Roads (Medium)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Roads (High)	<input type="checkbox"/>	<input type="checkbox"/>
Contours (500m)	<input type="checkbox"/>	<input type="checkbox"/>
Contours (100m)	<input type="checkbox"/>	<input type="checkbox"/>
Lakes (Low)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Rivers & Lakes (Medium)	<input type="checkbox"/>	<input type="checkbox"/>
Urban Areas	<input type="checkbox"/>	<input type="checkbox"/>
10 Degree Lat/Long Blocks	<input type="checkbox"/>	



Data type:

Year:

Refresh



Data type:

Year:

Animate





## Processing the Requested Animation



**This will take some time ...**

Capturing Animation Request;  
Querying the Database;  
Setup Maps;  
Rendering Animation:

- Frame 1 (4%),
- Frame 2 (8%),
- Frame 3 (12%),
- Frame 4 (15%),
- Frame 5 (19%),
- Frame 6 (23%),
- Frame 7 (27%),
- Frame 8 (31%),
- Frame 9 (35%),
- Frame 10 (38%),
- Frame 11 (42%),
- Frame 12 (46%),
- Frame 13 (50%),
- Frame 14 (54%),
- Frame 15 (58%),
- Frame 16 (62%),
- Frame 17 (65%),
- Frame 18 (69%),
- Frame 19 (73%),
- Frame 20 (77%),
- Frame 21 (81%),



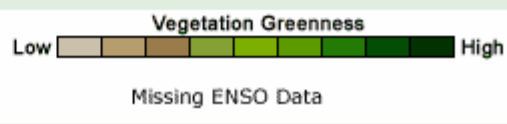
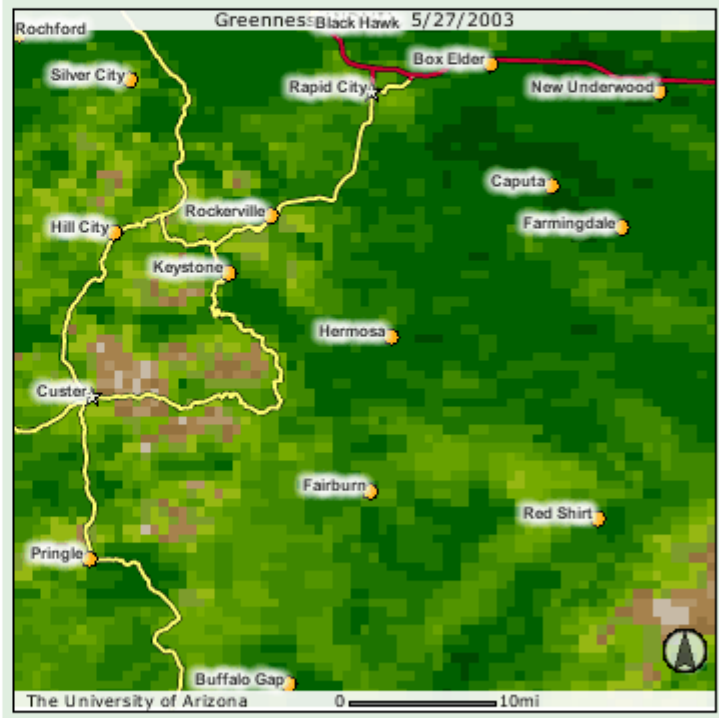
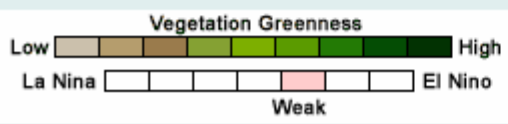
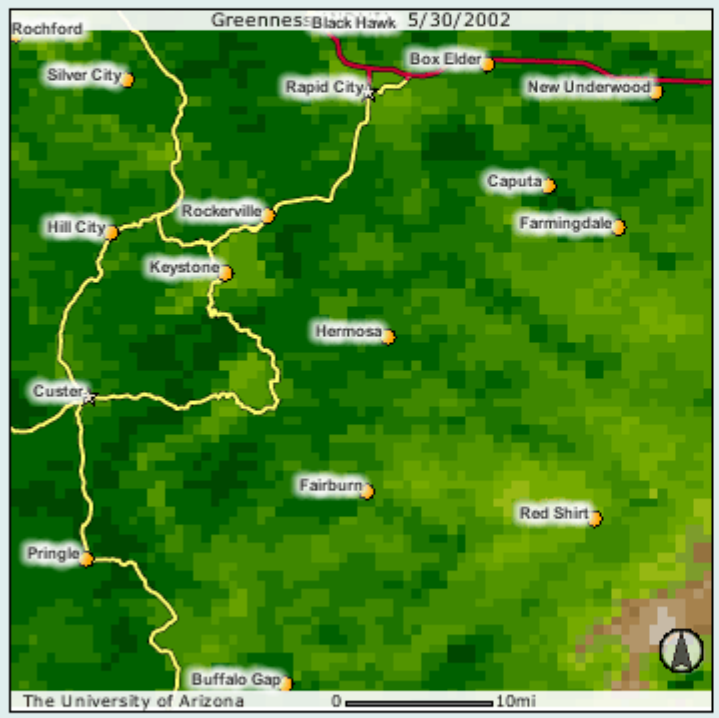
# Dynamic NDVI Animation



Navigation controls: Previous, Play, Next, Stop, Speed (SPEED), Previous, Play, Next, Refresh, and a time input field.

