

Weather and Elections: Who prays for rain?



AMS Broadcasters Conference

June 26, 2008

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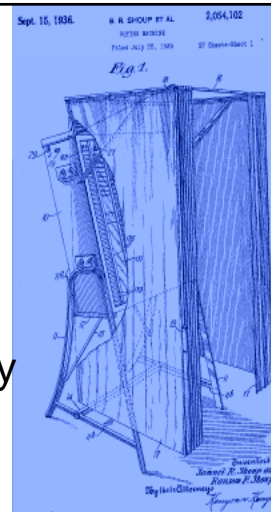
National Institute of Standards and Technology

<http://vote.nist.gov>

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Outline

- Historical Background
- Review of the Literature
- Election Day Weather Events
- 2008 Primaries: Super Tuesday Tornadoes
- 2002 Help America Vote Act
- Weather, Climate and Voting Systems
- Conclusions

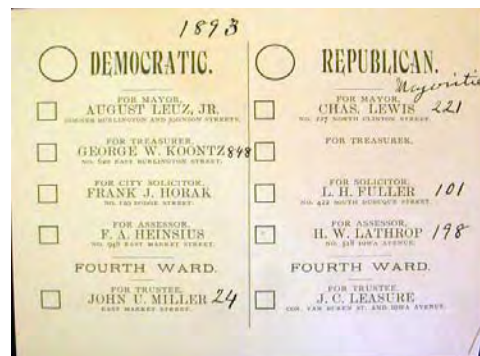


The County Election- 1846



Historical Milestones: Casting Ballots

- Ancient Greeks- Clay Tokens
- Romans- Paper (139 BCE)
- Italian- Round Balls (1600s)
- Australian Ballot- 1888
- Mechanical Lever Machines 1898
- Computers
1962- Counting
1975- Cast



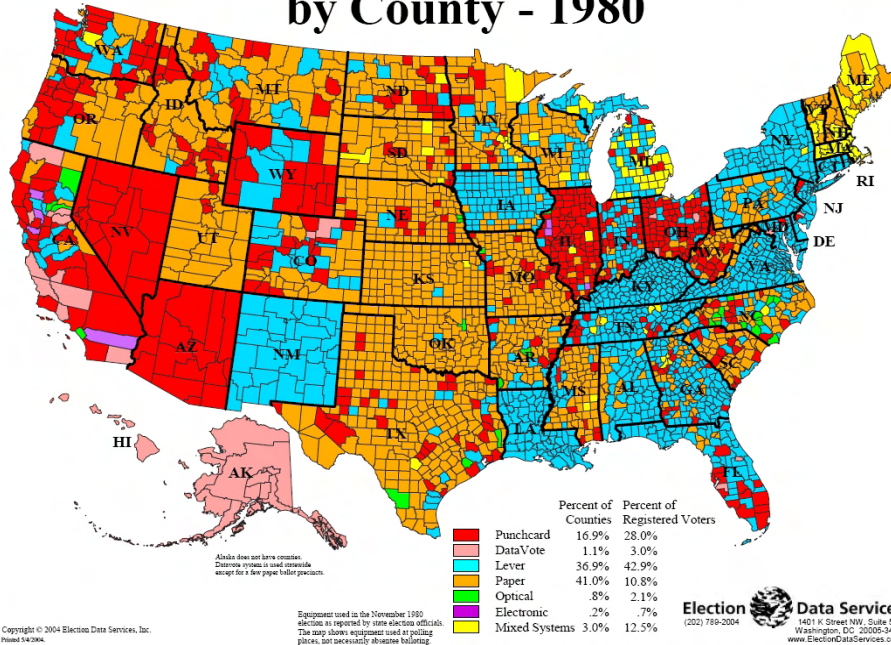
Voting Systems 2000-2008

- Paper
- Punch Card
- Mechanical Lever
- Optical Scan/ Mark Sense*
- Computer: Direct Recording Electronic *

