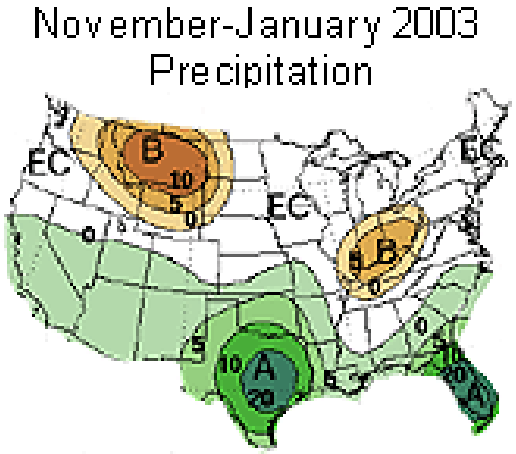
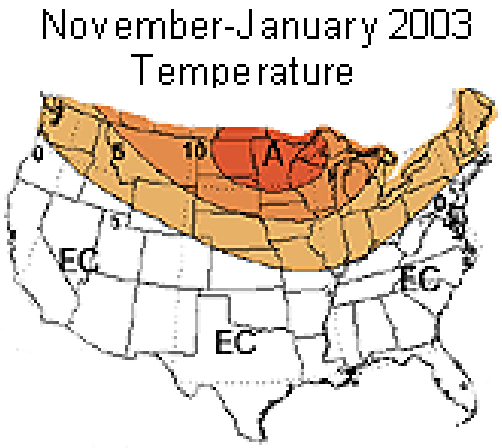
Assessment of Probabilistic Forecasts Using Field Surveys of Resource Management Professionals: Preliminary Results





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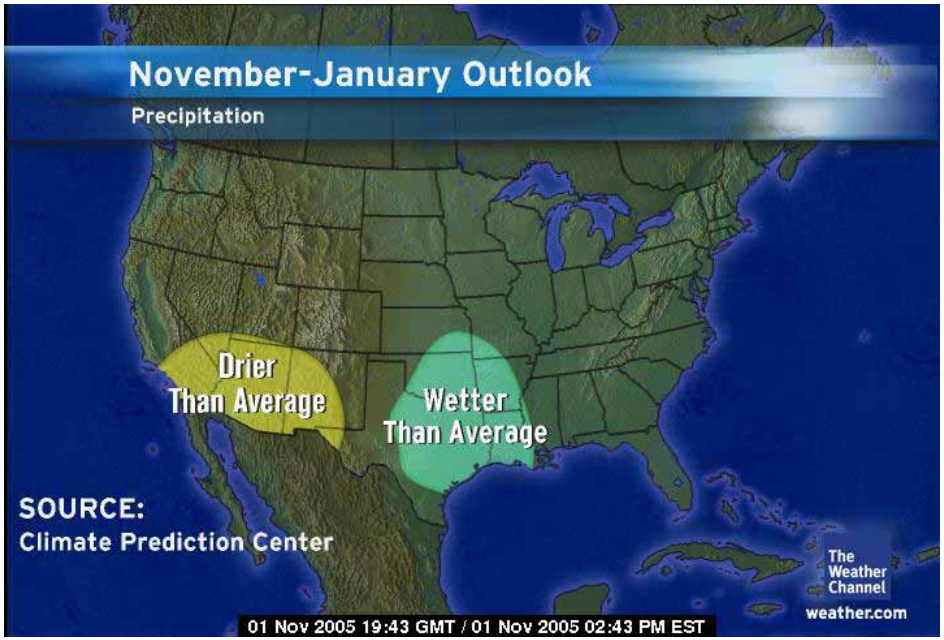
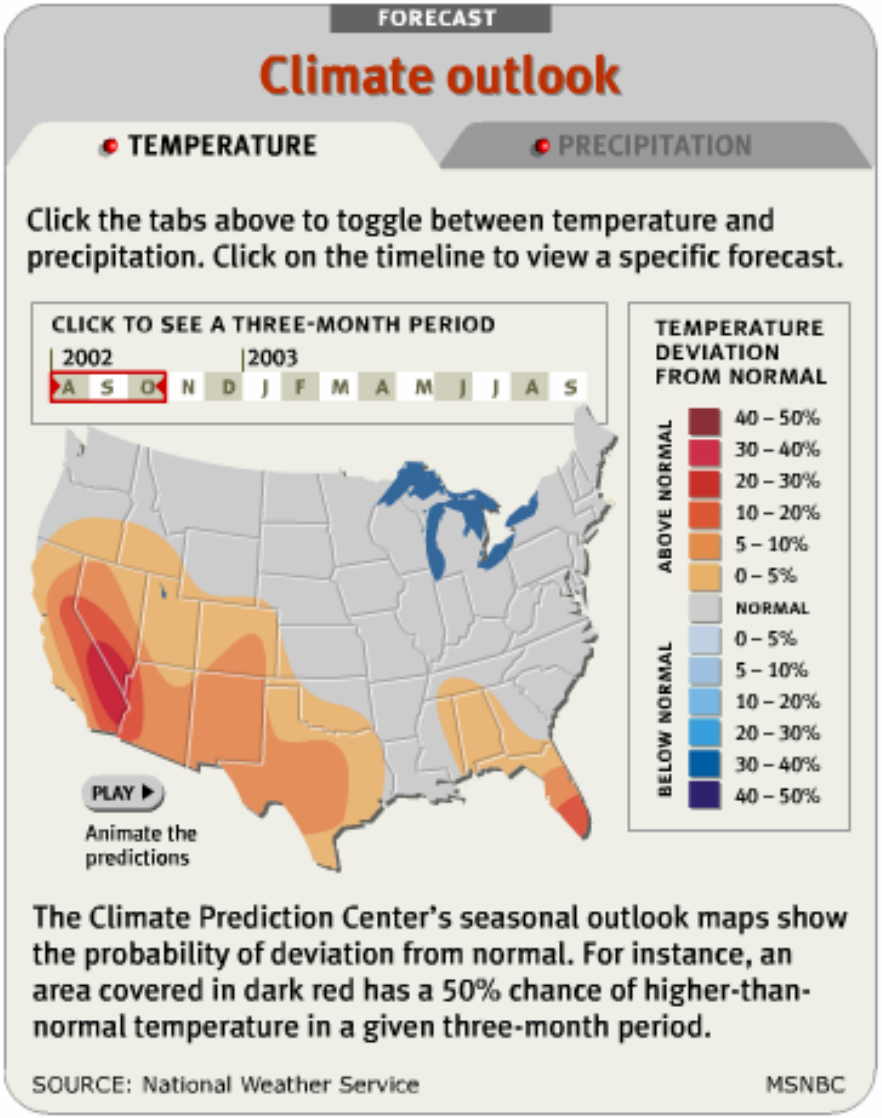
NOAA Climate and Societal Interactions – Human Dimensions of Global Change Research

NOAA CLIMAS-RISA

Re-Interpreted Forecast Products Often Wrong





Stakeholder Use of Climate Info & Forecasts

Common across all groups: climate vs. weather

Uninformed, mistaken about forecast interpretation

Understand implications of “normal” vs. “unknown” forecasts

Use of forecasts limited by lack of demonstrated forecast skill

Common across many, but not all, stakeholders

Have difficulty distinguishing between “good” & “bad” products

Have difficulty placing forecasts in historical context

Unique among stakeholders

Relevant forecast variables, regions (location & scale), seasons, lead times, performance characteristics

Technical sophistication: base probabilities, distributions, math

Role of of forecasts in decision making

Goals of Forecast Communication

Interpretation should be: Correct, Reliable, Easy

Elements to Consider

- Variable depicted: temperature, temperature anomaly, probability, probability anomaly
- Two-category or three-category forecast
- Forecast reference period
- Probability ranges: colors, numeric scales
- 'No forecast' situation
- Appropriate spatial scale
- Translation of information
- Extension of information

Field Survey Methodology

Surveys at Professional Society Meetings

- Common population
- Independent testing of different forecast formats
- Preclude 'learning' by respondents
- Sufficient sample size (across surveys)

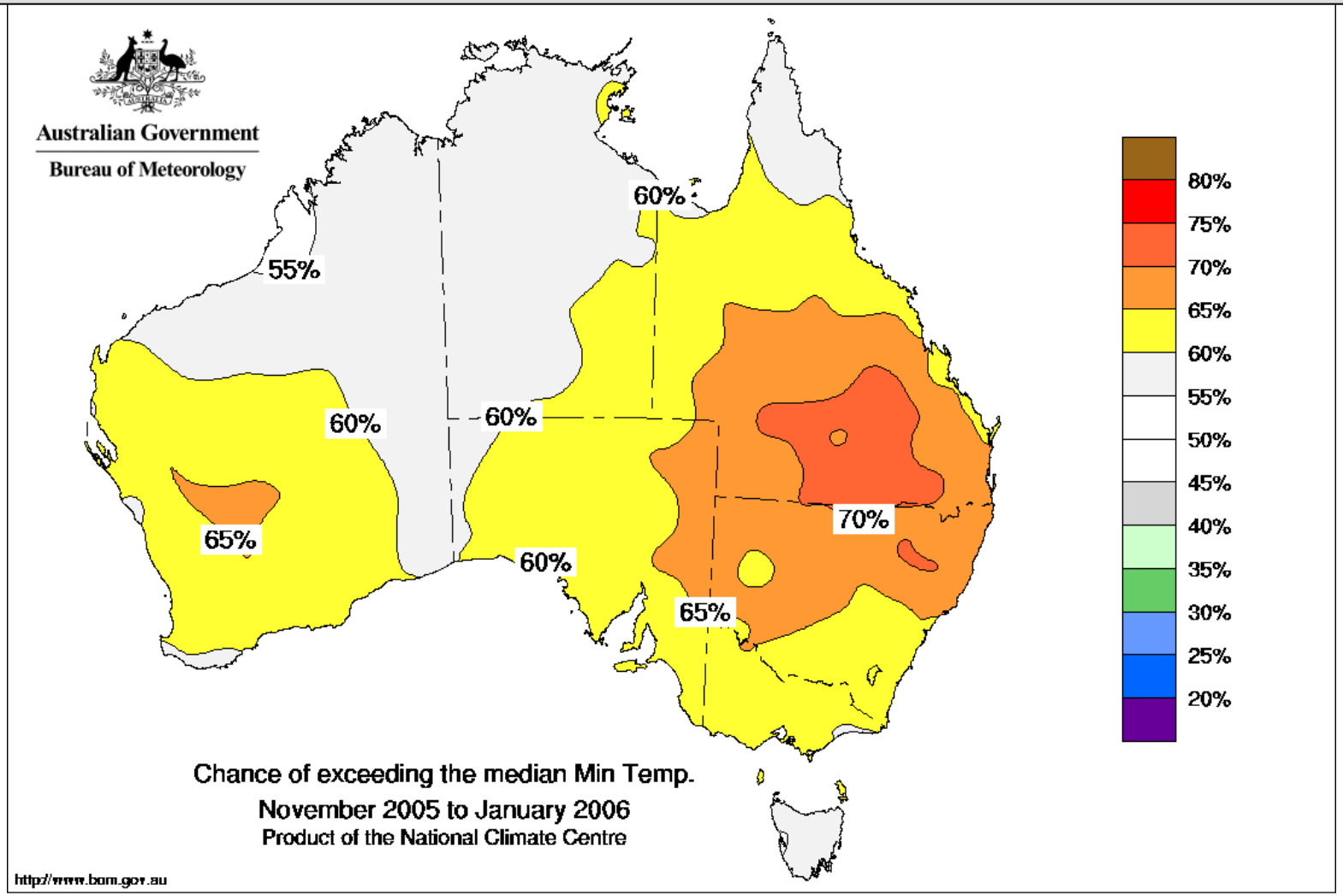
Experimental Protocol

- Multiple forecast products
- One forecast per survey
- Well mixed distribution of surveys
- Attempt 100% distribution
- Supplement with 1-on-1 interviews

