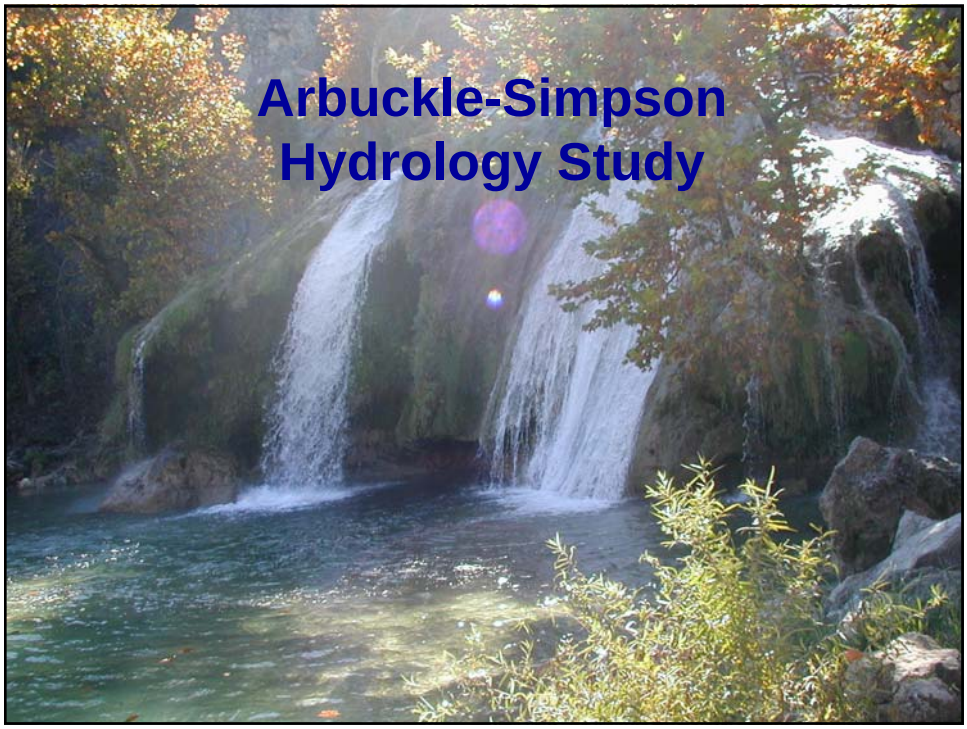
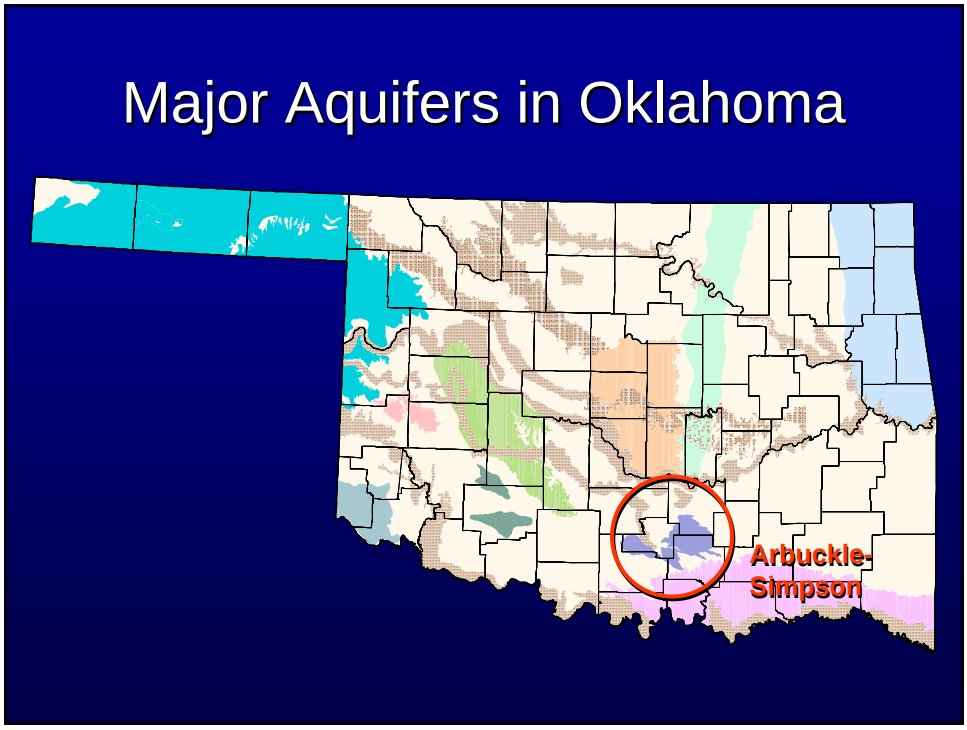