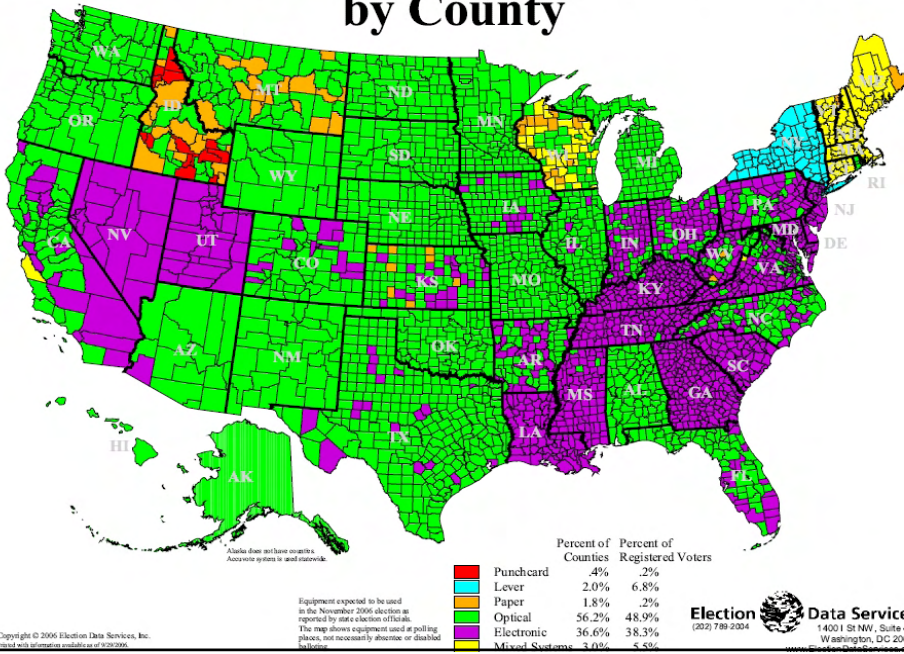


* Accessible Voting Station

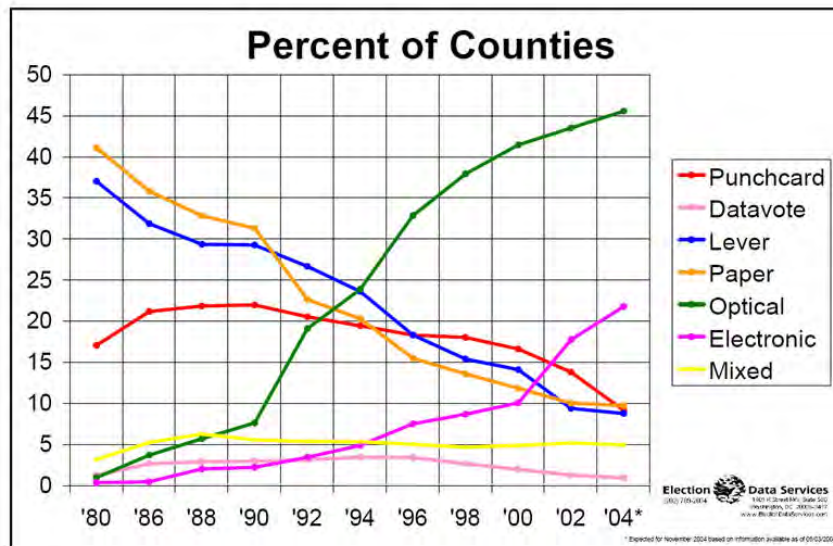
Type of Voting Equipment by County - 1980



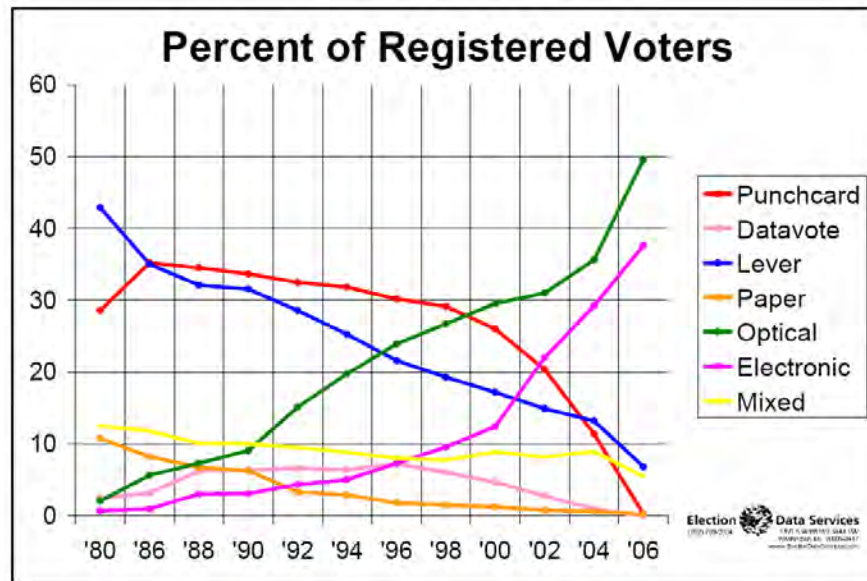
November 2006 Voting Equipment Usage by County



Type of Voting Equipment in Use

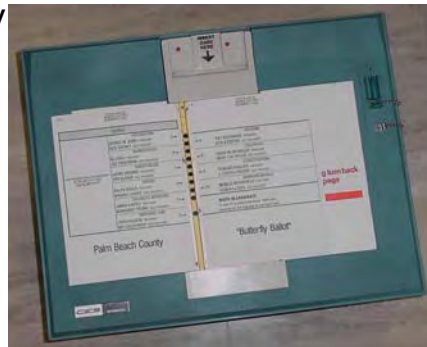


Type of Voting Equipment in Use



Some Election Numbers

- Two million volunteers are required to conduct a Presidential election
- The average U.S. poll worker is 72 years old
- There are about 13 million eligible blind voters in the U.S.
- Approximately 537 votes separated Bush and Gore in the Florida 2000 tally
- JFK defeated Nixon in 1960 by less than one vote per precinct nationally.