Australian Bureau of Meteorology

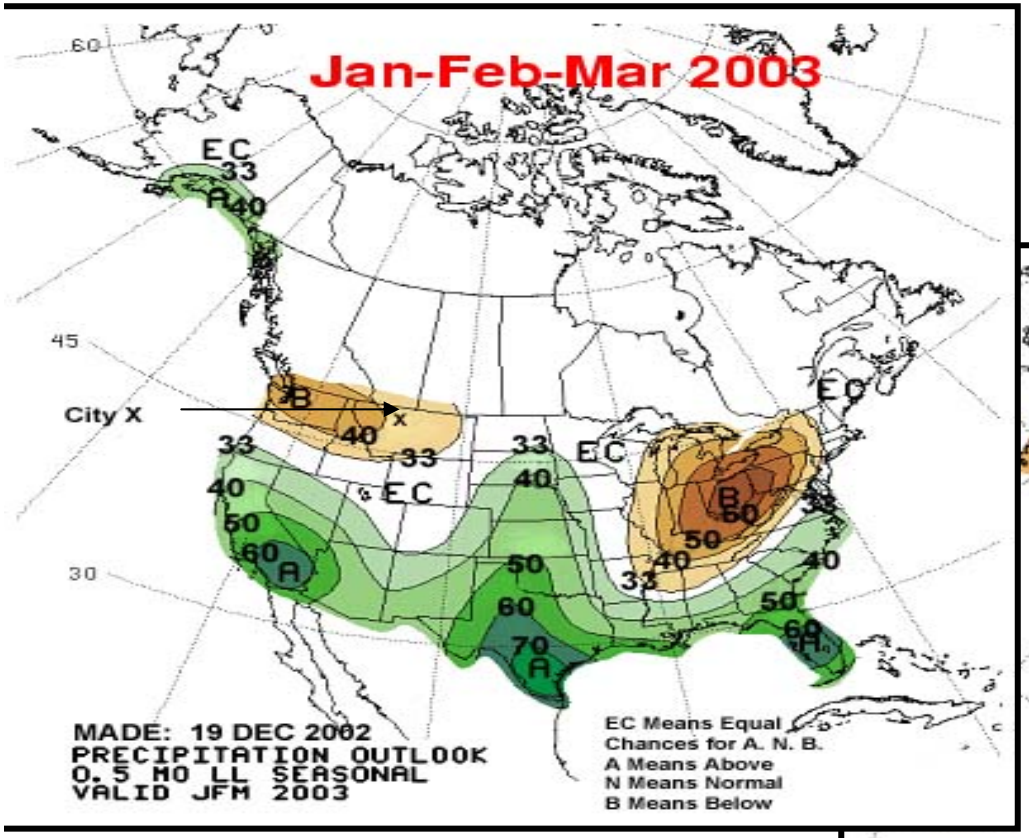
Minimum temperature
1961-1990 reference period