Arbuckle-Simpson
Hydrology Study


Major Aquifers in Oklahoma
Arbuckle-
Simpson

Central Oklahoma Water Authority
Proposed Pipeline

Senate Bill 288

- Moratorium
- Comprehensive study
- Maximum annual yield that will not reduce the natural flow of water from springs or streams emanating from the aquifer

Technical Peer Review Team

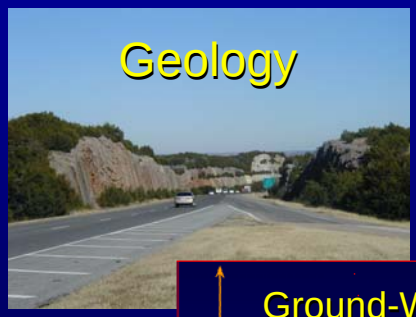
Scott Christenson – USGS

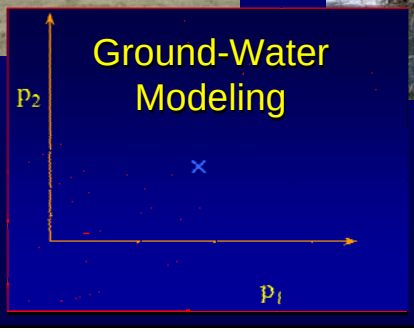
Todd Halihan – OSU

Randall Ross - U.S. EPA

Neil Suneson – OGS

Challenges





Study

- 5-year
- $5,500,000
- 50/50 cost share between OWRB and the U.S. Bureau of Reclamation
- $1,590,000 first two years
- $ 820,000 third year