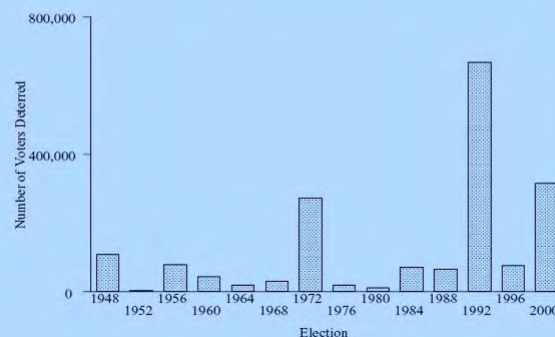


Published Research

- Gomez, Hansford, and Krause (2007) The Republicans Should Pray for Rain: Weather, Turnout, and Voting in U.S. Presidential Elections
- Gatrell, and Bierly (2002) “Weather and Voter Turnout: Kentucky Primary and General Elections, 1990– 2000.”
- Knack (1994) “Does Rain Help the Republicans? Theory and Evidence on Turnout and the Vote.”
- Ludlum (1984) The Weather Factor
- DeNardo, James. 1980. “Turnout and the Vote: The Joke’s on the Democrats.”

Gomez et al Findings

FIGURE 2 Estimated Number of Potential Voters Deterred by Precipitation (Rain and Snow) on Election Day, 1948–2000



- 1 inch of above normal rain reduces turnout by nearly 1%
- 1 inch of above normal snow reduces turnout by .5%

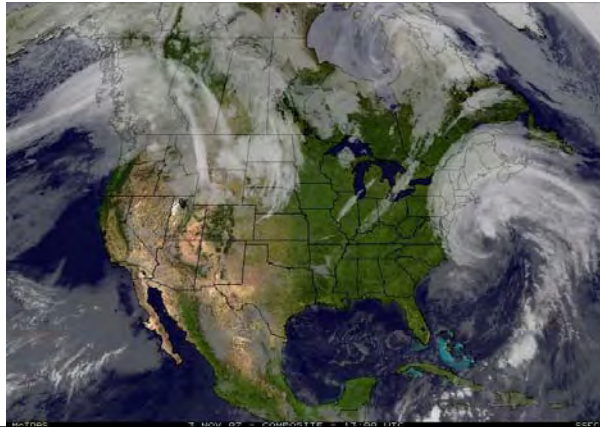
Published Research Conclusions

- Peripheral (or marginal) voters are less likely to vote when it rains or snows.
- Storms do not necessarily favor Republicans over Democrats WRT voter participation.
- Statistical sample size was small
- Extreme temperatures and wind were excluded from “bad weather” definitions.
- Authors developed socio-economic models of “voting costs”.



Early November Weather

- Nov 2, 1946 - 31" Denver snow storm
- Nov 2, 2007 - Hurricane Noel/Nor'easter
- Nov 3, 1890 - 96° Los Angeles



Early November Weather

- Nov 4, 1988- 19 Tornadoes in Tenn. Valley
- Nov 5, 1894 - Election Day snow storm
10-12 " over Connecticut
- Nov 6, 1951- 13" Snow storm STL (20" Washington
County Missouri)
- Nov 7, 1940-
Tacoma Narrows
Bridge collapse in
wind storm
- Nov 8, 1943- Wind
Chill 3-8°, Minn. &
the Dakotas