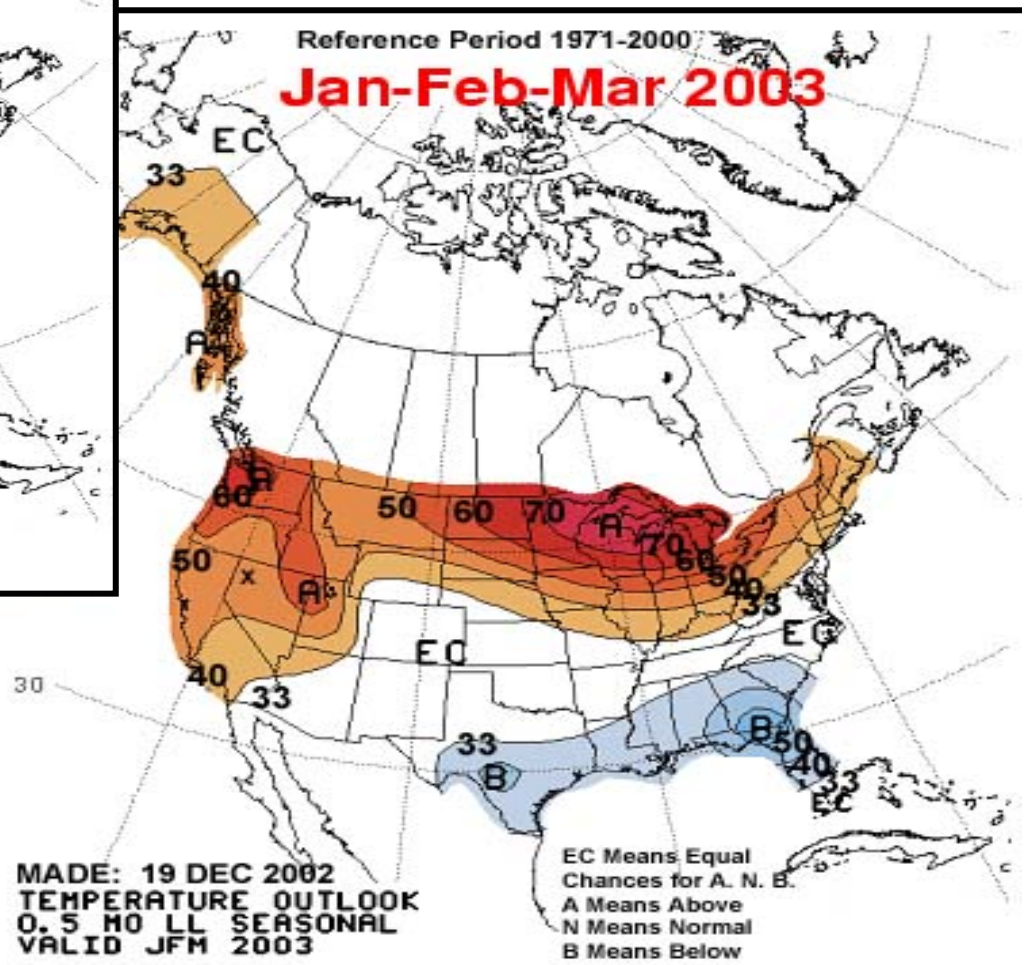
Two-category:median
Forecast everywhere



Issued: 06/10/2005

Climate Prediction Center – National Weather Service



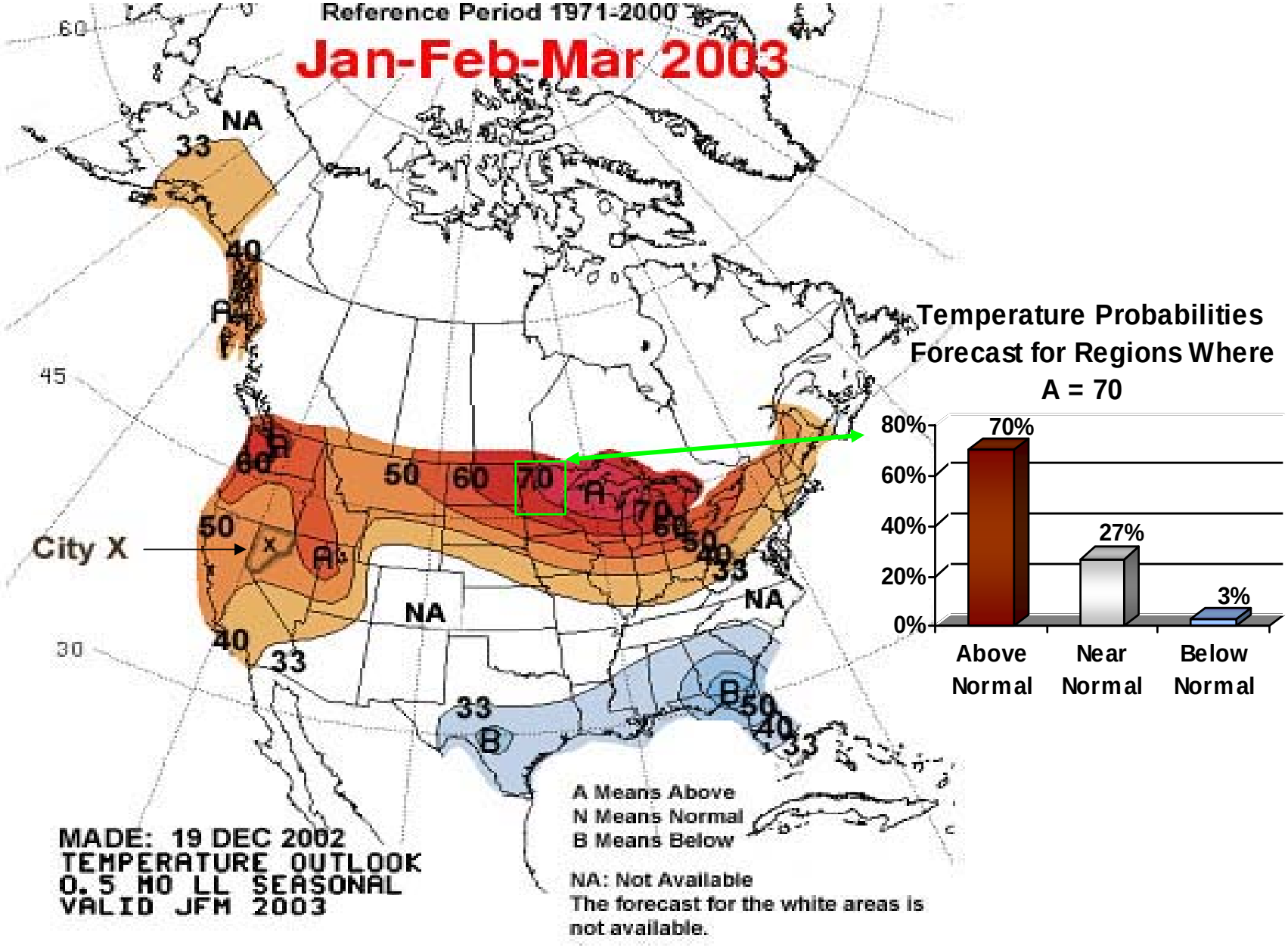


Terciles

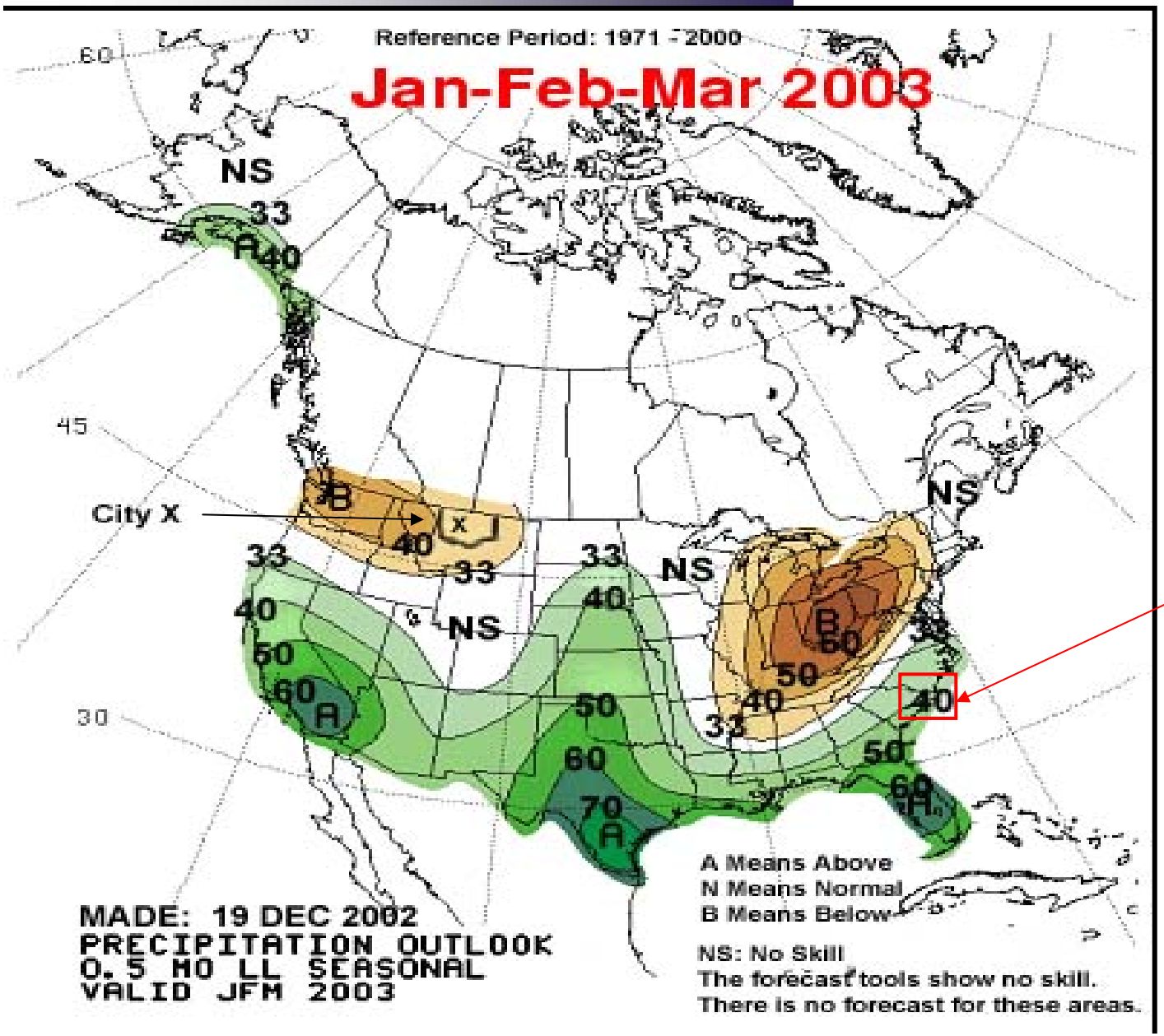
1971-2000 reference period

Forecasts of opportunity

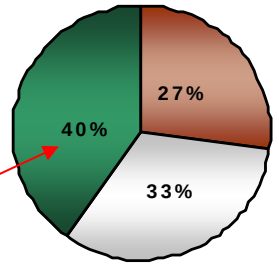
Climate Prediction Center: Modified



Climate Prediction Center: Modified



Precipitation Probabilities Forecast for Regions Where A = 40



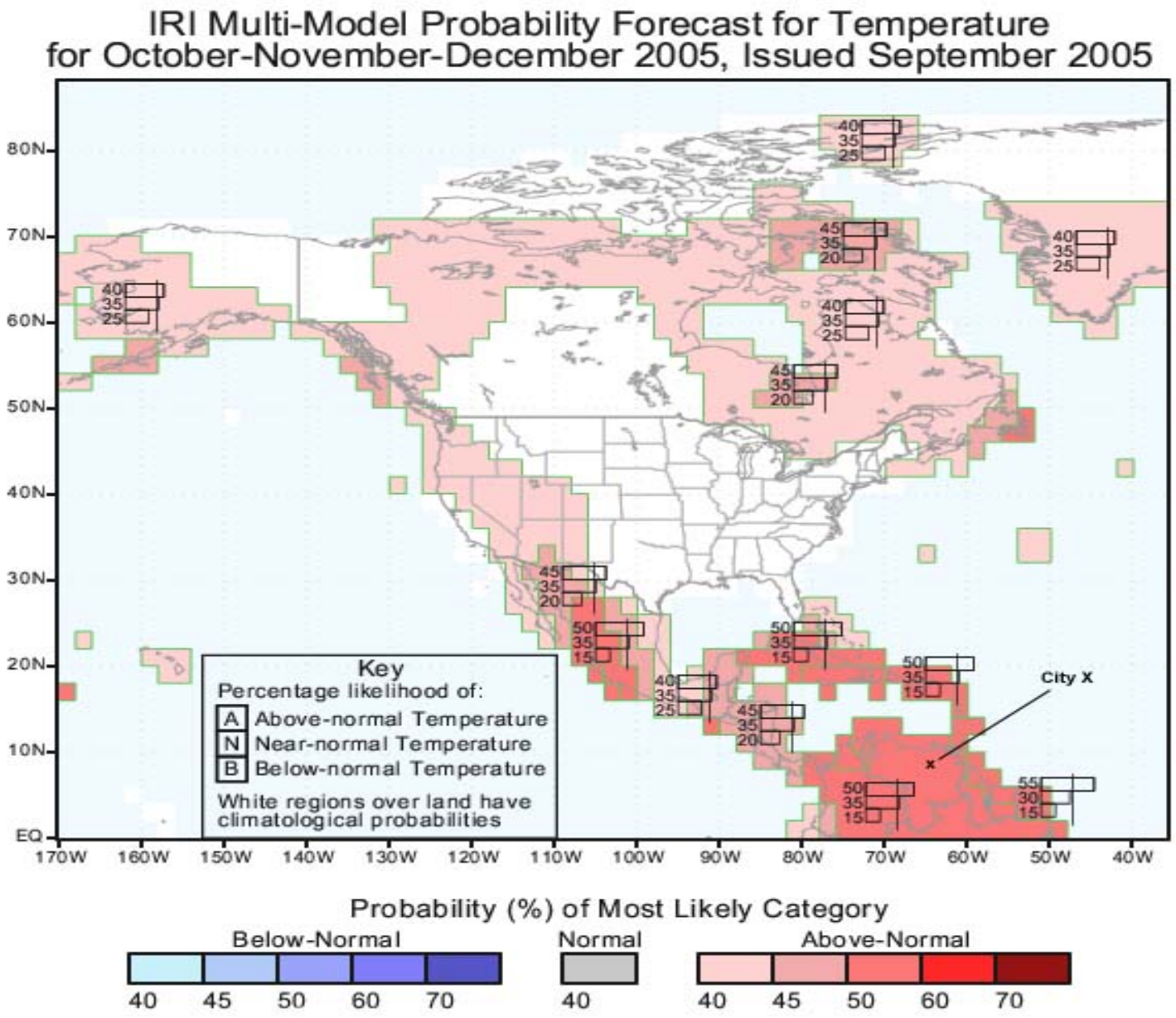
- Below Normal: 27%
- Near Normal: 33%
- Above Normal: 40%