USGS
science for a changing world

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

the Chickasaw Nation

Oklahoma Mesonet

OSU

CENTENNIAL 1900 2000 GEOLOGY & GEOPHYSICS

NATIONAL PARK SERVICE

Data collection and analysis

↓

Understanding of Hydrologic System

↓

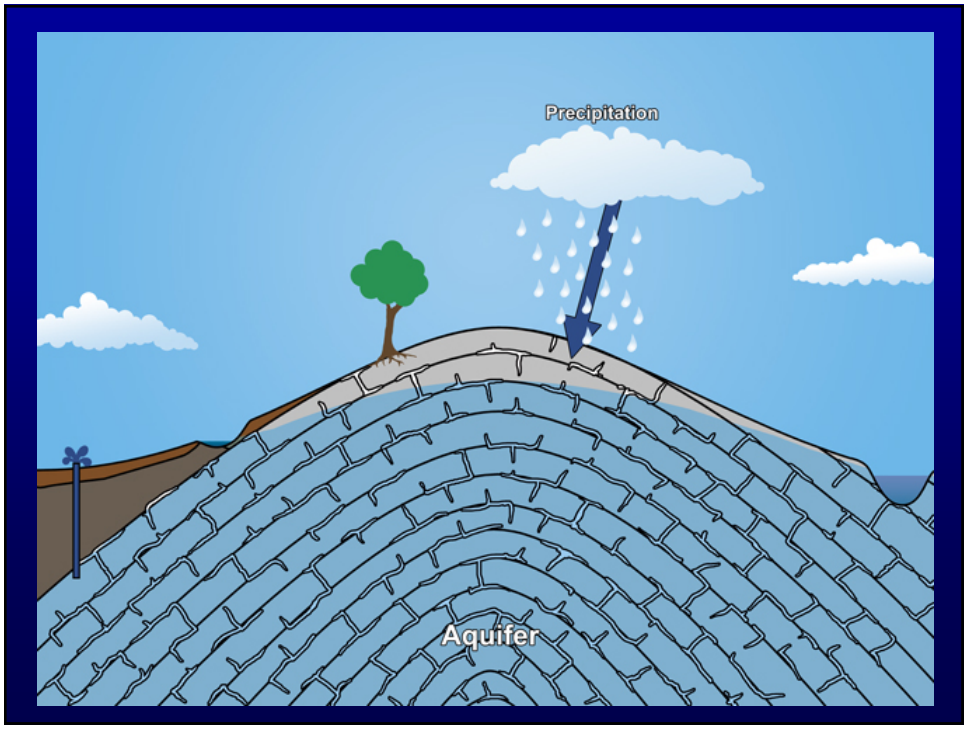
Model

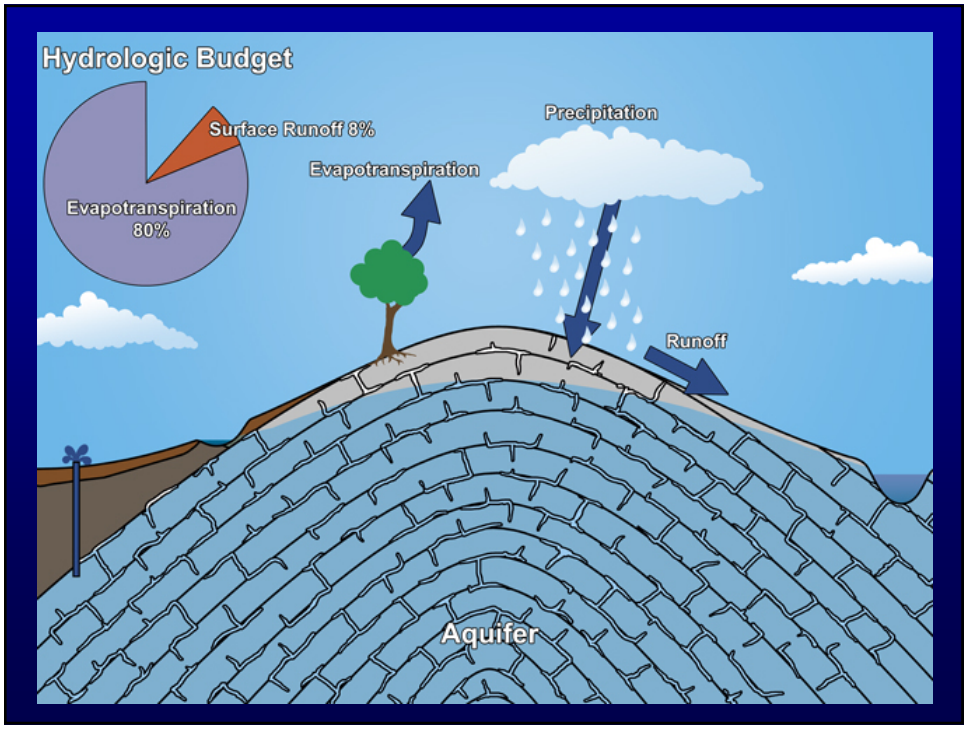
↓

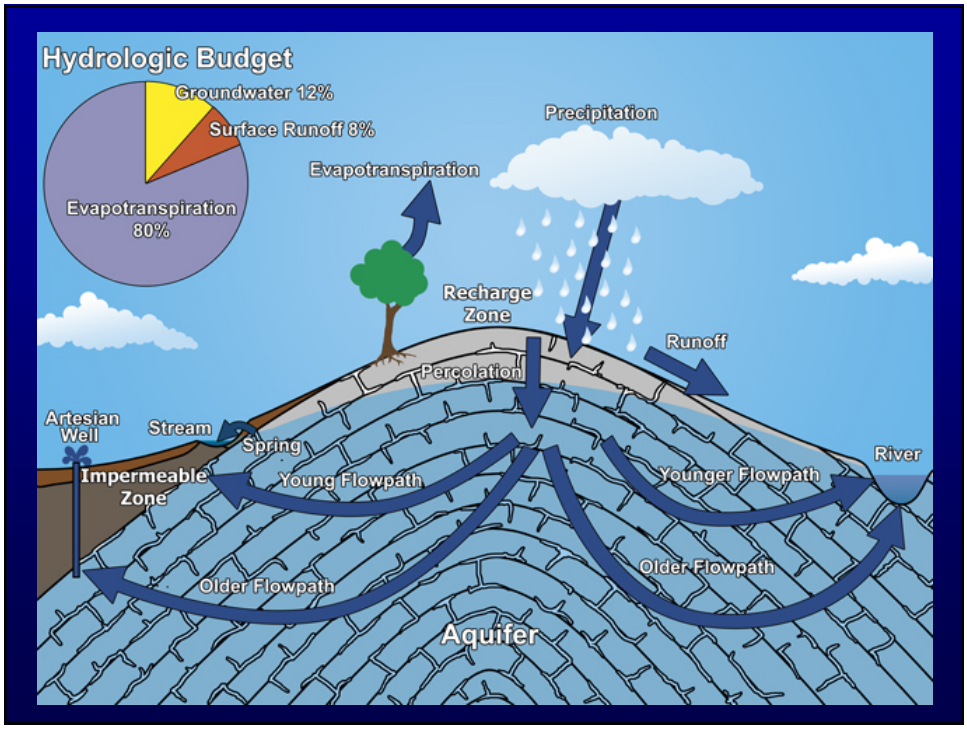
Determine impact of pumping on springs and streams

↓

Management options


Precipitation
Aquifer


Hydrologic Budget
Surface Runoff 8%
Evapotranspiration
80%
Precipitation
Evapotranspiration
Runoff
Aquifer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Evapotranspiration
Recharge Zone
Runoff
Percolation
Artesian Well
Stream
Spring
Impermeable Zone
Young Flowpath
Younger Flowpath
River
Older Flowpath
Older Flowpath
Aquifer