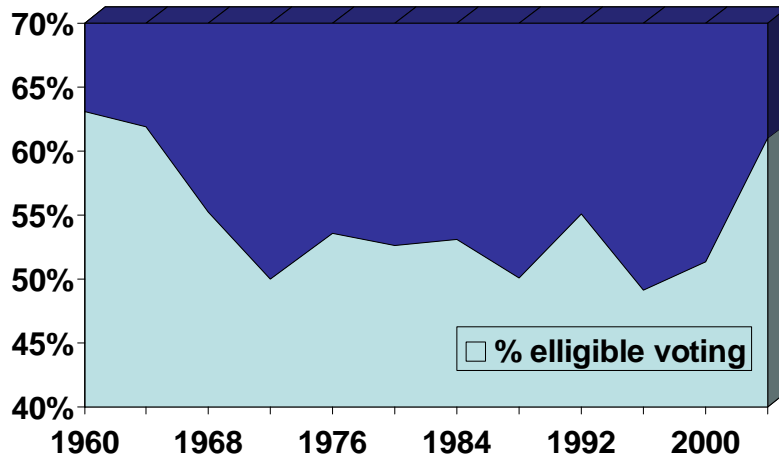


“The weather was clear all across Massachusetts and New England perfect for voting as far as the crest of the Alleghenies. But from Michigan through Illinois and the Northern Plains states it was cloudy: rain in Detroit and Chicago, light snow falling in some states on the approaches of the Rockies. The South was enjoying magnificently balmy weather which ran north as far as the Ohio River; so, too, was the entire Pacific Coast. The weather and the year’s efforts were to call out the greatest free vote in the history of this or any other country.”

**– Theodore H. White
(1960, *The Making of the President*)**



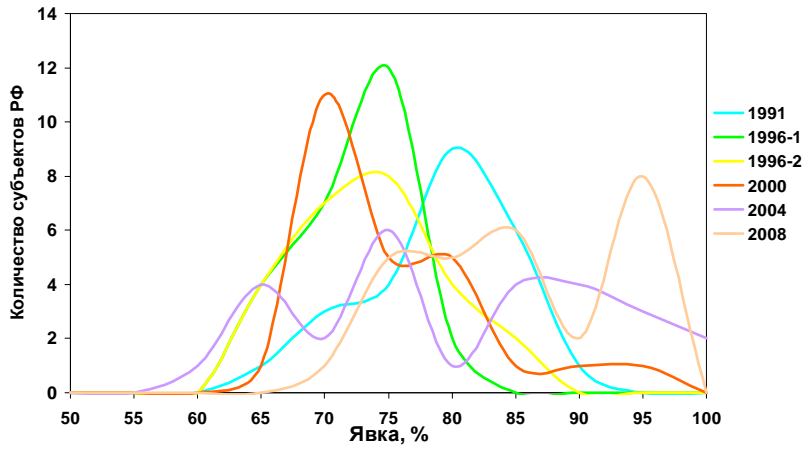
Voter Participation in U.S. Presidential Elections (1960-2004)