IRI for Climate and Society

Terciles

1969-1998 reference period

Forecasts of opportunity



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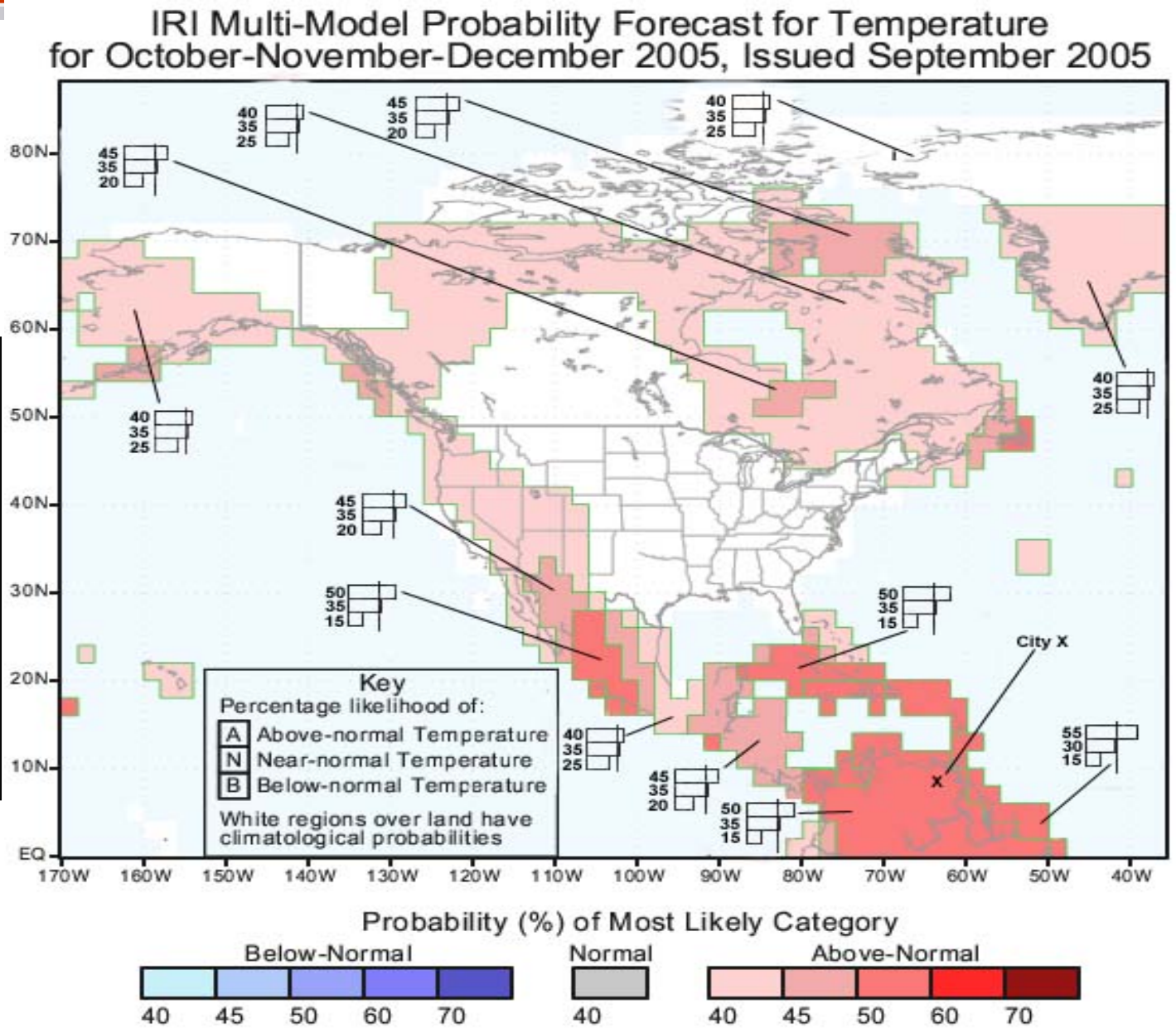
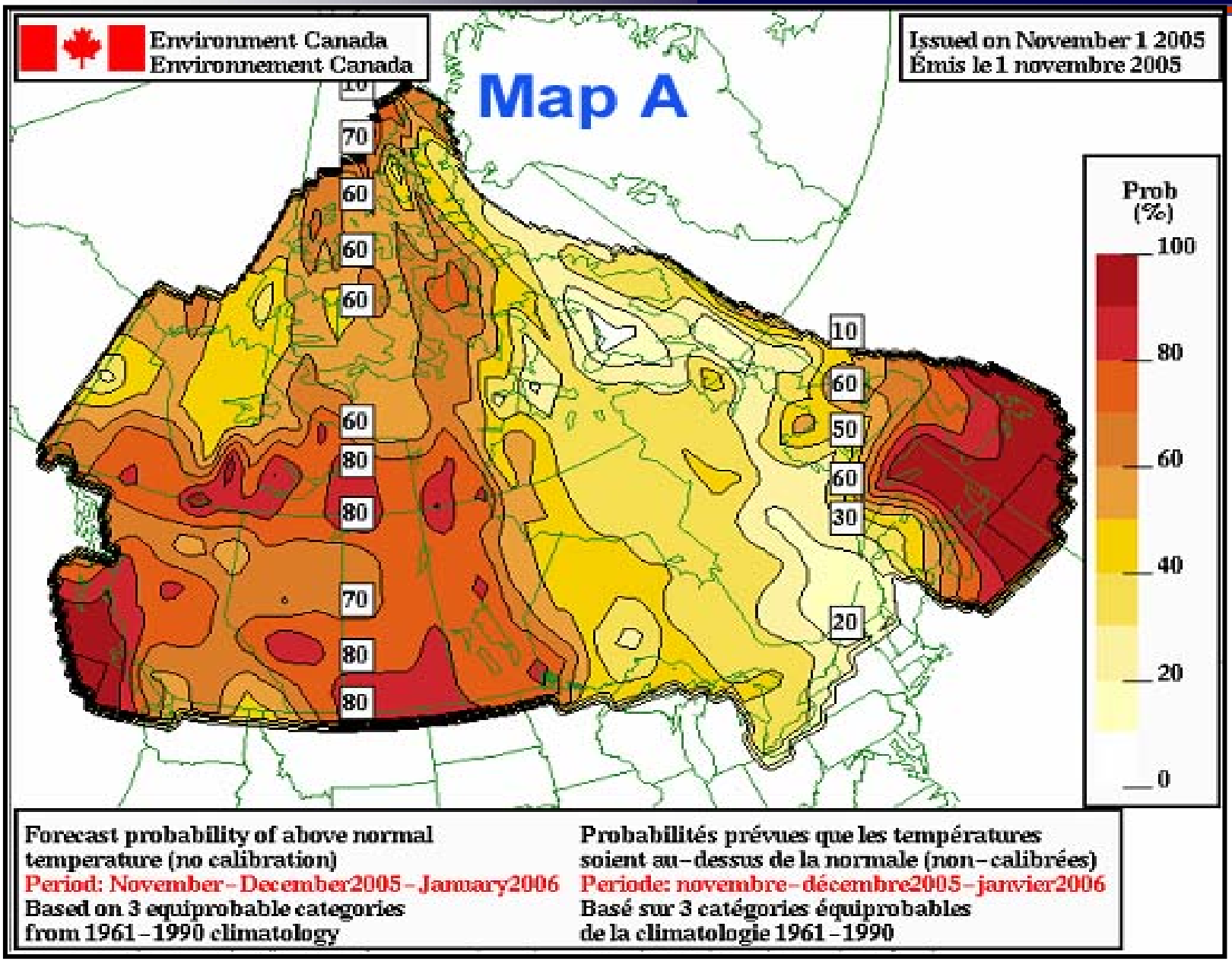