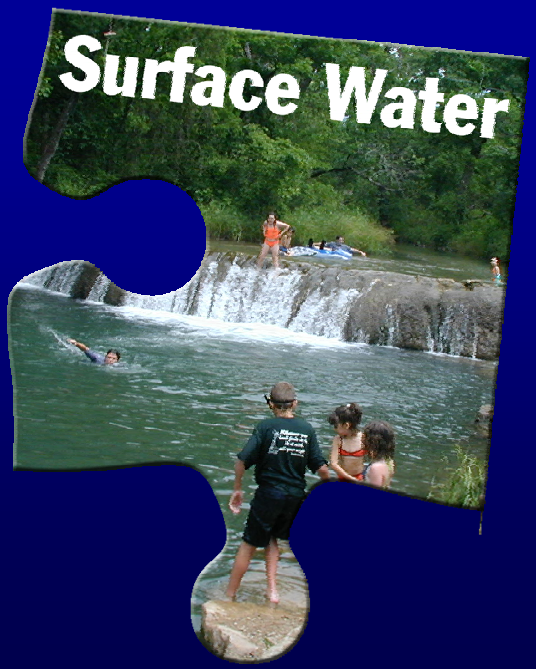
Geology
Surface Water
Climate
Ground Water

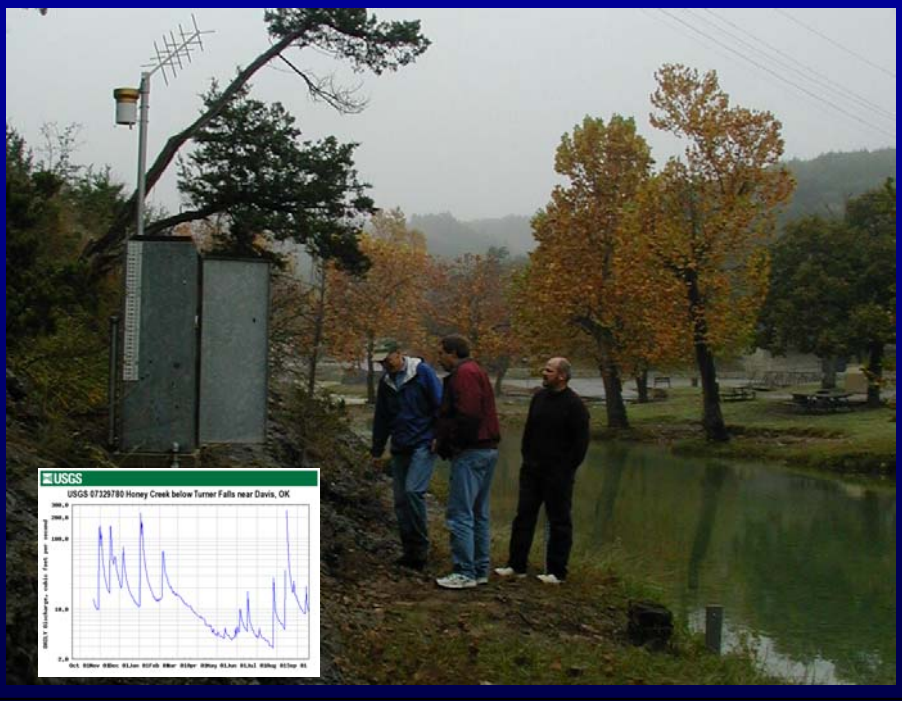
Fittstown Mesonet Station

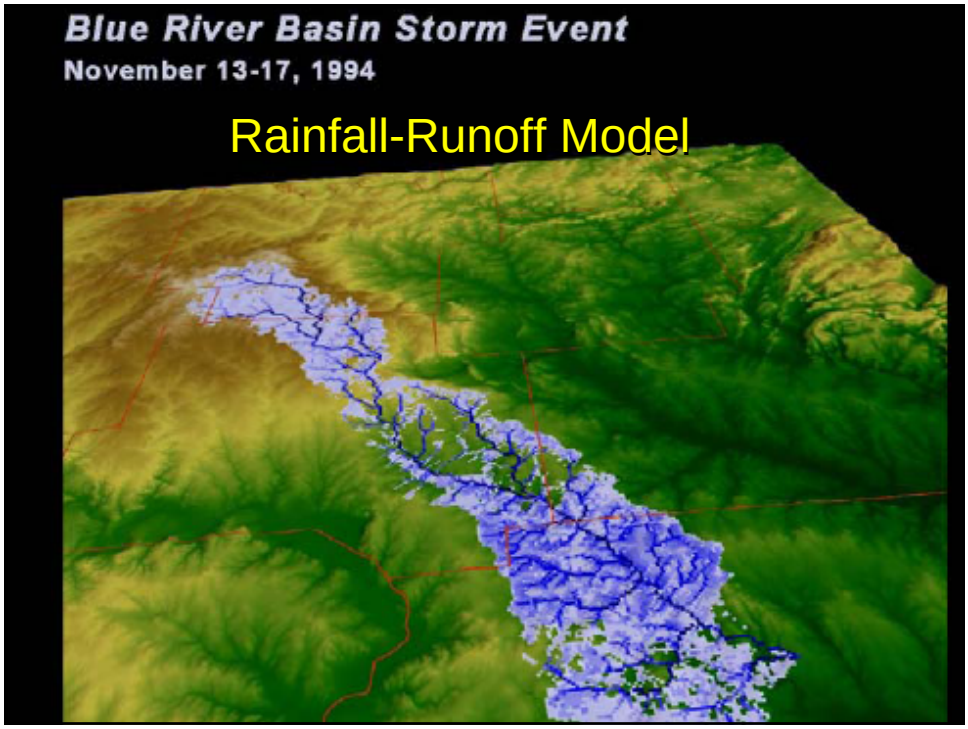
- Temperature
- Rainfall
- Humidity
- Wind Speed
- Wind Direction
- Barometric Pressure
- Solar Radiation
- Soil Temperature
- Soil Moisture
- Ground-Water Elevation

10/27/2005

HISTORIC LOG BUILDING
POST OAK
1623
1843


Surface Water


USGS
USGS 07329780 Honey Creek below Turner Falls near Davis, OK


Blue River Basin Storm Event
November 13-17, 1994
Rainfall-Runoff Model

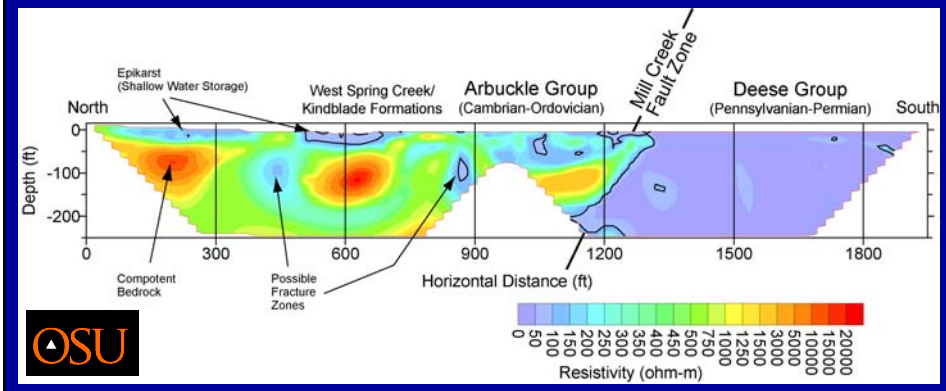
Geology

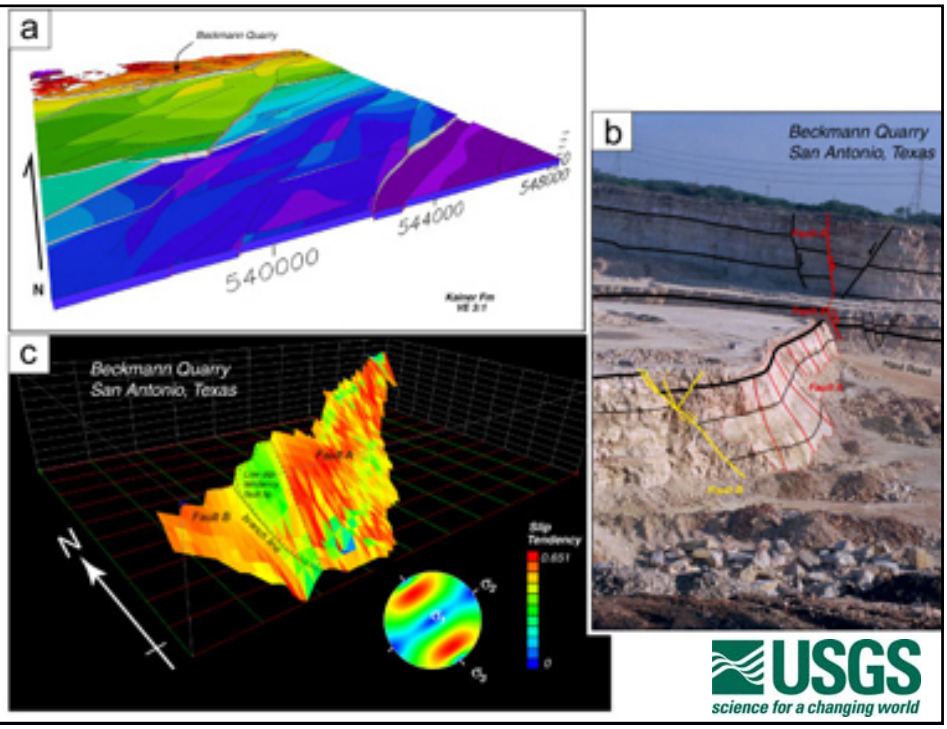
Cross Section Through the Arbuckle Anticline
Showing Geological Structure Along I-35
THESE ROCKS WERE ORIGINALLY DEPOSITED AS HORIZONTAL LAYERS OF SEDIMENT IN A MARINE SEA. THE SEDIMENTARY LAYERS OVERLIE IGNEOUS ROCKS (PURPLE) OF A VOLCANIC ORIGIN. ABOUT 285 MILLION YEARS AGO, THE STRATA WERE FOLDED BY TECTONIC COMPRESSION INTO A HIGH MOUNTAIN RANGE. OVER EONS OF TIME, WIND & WATER HAVE WORN AWAY THE HIGH MOUNTAINS, LEAVING ONLY THE SMALL HILLS THAT PRESENTLY SHAPE THE SURROUNDING COUNTRYSIDE
THESE GEOLOGICAL SIGNS WERE SPONSORED BY THE ARDMORE GEOLOGICAL SOCIETY AND ERECTED WITH THE APPROVAL OF THE STATE HIGHWAY DEPARTMENT