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- Jan Feb Mar Apr **May** Jun Jul Aug Sep Oct Nov Dec





## Dynamic NDVI Animation

**RANGE VIEW**

⏪
⏴
⏵
⏩
⏮
SPEED
⏭
⏪
⏩
⏮
⏭
⏩
⏮
⏭
⏩

Jan Feb Mar Apr May **Jun** Jul Aug Sep Oct Nov Dec

Rochford **Greennes=Black Hawk 6/13/2002**

The University of Arizona 0 10mi

Rochford **Greennes=Black Hawk 6/10/2003**

The University of Arizona 0 10mi

**Vegetation Greenness**

Low  High

La Nina  El Nino

Weak

**Vegetation Greenness**

Low  High

Missing ENSO Data



## Dynamic NDVI Animation

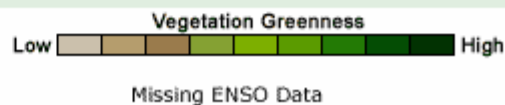
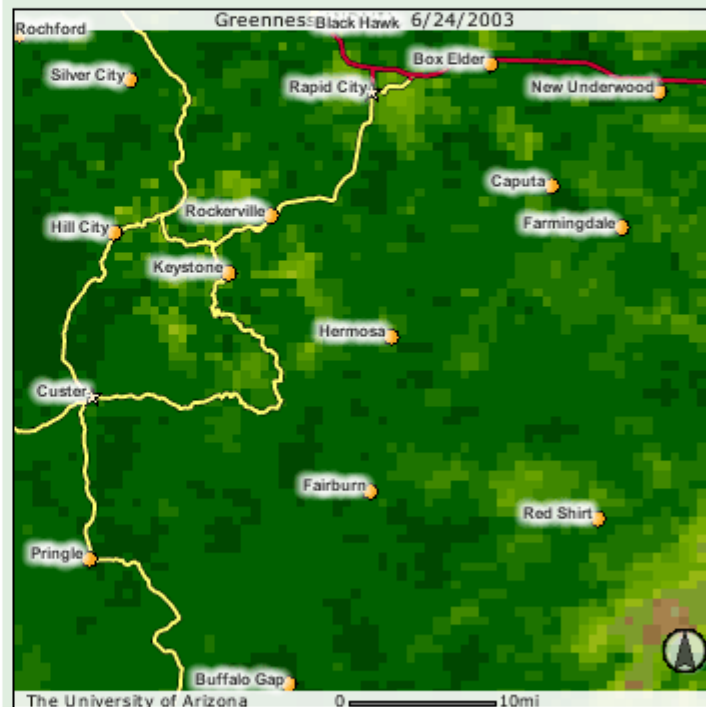
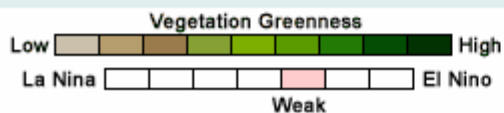
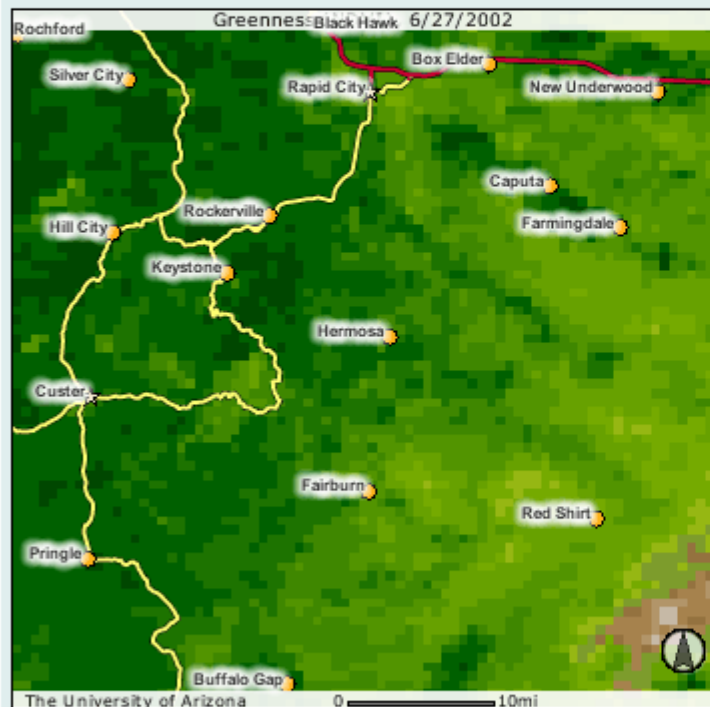