Canada: Seasonal climate outlook



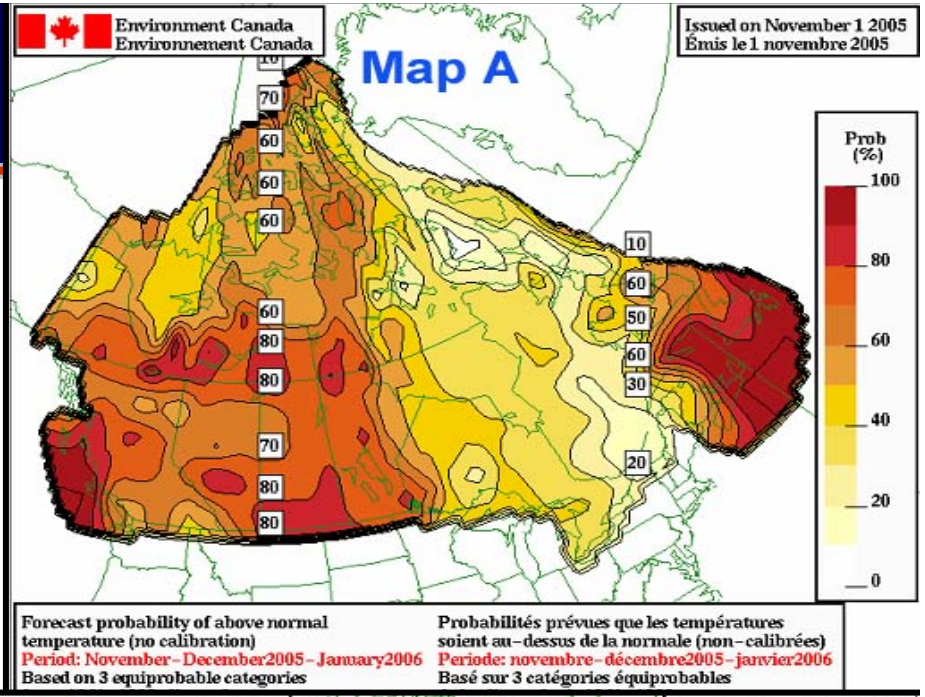
Canada: Temperature

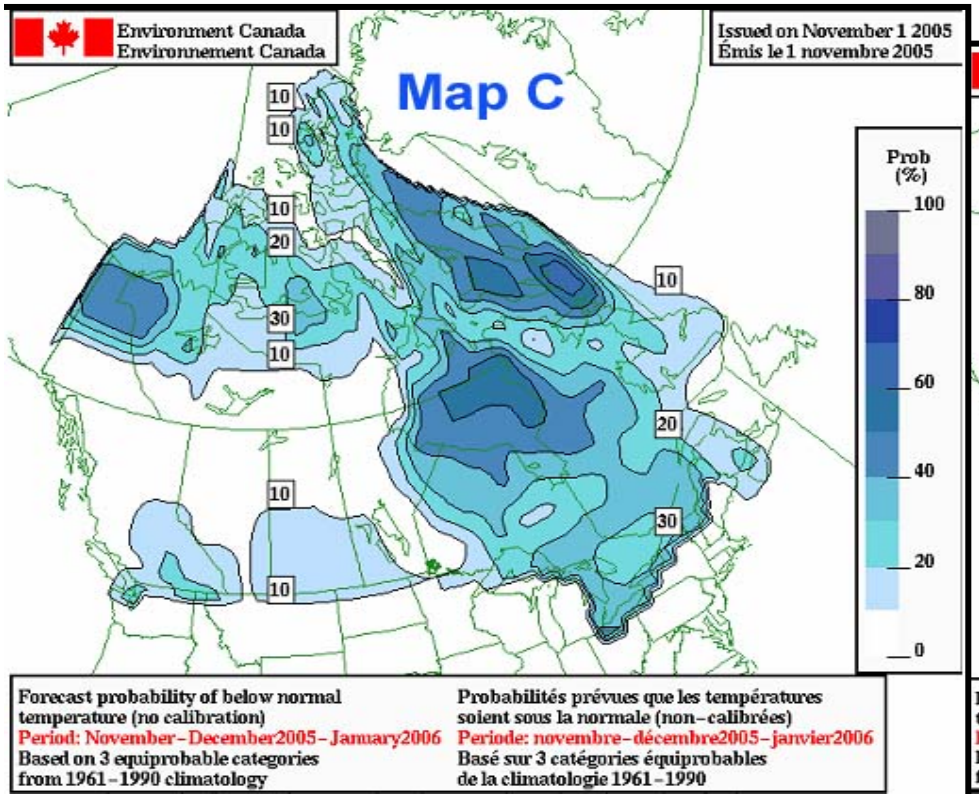
Three maps = one forecast

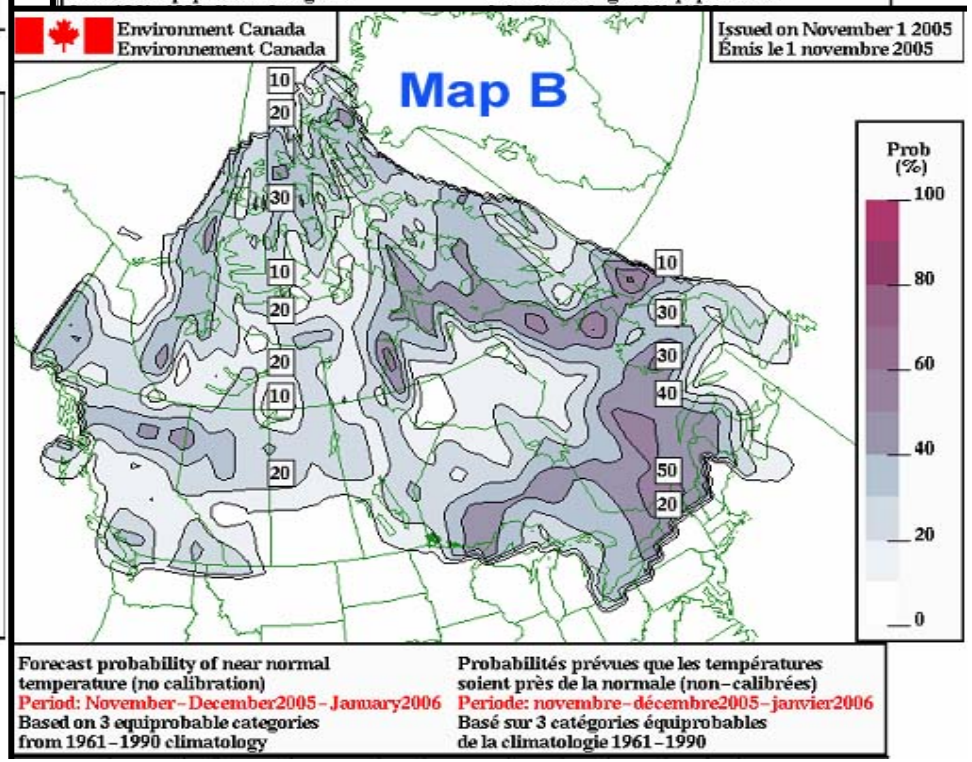
Terciles

1961-1990 reference period

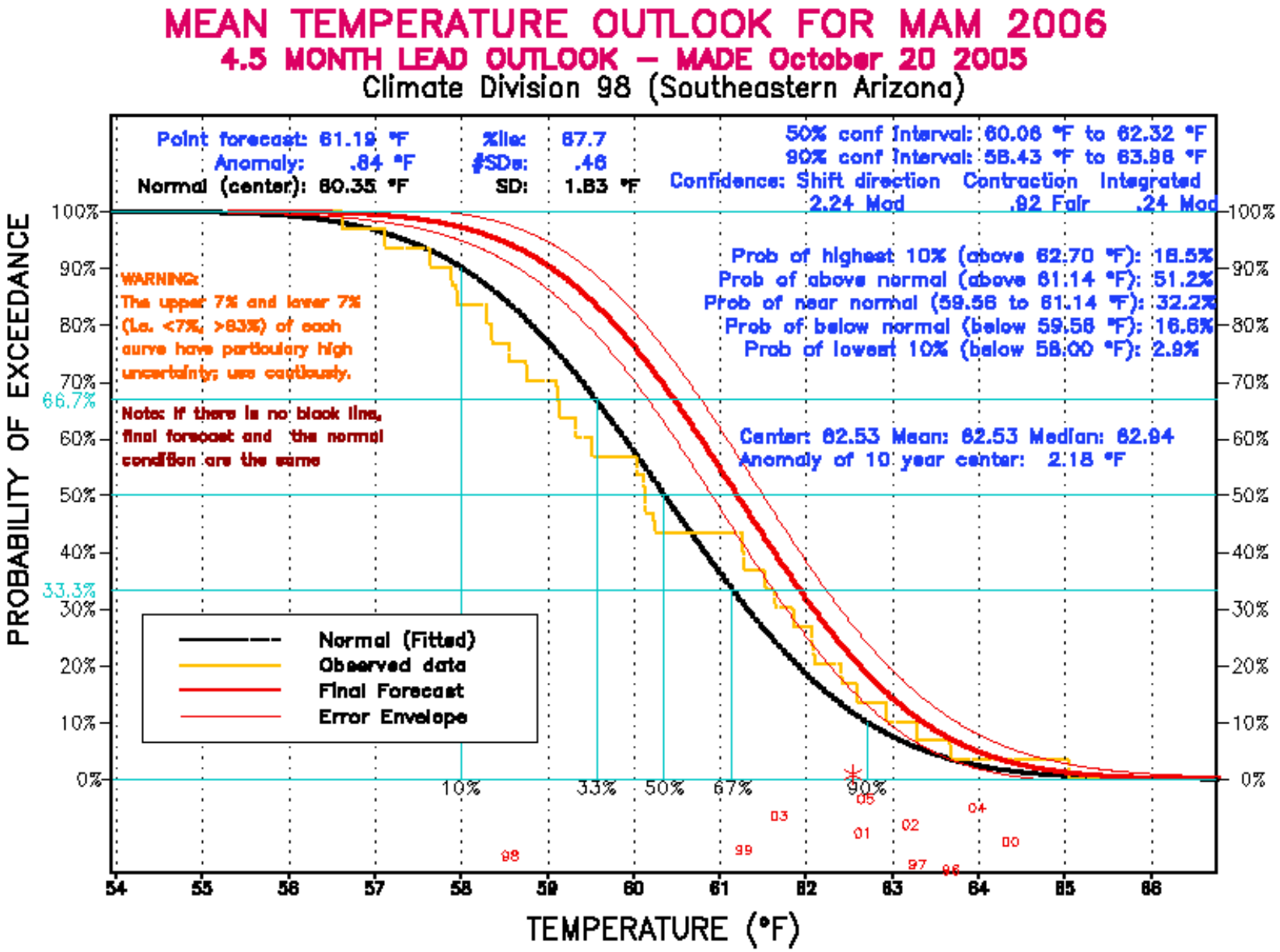
Forecast everywhere



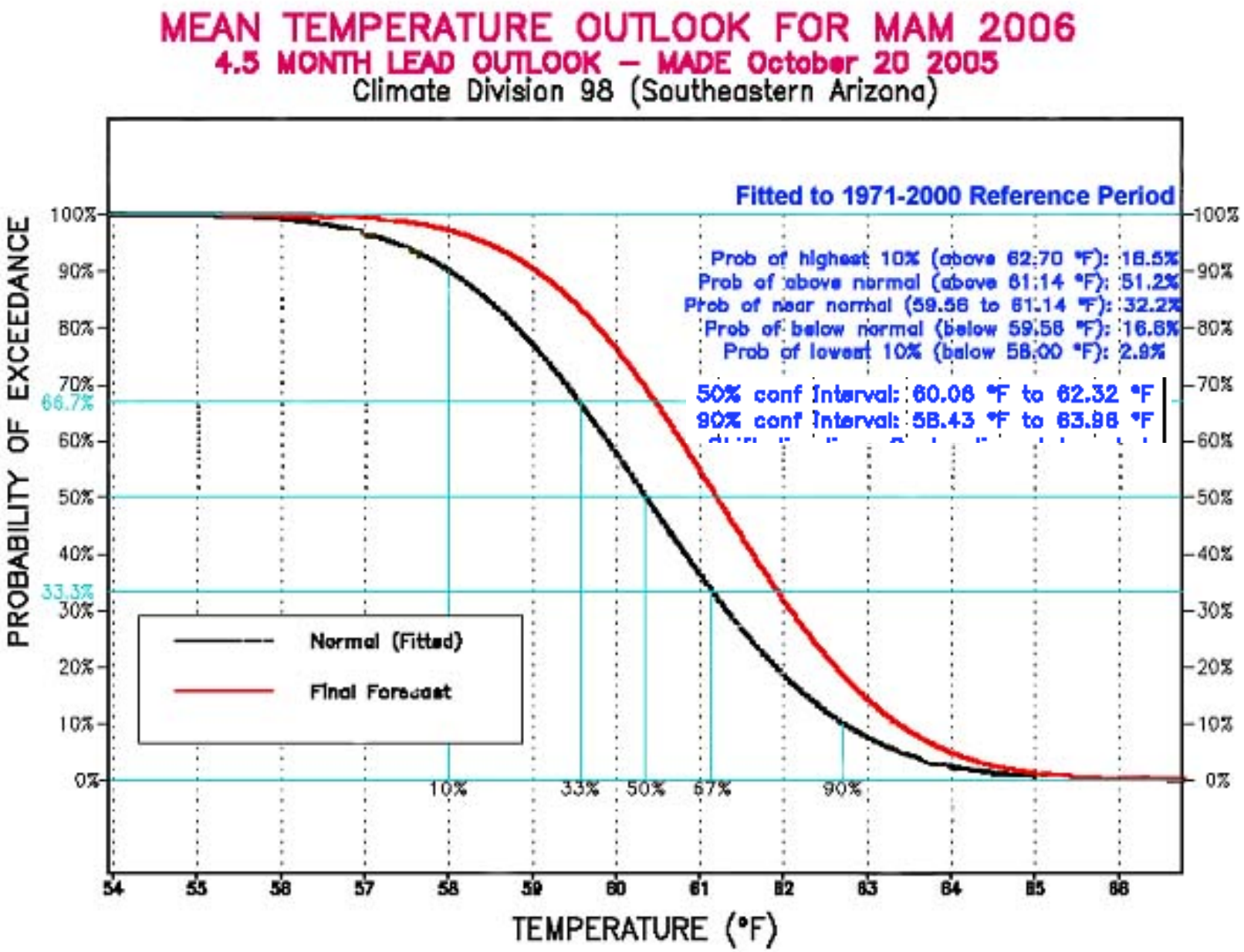




CPC Probability of Exceedance Outlook



CPC Probability of Exceedance: Modified



First Survey Effort: AWRA

American Water Resources Association Annual Meeting, Seattle, WA, 11/05

- Diverse representation within sector
- Attendance: about 475 over 4 days

Logistics

- Manageable meeting size
- Smaller meeting = simplified environment
- “Hustle and Harass”
- Total response: 136 + interviews

Findings: People, Product

Respondents had high potential for considering climate variability.