Arbuckle-Simpson Regional Geology

Electrical Image – Mill Creek Fault

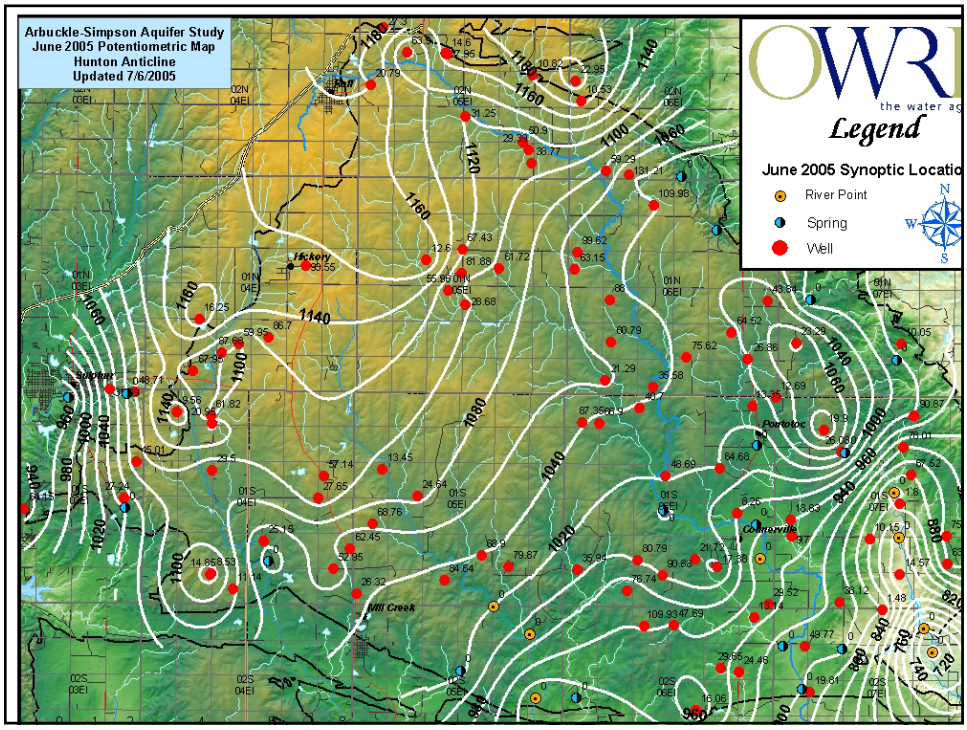
Images can tell us where to look
Can provide data to evaluate fault properties
Can provide a better "picture" than can be obtain using only wells