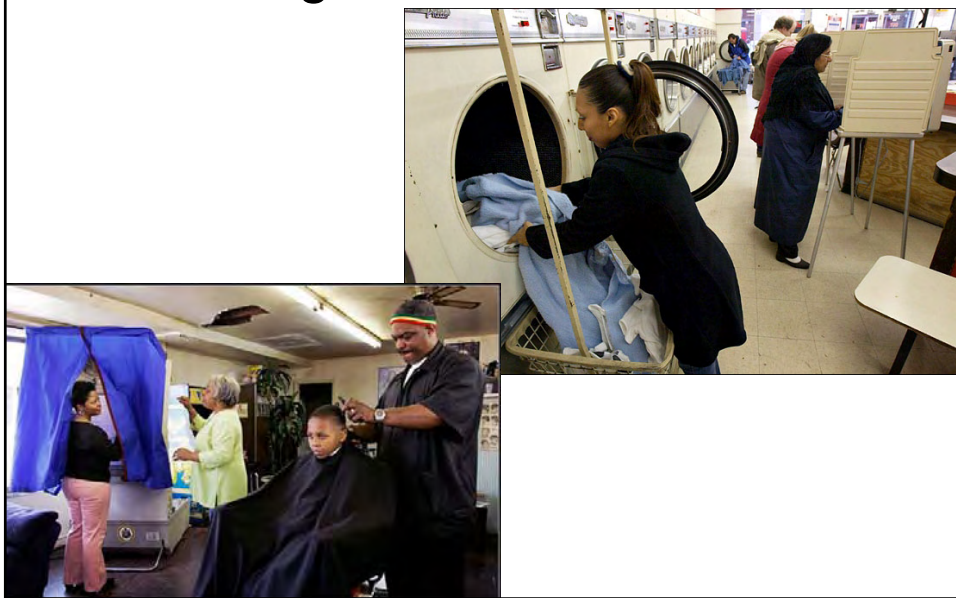
Voter Participation in Russia



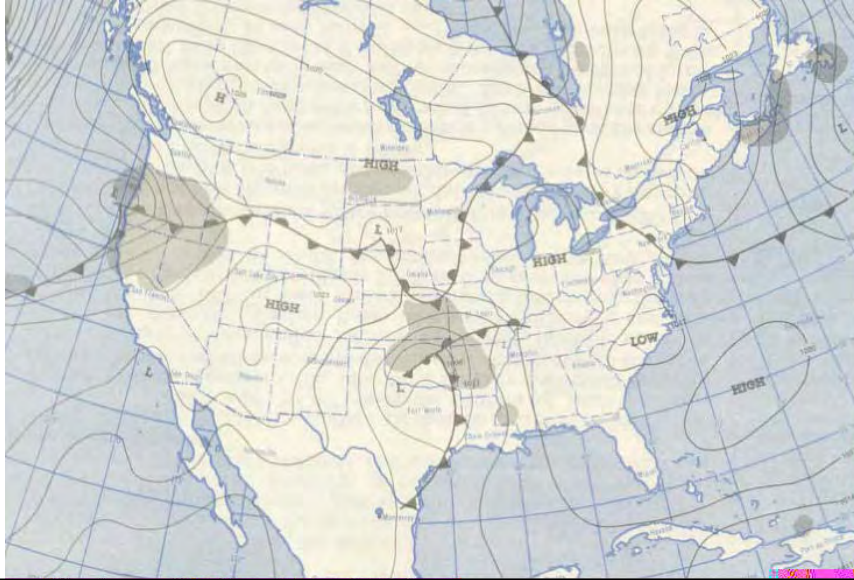
Voter Participation in Russia



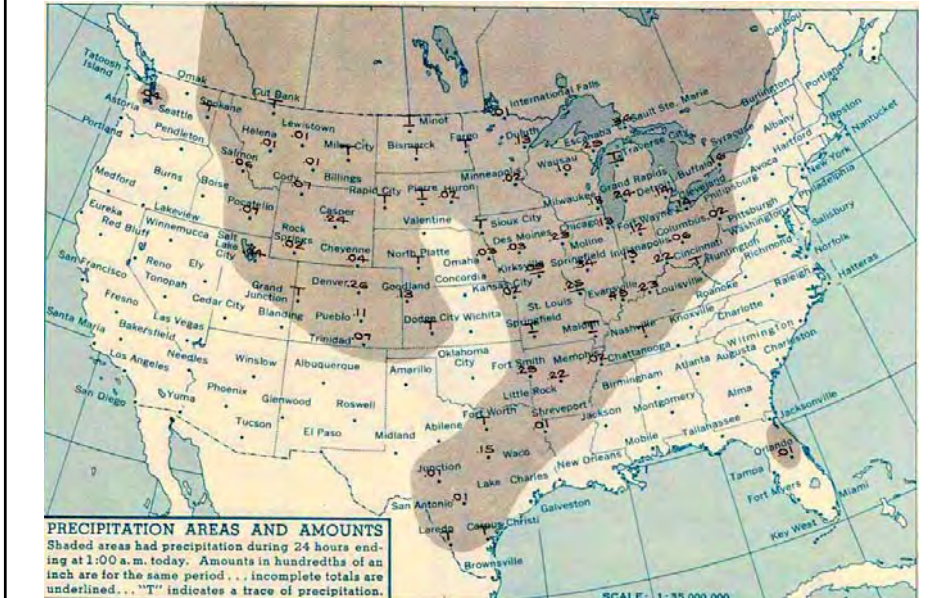
Polling Places in the U.S.