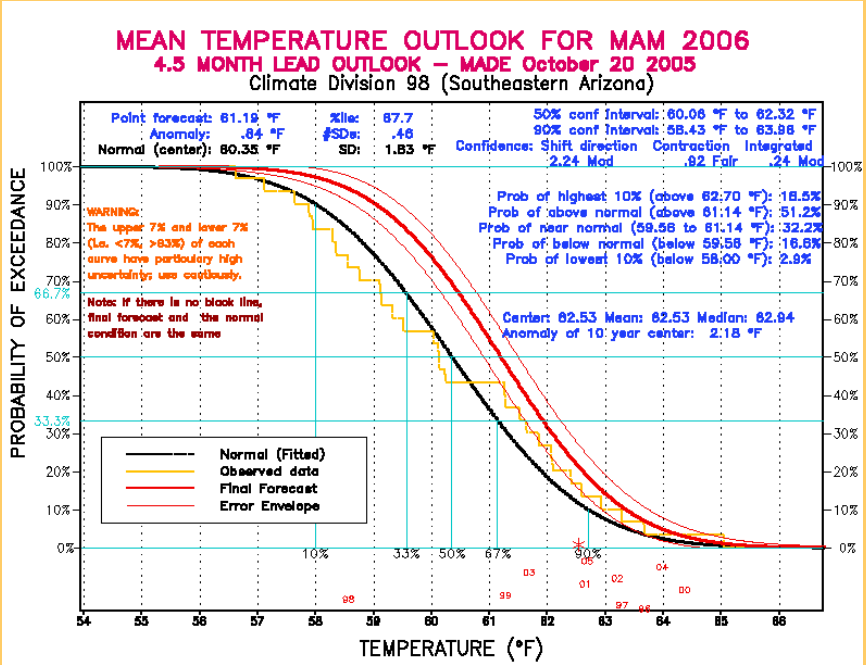
water quality, stormwater management, watershed restoration, water supply planning, floodplain studies, groundwater, saltwater intrusion, watershed management, water economics, utility asset management, permitting and regulatory review, geomorphology, water law and policy, forest hydrology, infrastructure design, planning, operations

Findings: People, Product

Respondents had high potential for considering climate variability.

Forecast users did worse at answering correctly than non-users!

Findings: People, P



Respondents had high p
climate variability.

Forecast users did worse
non-users!

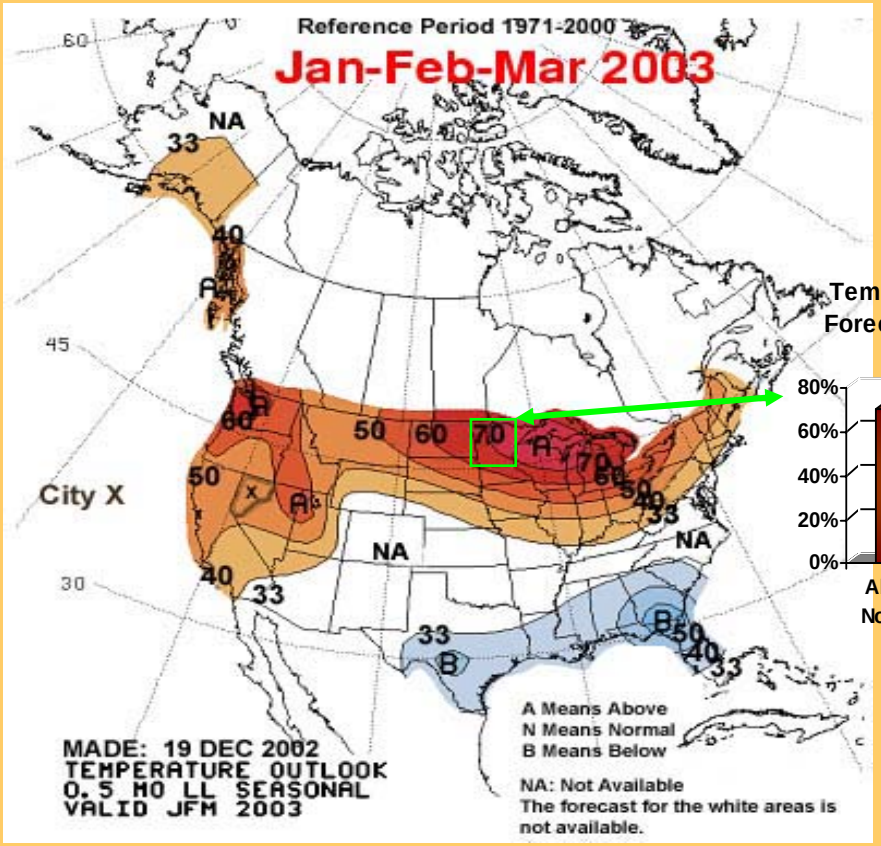
No format was more effective than any other.
POE is notably ineffective.

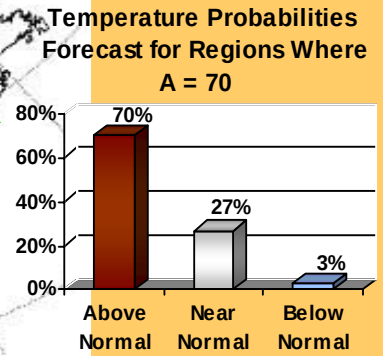
Findings: People, Product

Responden
climate v

Forecast us
non-user

No format
POE is n





Our 'fixes' were no better – except simplifying the POE graph. Issue: introducing more complexity, without structure, persistent language problems.

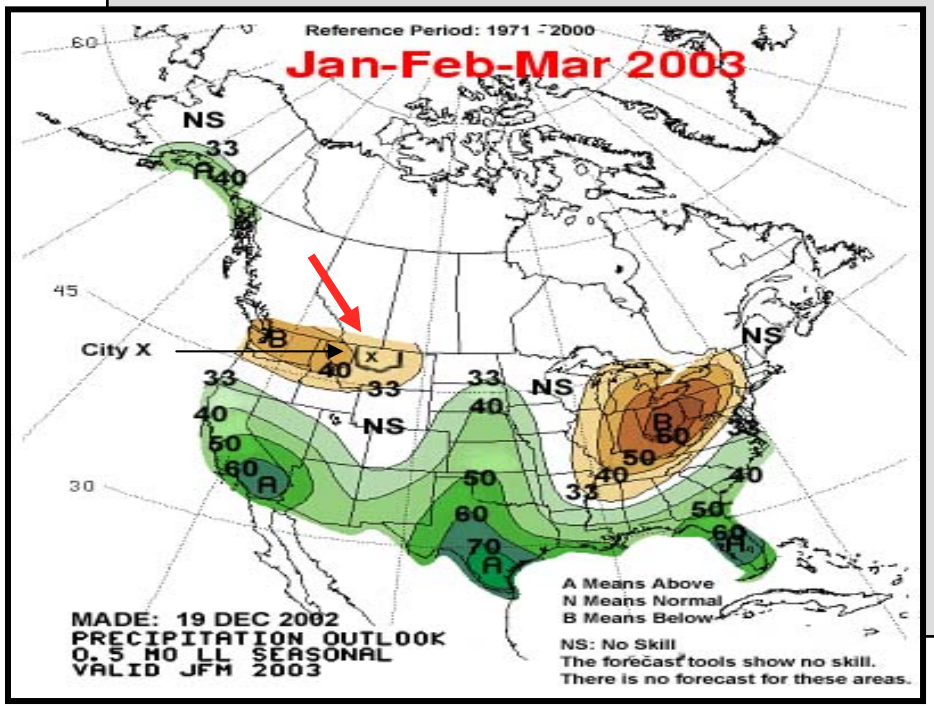
Findings: Identification, Discernment

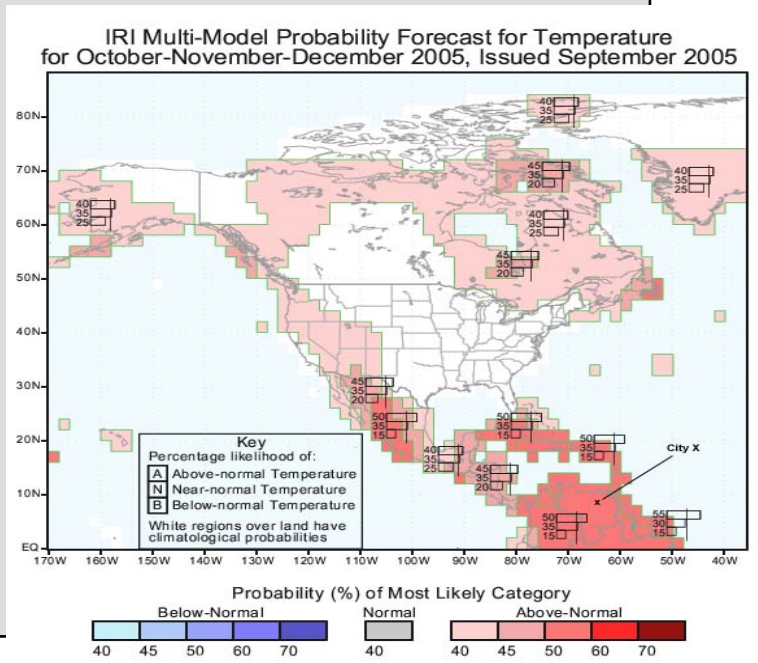
Reference Period: people could *identify* the reference period, mostly… but we didn't test *interpretation*.

Findings: Identification, Discernment

Reference Period: people could *identify* the reference period, mostly… but we didn't test *interpretation*.

Spatial scale: local to regional to global. IRI (grid) and CPC with regional outline were best.





Findings: Identification, Discernment

Reference Period: people could *identify* the reference period, mostly… but we didn't test *interpretation*.

Spatial scale: local to regional to global. IRI (grid) and CPC with regional outline were best.