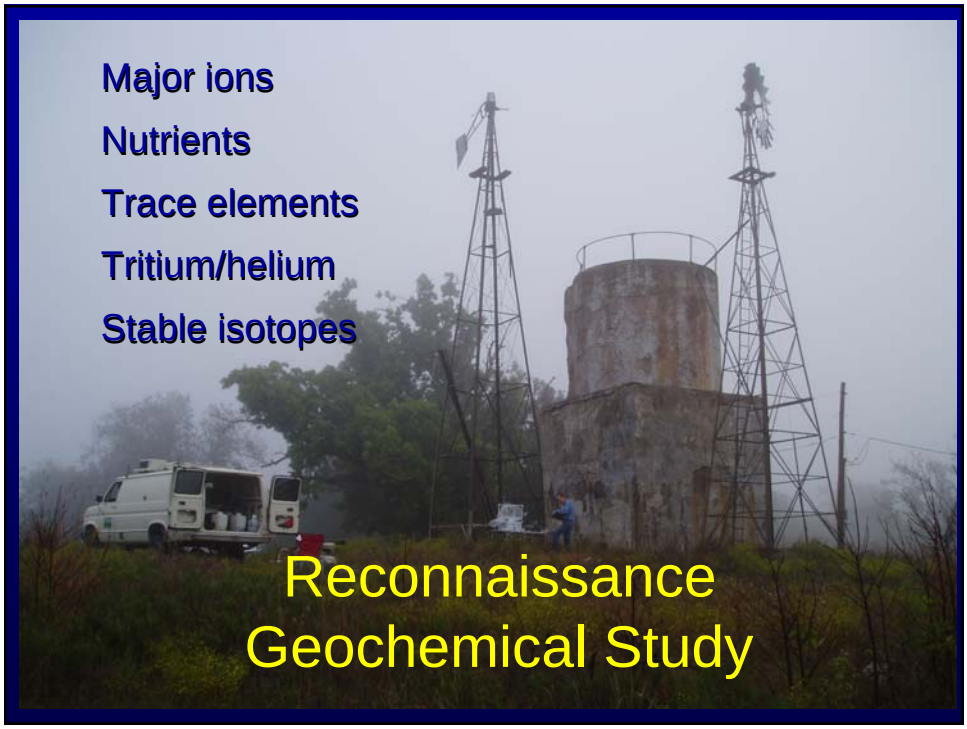




USGS
science for a changing world

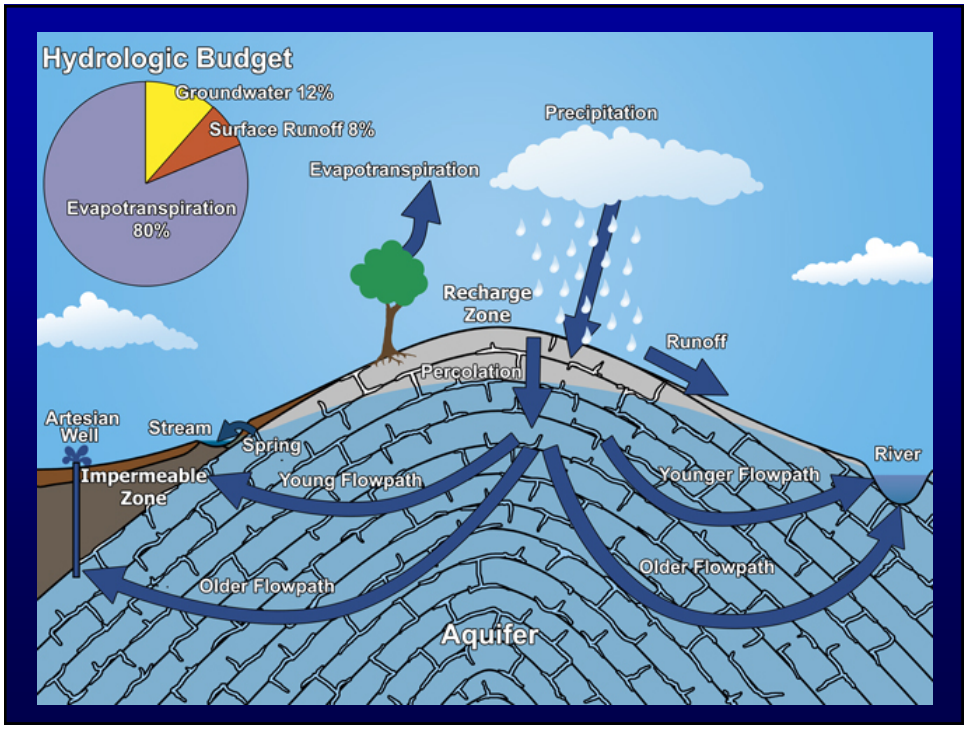
Groundwater


Arbuckle-Simpson Aquifer Study
June 2005 Potentiometric Map
Hunton Anticline
Updated 7/6/2005
OWRI
the water ag
Legend
June 2005 Synoptic Locatio
River Point
Spring
Well
N
W
S
Mill Creek
Pontotoc
Connerville