SPEED



Back

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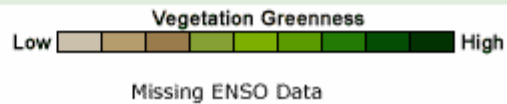
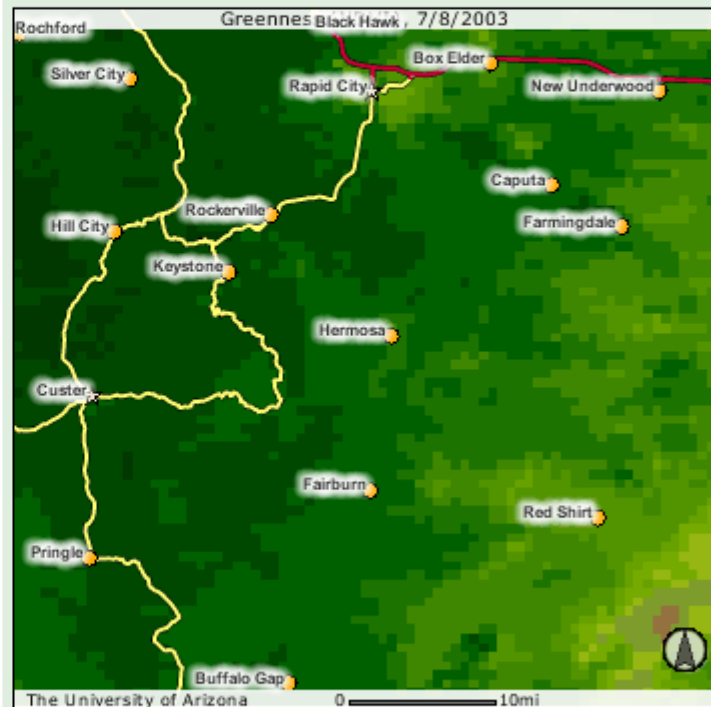
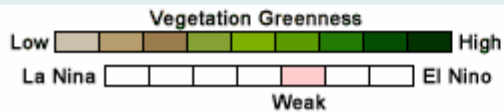
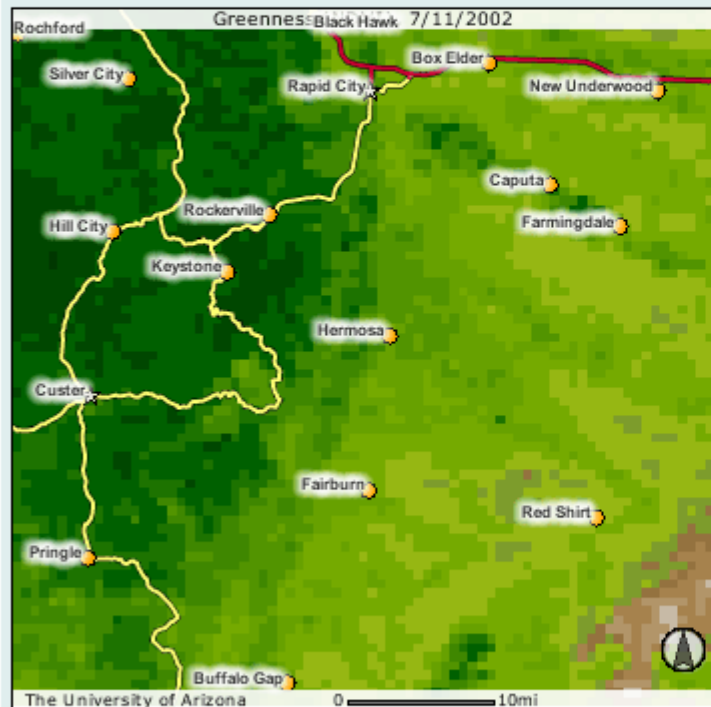
# Dynamic NDVI Animation



Navigation controls: Previous, Play, Next, Stop, Speed (SPEED), and other playback buttons.

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Dynamic NDVI Animation - Microsoft Internet Explorer provided by ARSC

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Address <http://geodiva.arid.arizona.edu/rv/dynam/animation.asp> Go

## Dynamic NDVI Animation

Navigation: [Previous] [Previous] [Previous] [Stop] [Next] [Next] [Next] [SPEED] [Next] [Previous] [Previous] [Previous]

Month Selector: Jan Feb Mar Apr May Jun **Jul** Aug Sep Oct Nov Dec

Rochford  
Silver City  
Rapid City  
Box Elder  
New Underwood  
Caputa  
Farmingdale  
Hill City  
Rockerville  
Keystone  
Hermosa  
Custer  
Fairburn  
Red Shirt  
Pringle  
Buffalo Gap

Greennes=Black Hawk 7/25/2002

The University of Arizona 0 10mi

Rochford  
Silver City  
Rapid City  
Box Elder  
New Underwood  
Caputa  
Farmingdale  
Hill City  
Rockerville  
Keystone  
Hermosa  
Custer  
Fairburn  
Red Shirt  
Pringle  
Buffalo Gap