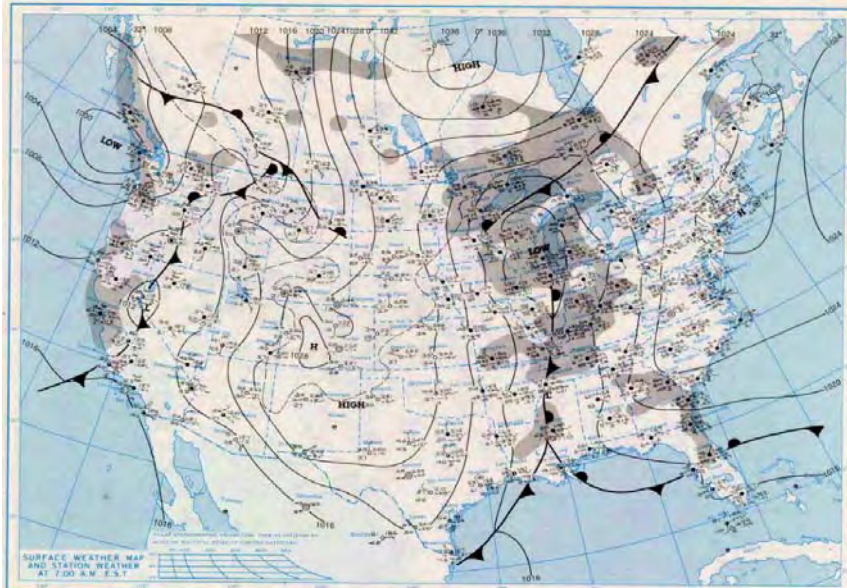
November 2, 1948



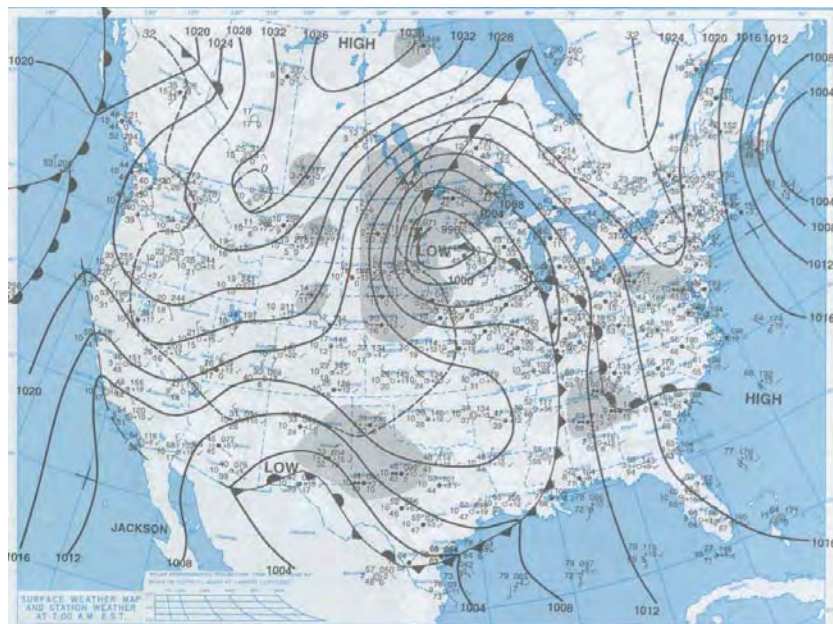
November 8, 1960



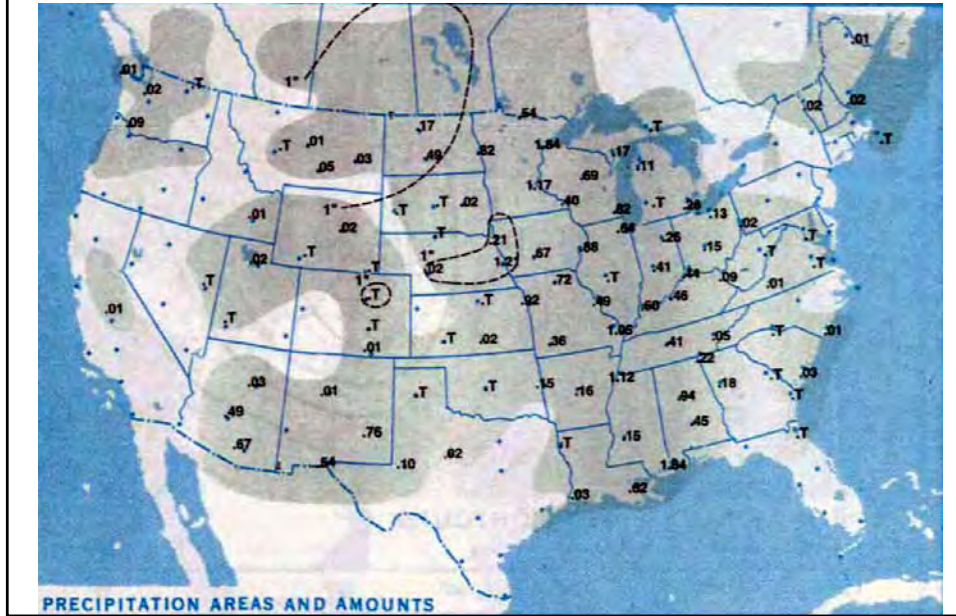
November 1972



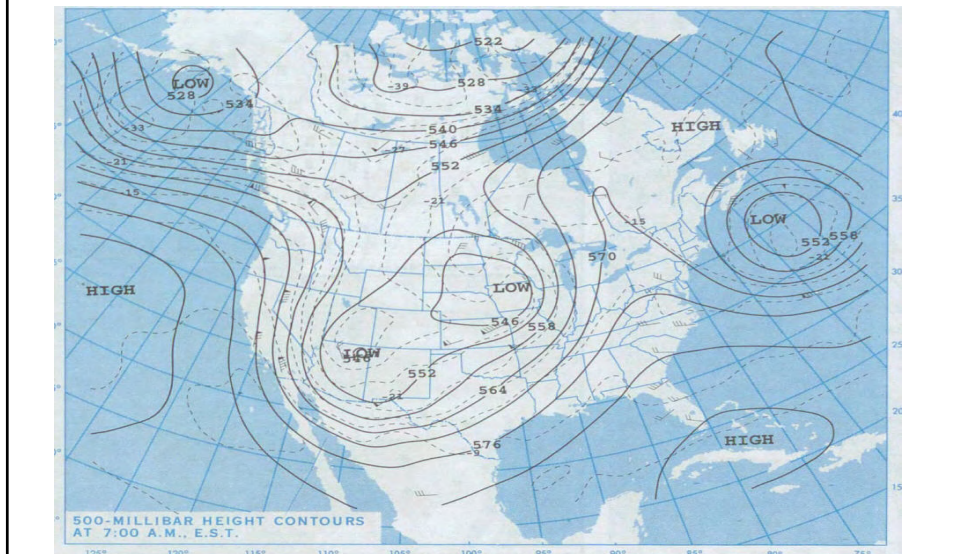
November 7, 2000: Weather Map



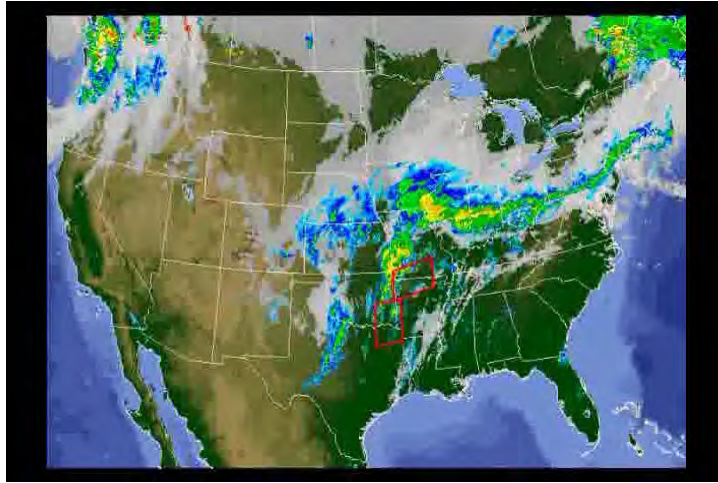
November 7, 2000 Precipitation



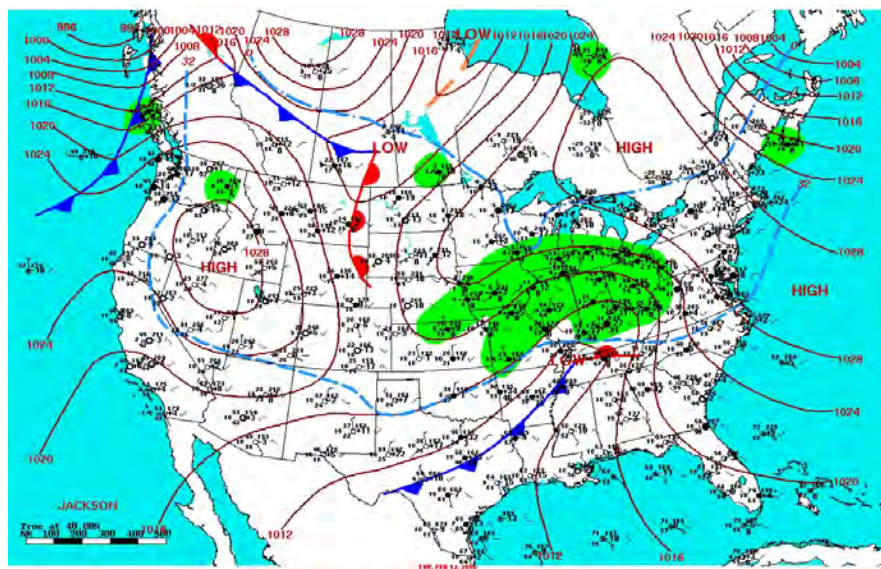
November 7, 2000- 500 mb



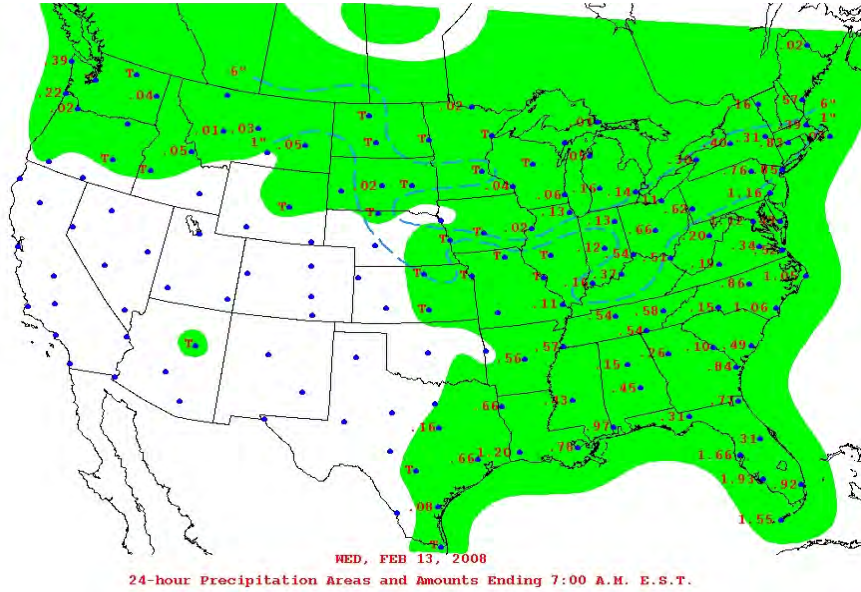
2008 Super Tuesday Primaries



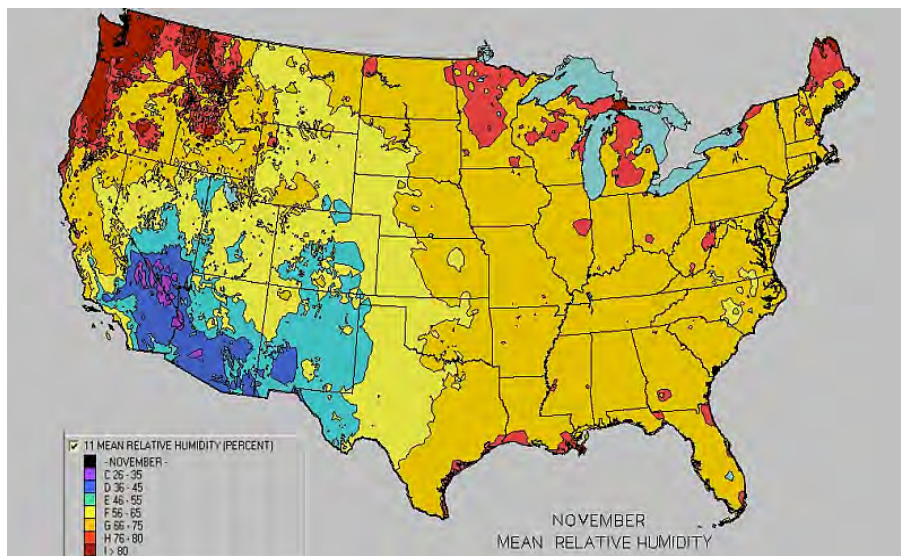
February 12, 2008



Feb 12-13 2008 Precipitation



Climate and Elections



Humidity & Paper

- October 2005- SAT Test Sheets for 4,400 students were incorrectly scored by computer scanners
- An independent study determined that the papers absorbed moisture during transport to the test scoring facility
- Test officials ran the sheets through scanners before allowing the paper to acclimate to lower humidity