Geochemical Study

- 24 wells and 5 springs
- Springs and most wells (<300 ft) have pre-modern water (<60 yrs)
- Two deep wells (>700 ft) have fossil water (>10,000 yrs)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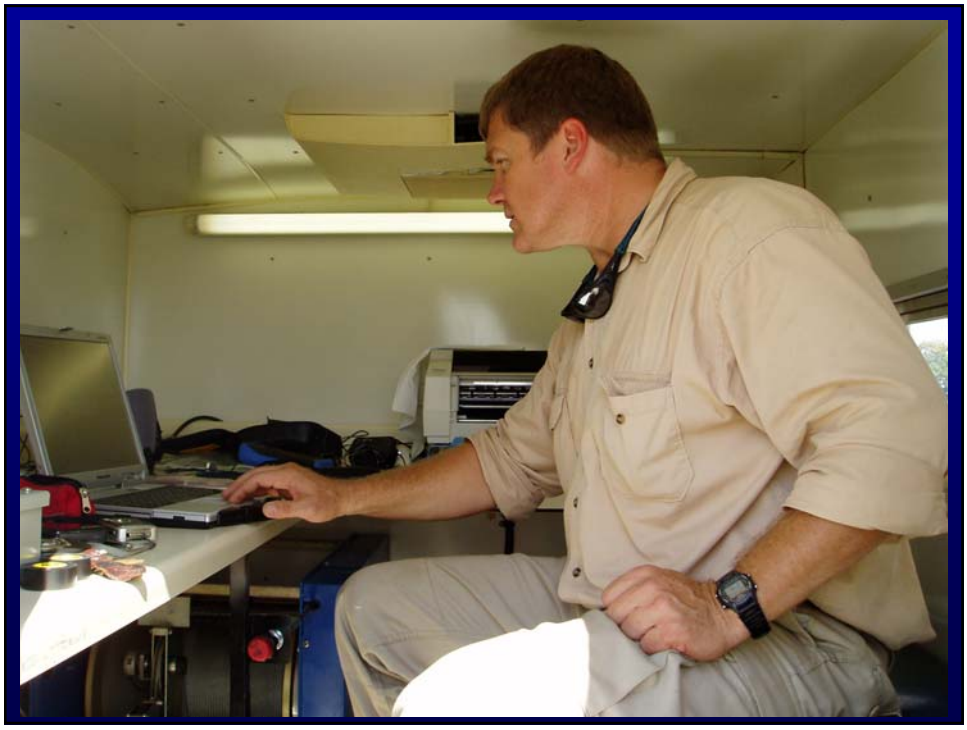
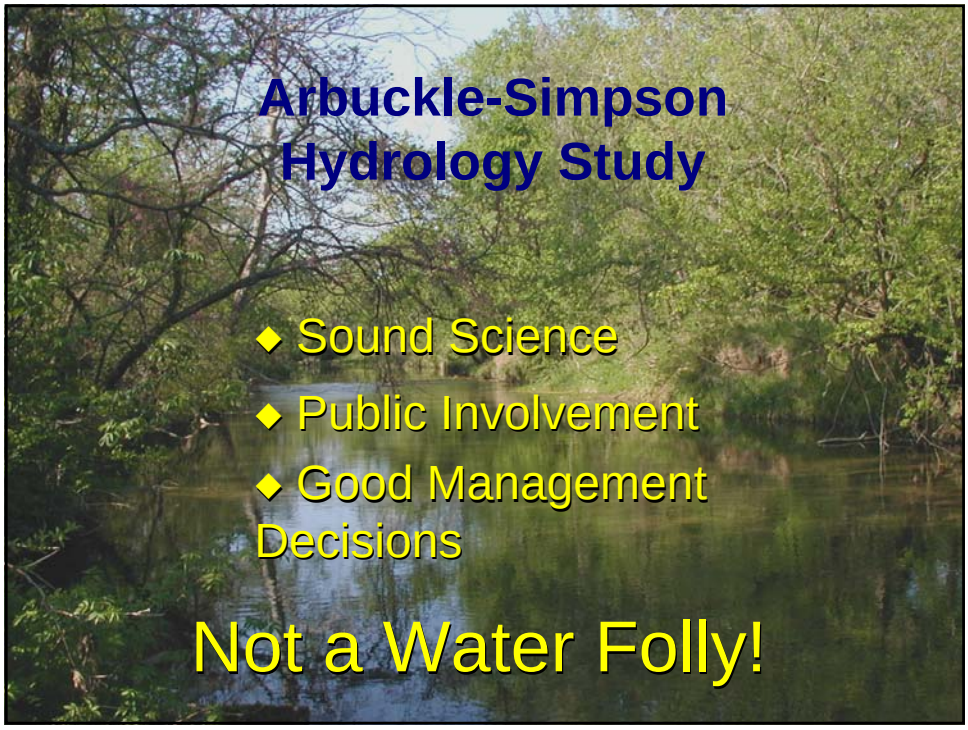


Surface Water
Geology
Climate
Ground
Water


Arbuckle-Simpson
Hydrology Study
◆ Sound Science
◆ Public Involvement
◆ Good Management Decisions
Not a Water Folly!