Greennes=Black Hawk 7/22/2003

The University of Arizona 0 10mi

Vegetation Greenness Low High

La Nina Weak El Nino

Vegetation Greenness Low High

Missing ENSO Data

Internet



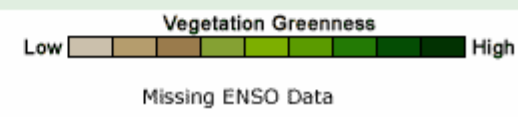
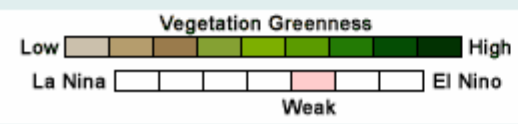
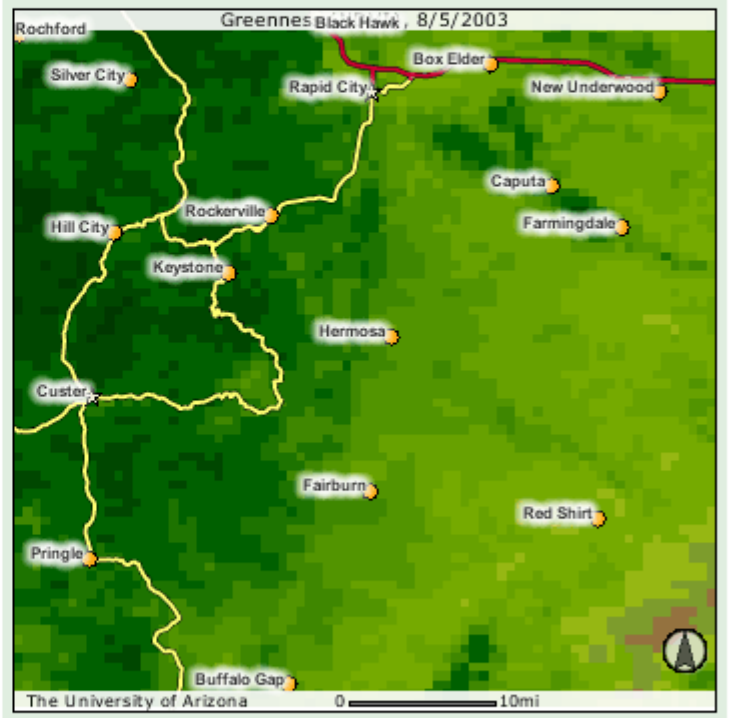
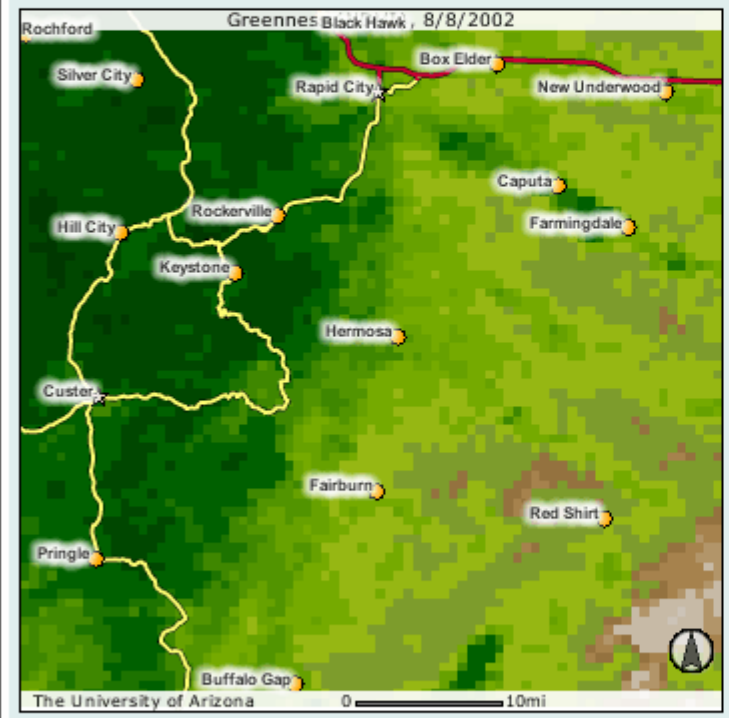


# Dynamic NDVI Animation

Back

Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), and a progress bar.

- Jan Feb Mar Apr May Jun **Aug** Sep Oct Nov Dec



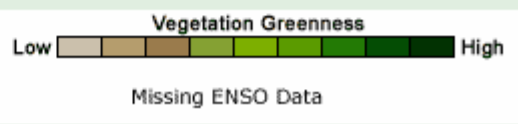
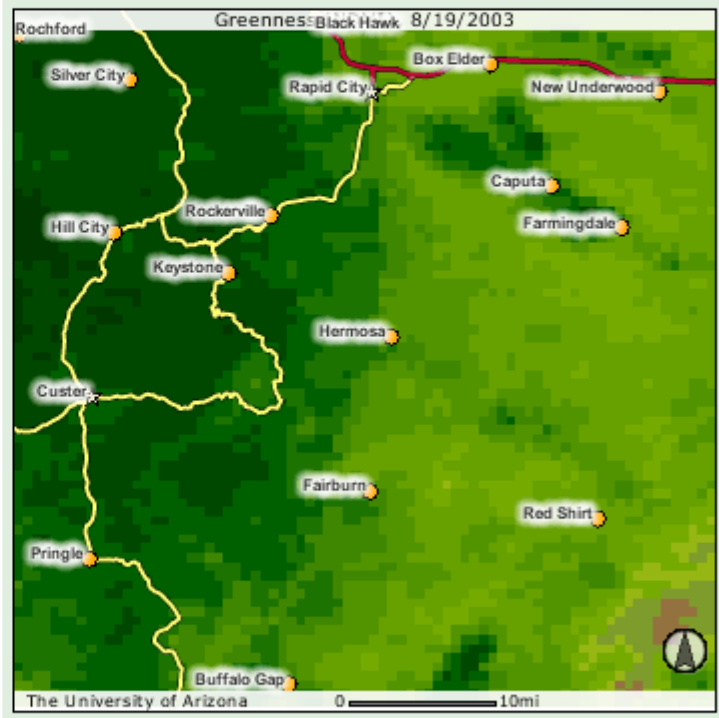
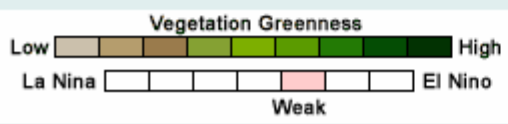
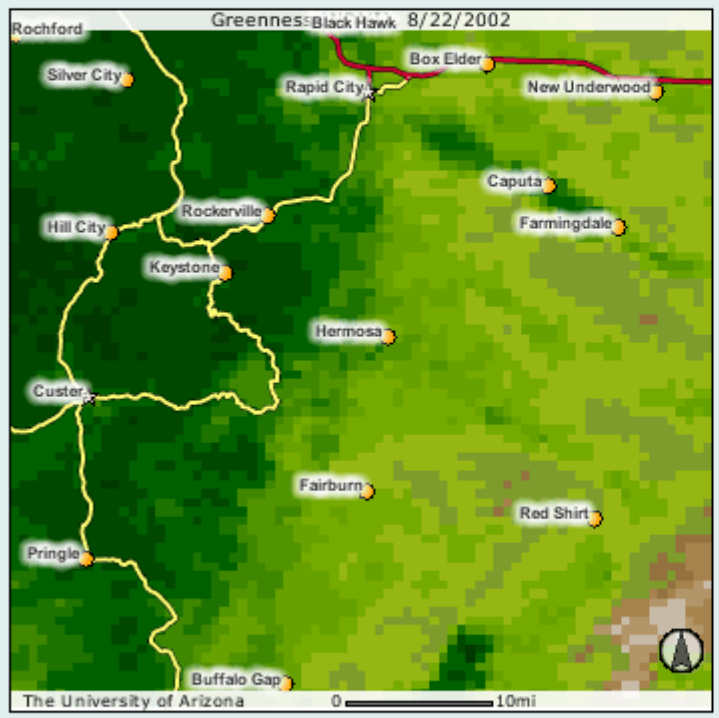


## Dynamic NDVI Animation



Navigation controls: Play, Stop, Previous, Next, Speed (SPEED), and Refresh buttons.