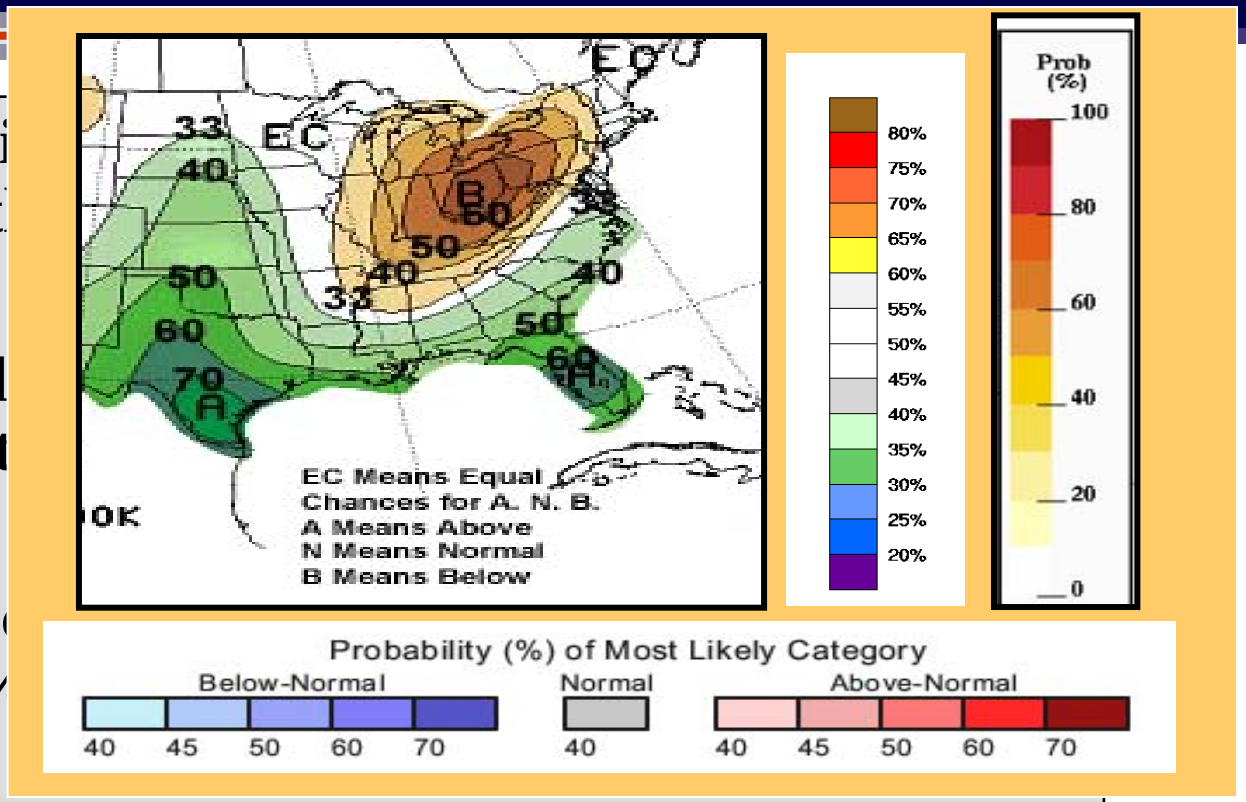
People *can* discern probabilistic nature, with assistance (%, pie chart, bar chart, big title)

Findings: Identification, Discernment

Reference Peri
period, most

Spatial scale: l
and CPC wit

People *can* dis
assistance (%

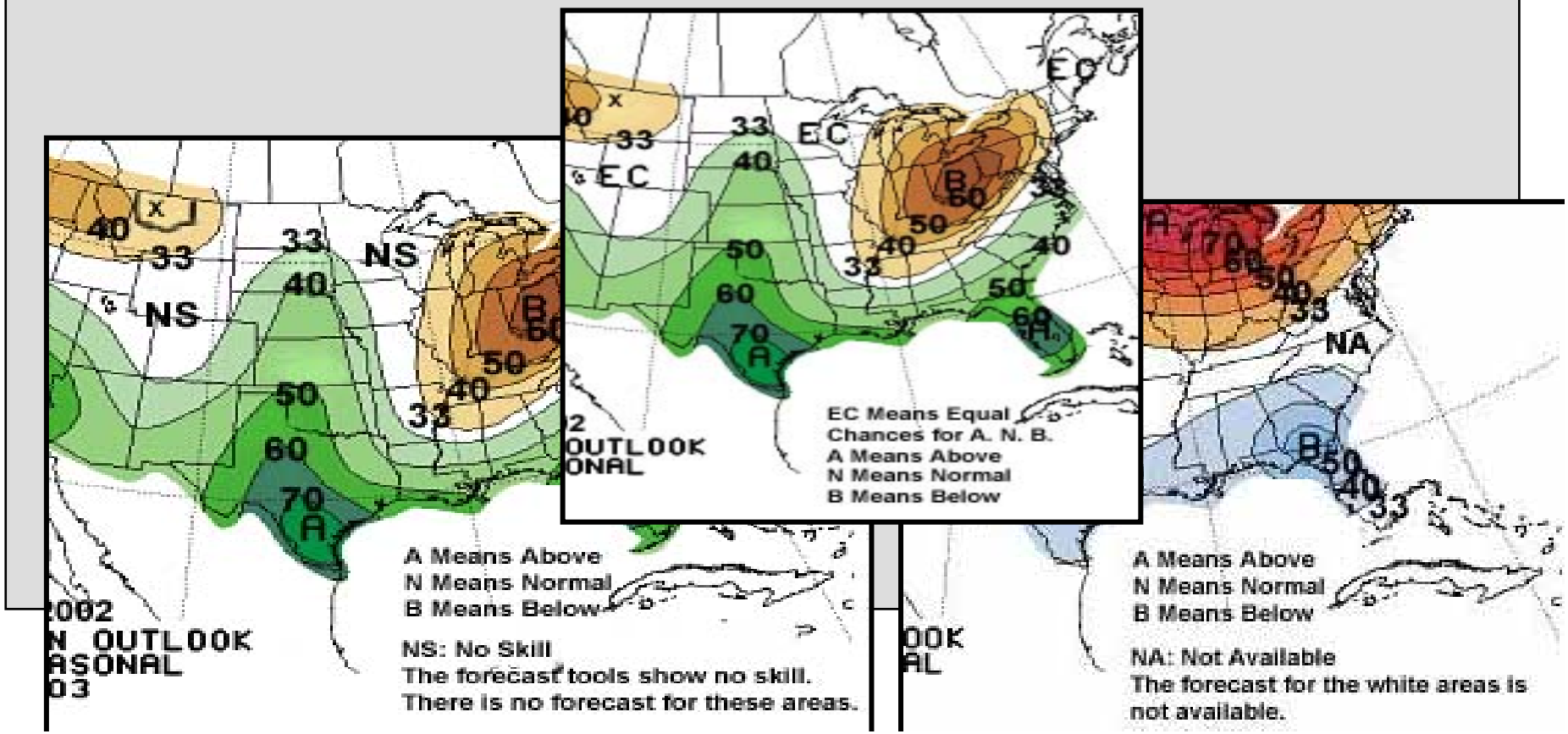


Expressing probability: difficulty putting bounds on probability ranges. Concept of a range of values: people indicated precise probability rather than a range of probabilities.

Findings: Translation, Extension

Reluctance to translate information

'No Forecast' language: No Skill seems to work better than Not Available, Equal Chances, or Climatological Probabilities.



Findings: Translation, Extension

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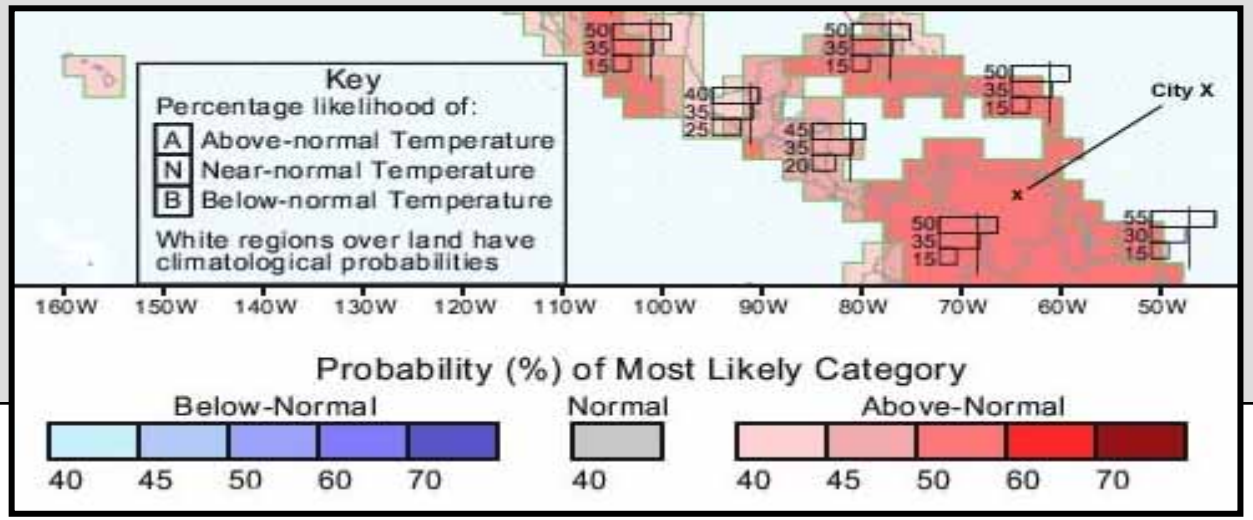
'No Forecast' language: No Skill seems to work better than Not Available, Equal Chances, or Climatological Probabilities.

People have difficulty comprehending terciles, even with graphical assistance. Source of confusion = terminology: 'above', 'below', 'normal' and 'near normal'.



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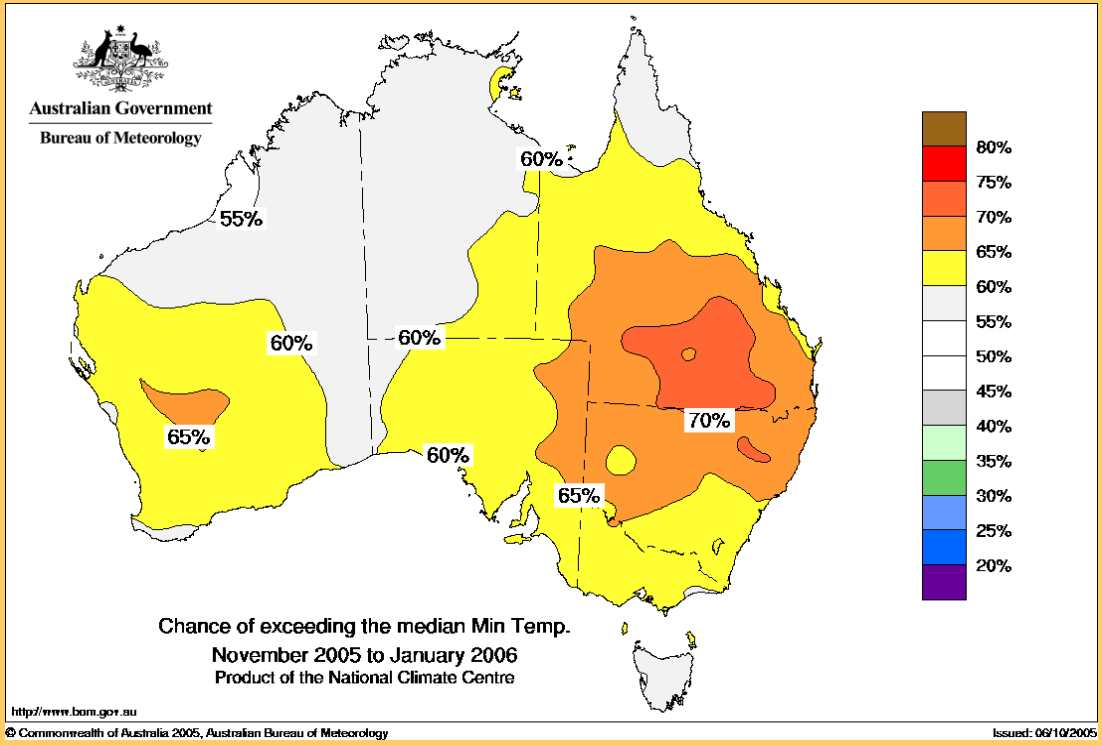

Reluctance to link even median and upper/lower half of reference distribution.