2002 Help America Vote Act

- Resulted in updated Federal equipment standards for voting systems (VVSG2005)
 - Environmental and Reliability standards
- Addressed usability, computer security and testing of voting systems
- Mandated a laboratory testing certification program



Electromagnetic Compatibility Requirements



EMC Requirements

- Conducted Compatibility
 - Interaction with local power supply
- Radiated Compatibility
 - Electrostatic discharge
 - Cell phones
- Telecommunications Compatibility
 - Telephone line to central tabulator
- No Wireless



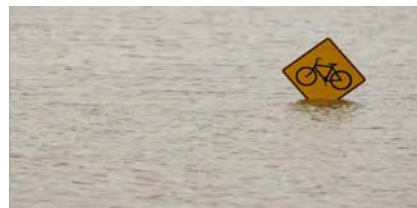
Environmental Requirements

- These requirements deal with
 - General build quality
 - Durability
 - Maintainability
 - Operating temperature and humidity
 - Equipment transportation and storage
 - Archival Records



Some Conclusions

- Voter participation issues are complex. Voter behavior is often unpredictable.
- Research on voter turn out dismisses the potential effect of temperature and wind exclusive of precipitation.
- An increase in early voting will mitigate the effect of weather on turn out.
- Voting equipment and paper are sensitive to weather and climate variables.
- Accurate forecasts enhance fair elections.





Final Thoughts

- Farmers pray for rain. Voters are agnostic.
- No voting system is perfect.
- Extreme weather could increase voter turn out
- Remember the past, don't repeat it.

“The ballots made no result. The counters made the result.”

William Tweed 1878

Related Web Site References

- www.eac.gov
- www.vote.nist.gov
- www.electionline.org



- www.votingmachinesprocon.org
- <http://www.votingtechnologyproject.org/index.html>
- <http://electionupdates.caltech.edu/blog.html>