- Jan Feb Mar Apr May Jun **Aug** Sep Oct Nov Dec







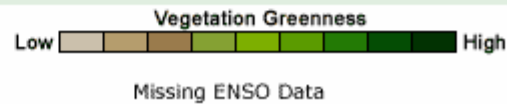
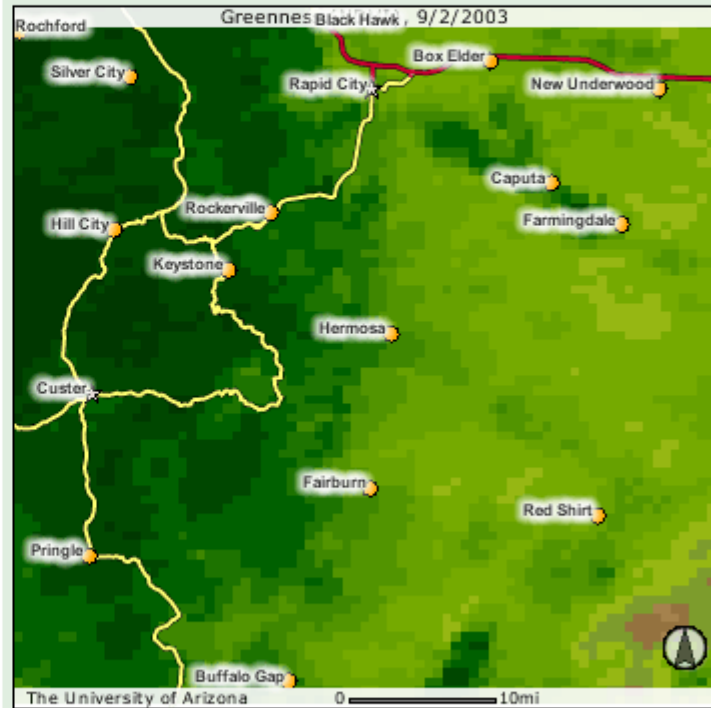
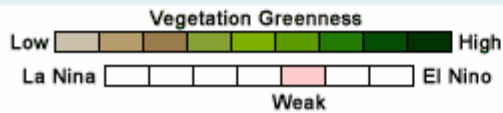
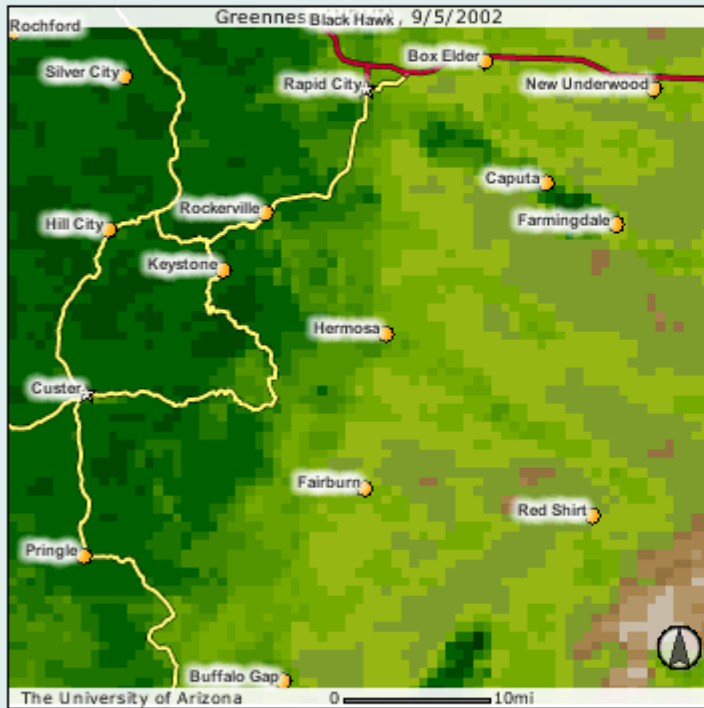
# Dynamic NDVI Animation



Navigation controls including back, forward, and speed adjustment buttons.