Findings: Translation, Extension

Reluctance to translate information

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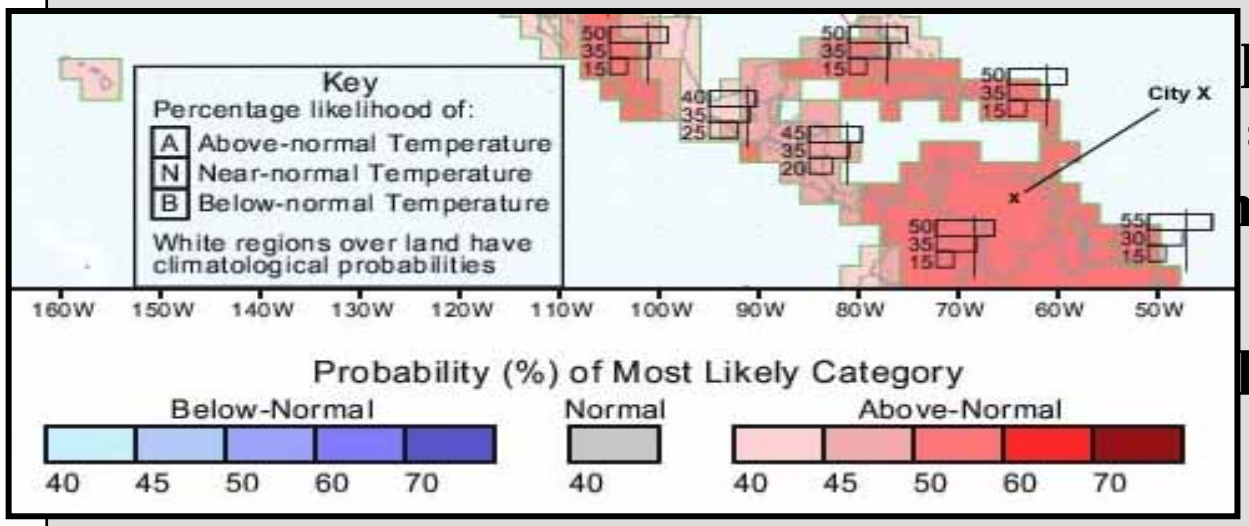


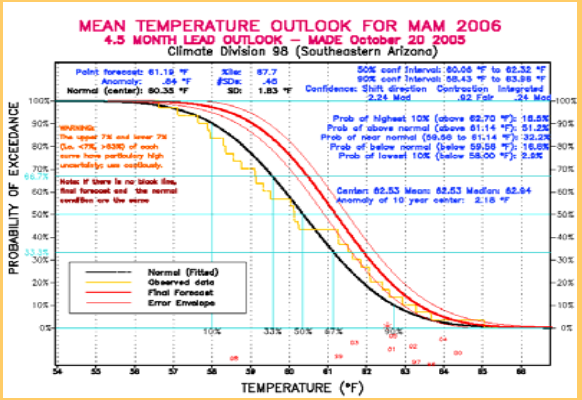
les, even with
= terminology:
mal’.

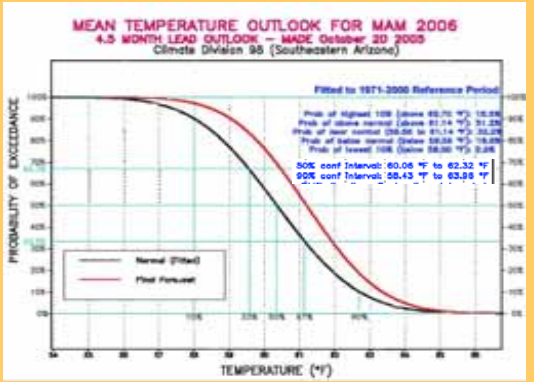
lower half of

Reluctance to specify probabilities for less likely categories.

Probability of Exceedance Outlooks

Unique product…
unique results





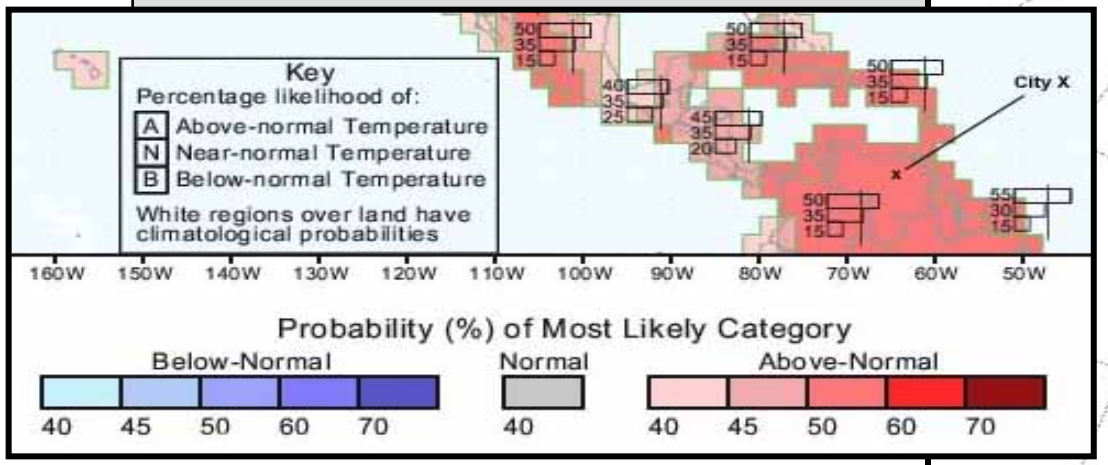
Return rate was extremely low and most questions had no correct answers.

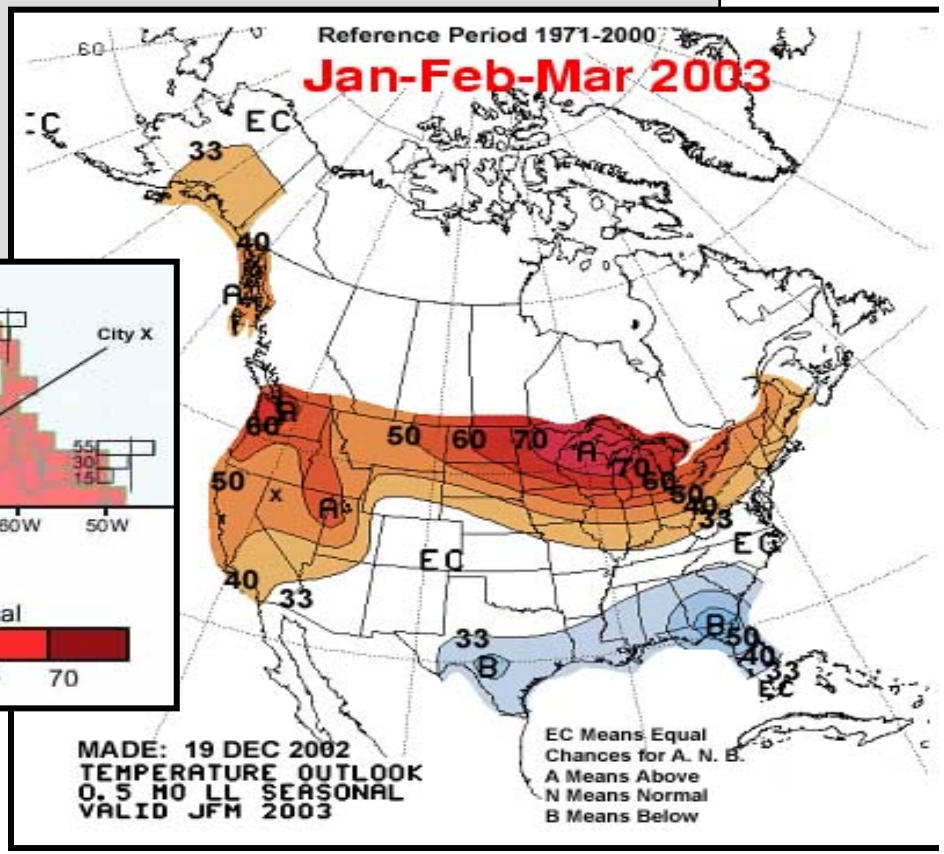
Simplified version had highest response rate and much higher rate of correct answers.

***No one* correctly answered that the probability of a single value is nearly zero…**

Findings/Recommendations

Information itself insufficient. Disconnected elements create confusion. People have trouble coordinating and connecting the dots… …





Findings/Recommendations

Information itself insufficient. Disconnected elements create confusion. People have trouble coordinating and connecting the dots… …

Confusion, tentativeness over basic principles: e.g., probability range=0-100%; median divides upper and lower half of distribution; forecasts address all three terciles.

Findings/Recommendations

Information itself insufficient. Disconnected elements create confusion. People have trouble coordinating and connecting the dots… …

Confusion, tentativeness over basic principles: e.g., probability range=0-100%, median divides upper and lower half of distribution; forecasts address all three terciles.

Structure information within product format.

Explicit reinforcement of basic principles.

Boundary Maintenance

Survey quotes:

It's obviously intended for use by meteorologists and climatologists who use these every day.

Get rid of techie language that only makes sense to other forecasters.

Make it more understandable for the layperson.

I just couldn't figure out what they basically tried to tell me.

Interview messages:

This product must not be applicable to my work, because otherwise I would understand it.