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## Dynamic NDVI Animation

Rochford Greennes=Black Hawk 9/19/2002

The University of Arizona 0 10mi

Rochford Greennes=Black Hawk 9/16/2003

The University of Arizona 0 10mi

Vegetation Greenness

Low High

La Nina Weak El Nino

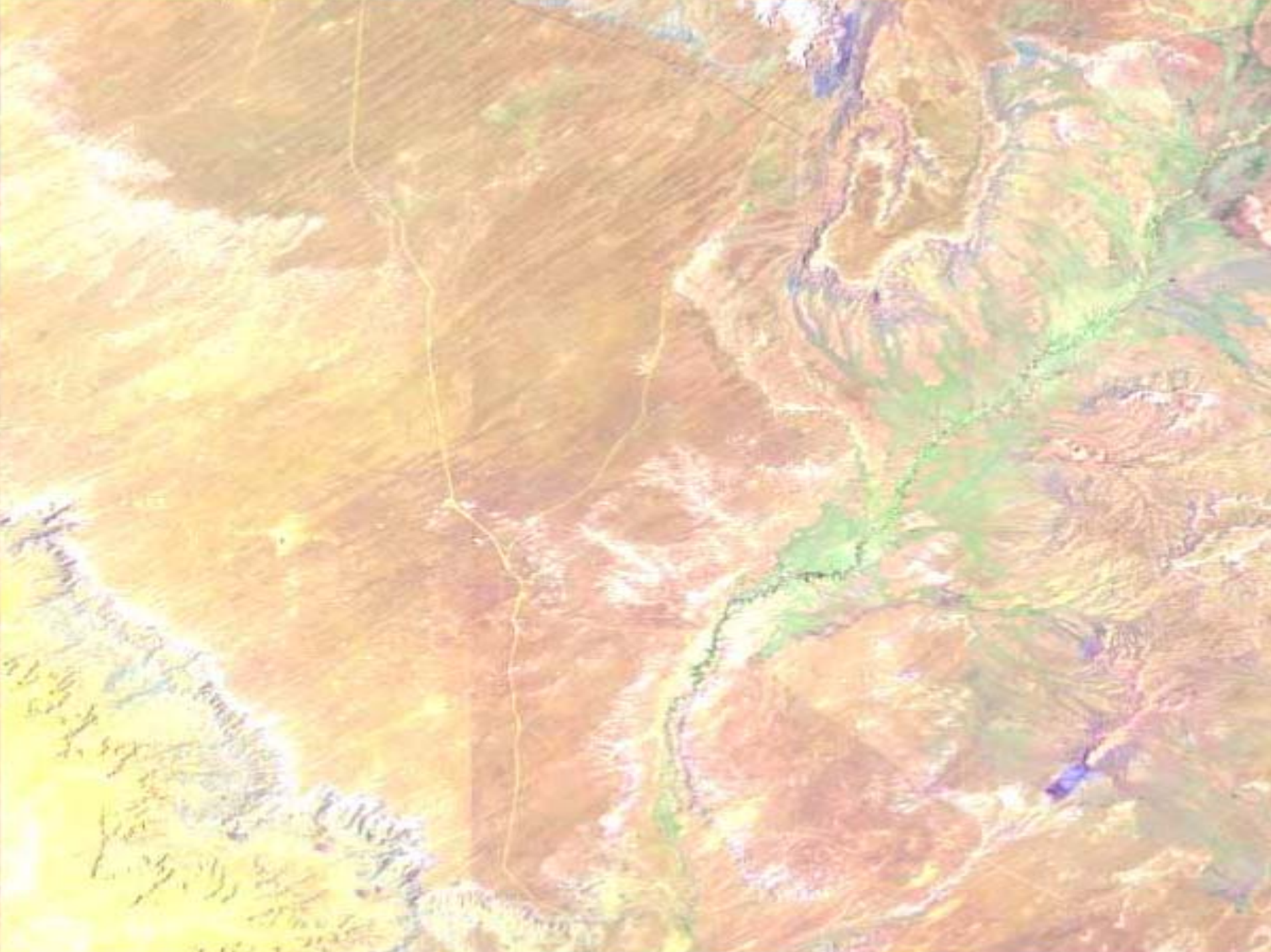
Vegetation Greenness

Low High

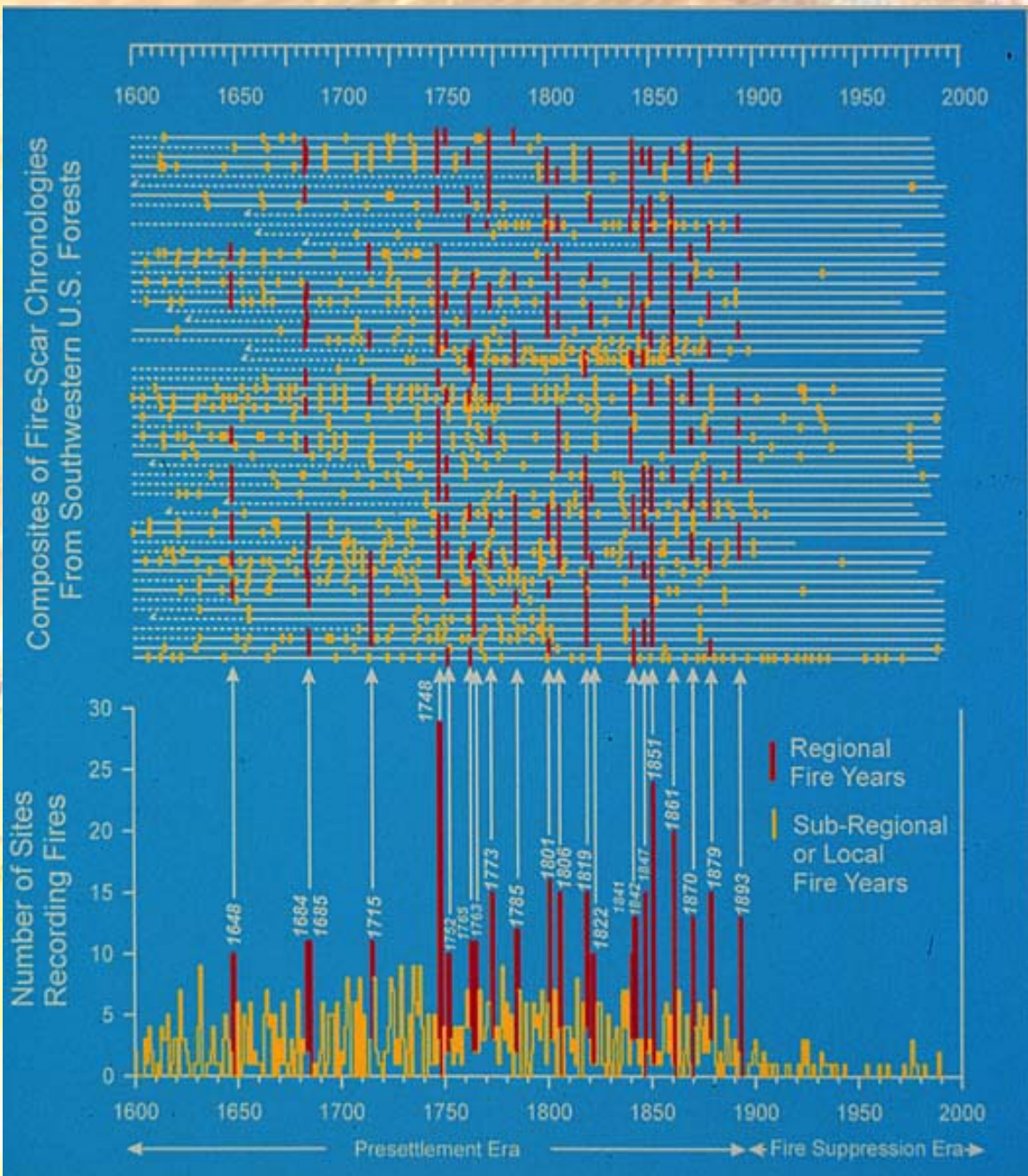
Missing ENSO Data

Internet









# Changes in the Wildfire Regime

Graphics courtesy of T. Swetnam







1990

**Biondi, F. 1999. Ecological Applications 9:  
216-227**



# The Urban-Wildland Interface Has Expanded





# A Convergence of User Needs and Agency Missions



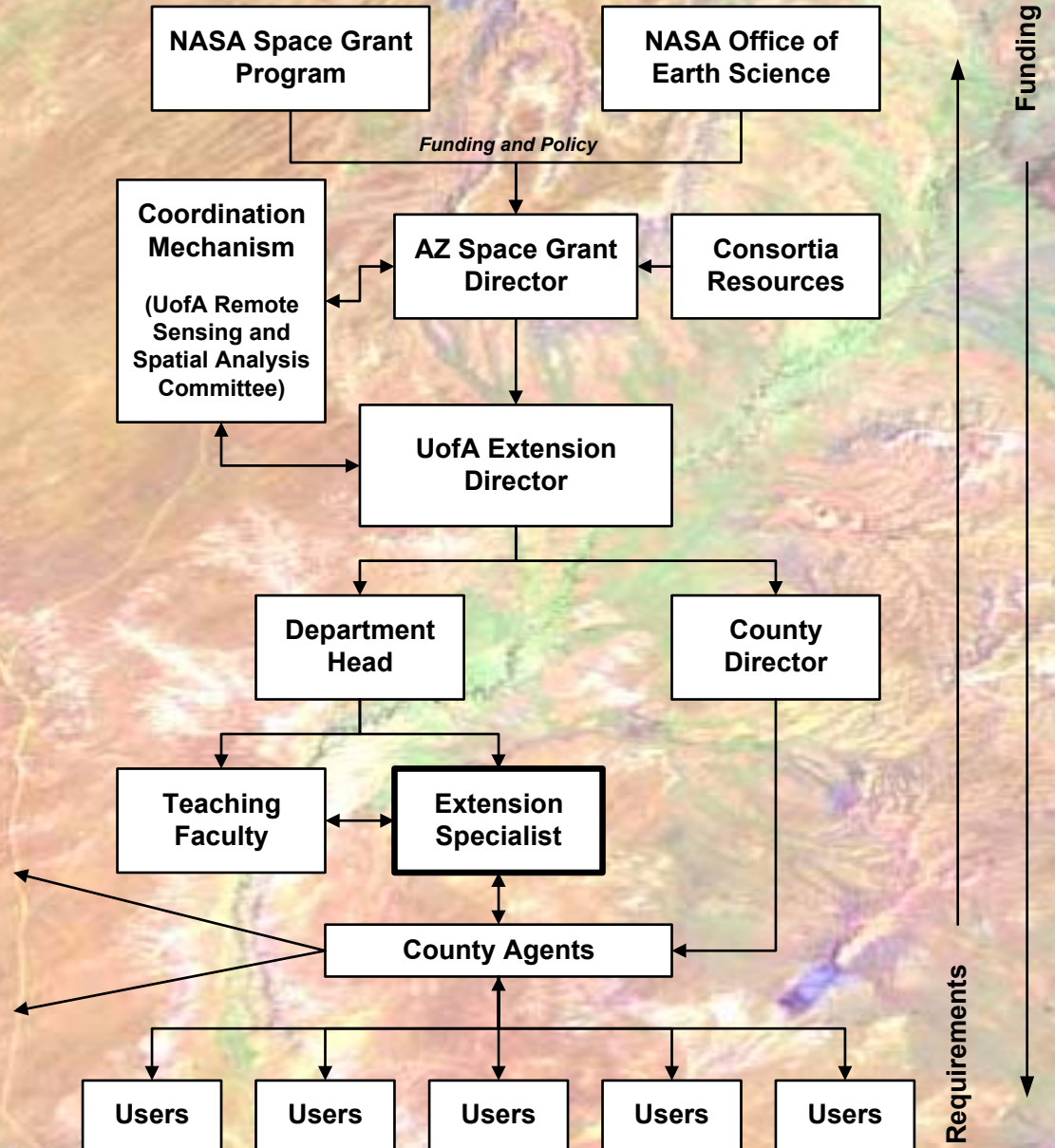


# Approach

## ARIZONA COUNTIES

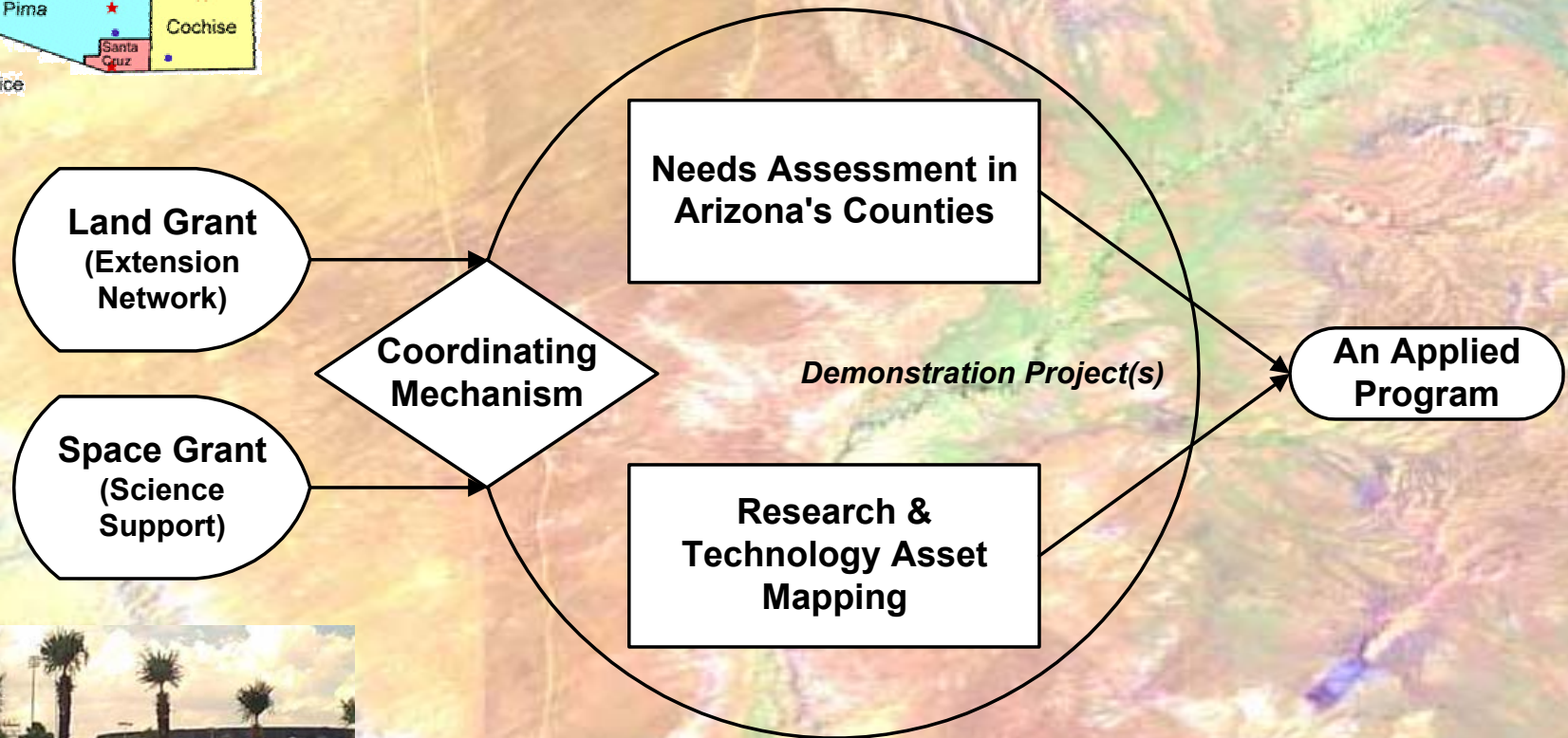


## ORGANIZATIONAL FLOW CHART





# To Meet Needs, It is Essential to Leverage Related R & D





# What Is Land Grant, Really ? !

- For this effort, the part of “Land Grant” we are interested in is Cooperative Extension.
- Arizona Cooperative Extension is the outreach arm of the University of Arizona, it is "taking the university to the people." Extension serves as a statewide network of knowledgeable faculty and staff that provides lifelong educational programs for all Arizonans. We are part of a nationwide educational network of scientists and educators who help people solve problems and put knowledge to use. Arizona Cooperative Extension provides a link between the university and the citizens of this state.
- Cooperative Extension is a statewide non-formal educational network bringing research-based information into communities to help people improve their lives.
- We are unique because our teaching efforts are made possible by a cooperative effort between the Federal Government, the University of Arizona's College of Agriculture and Life Sciences and each of the counties we serve.



THE UNIVERSITY OF ARIZONA,  
Cooperative Extension

*Taking the University to the People*



# Arizona Cooperative Extension - Who We Are Today

- 66 FACULTY based in counties
- 43 FACULTY based on campus
- 164 STAFF supporting county programs
- 18,845 VOLUNTEERS
- 74,116 YOUTH enrolled in 4-H Youth Development programs
- 486,185 PARTICIPANTS



# What Is Space Grant?



- The Arizona Space Grant College Consortium carries on a balanced suite of activities encompassing the active space science and aerospace engineering programs at Arizona's three major universities and four other higher education institutions. The University of Arizona focuses its greatest effort on providing cutting-edge research experiences for undergraduates and graduate fellows.
- The goal of Space Grant cooperative extension – to provide the public with practical information and assistance – may be implemented through NASA Strategic Enterprises such as Earth Sciences and Aerospace and Technology. Space Grant will supply a critical link between these data resources and the public in the form of information and technology transfer.