

Link between CGM's and IAV's

Snowmass 15

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Is there a Link?

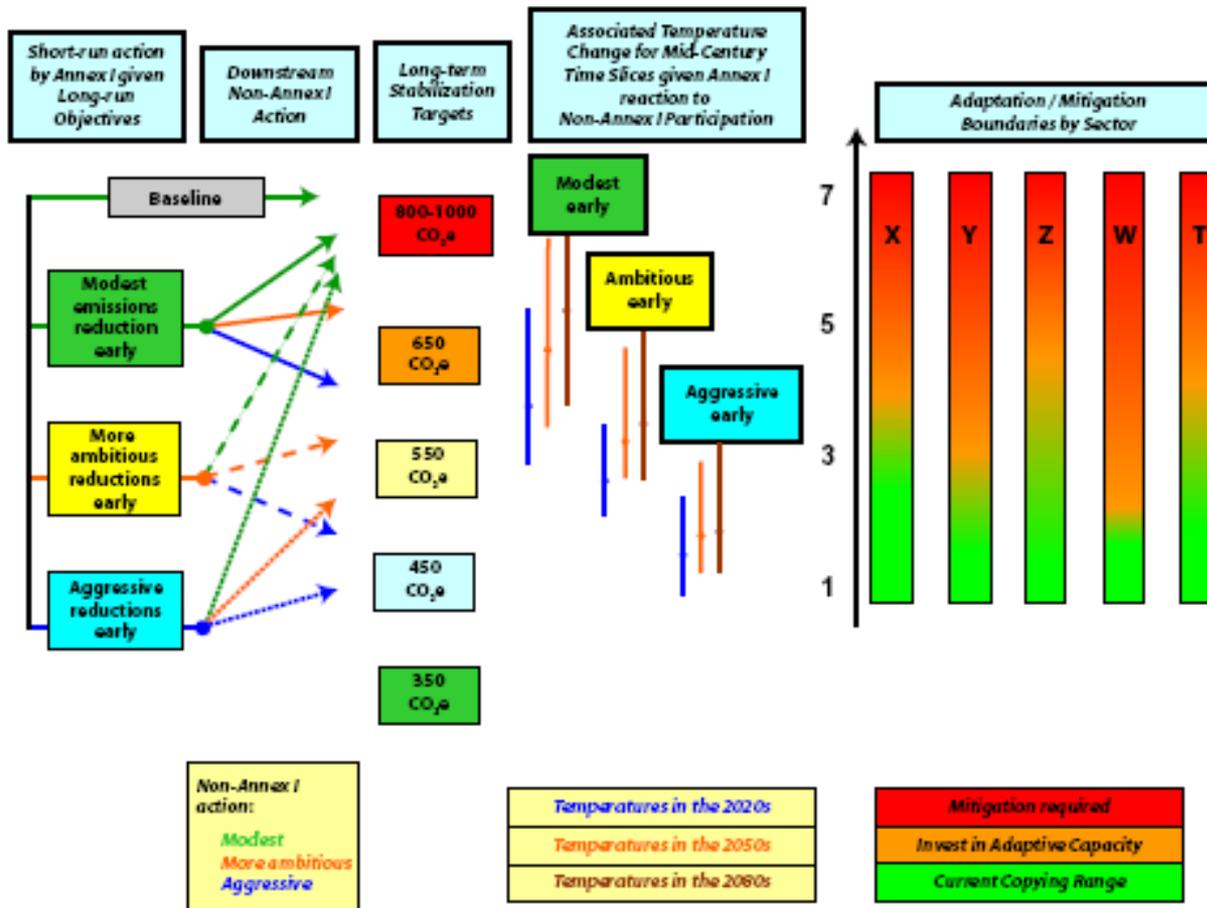
- Yes, but the type of link?
- It depends
 - Top down: framing the policy discussion
 - Bottom up: framing the analysis of vulnerabilities (site specificity and path dependency are critical) and finding what is “dangerous”.

Framing the Policy Discussion

My Take on Context

- Responding to climate change involves an *iterative risk management* process that includes both adaptation and mitigation, and takes into account climate change damages, co-benefits, sustainability, equity and attitudes to risk {IPCC Synthesis Report; AR4; 2007}.
- UNFCCC – Articles 2 and 4
 - Avoid dangerous anthropogenic interference
 - Developed countries help the most vulnerable adapt

Framing the Policy Discussion from the Top Down



The Caption.....

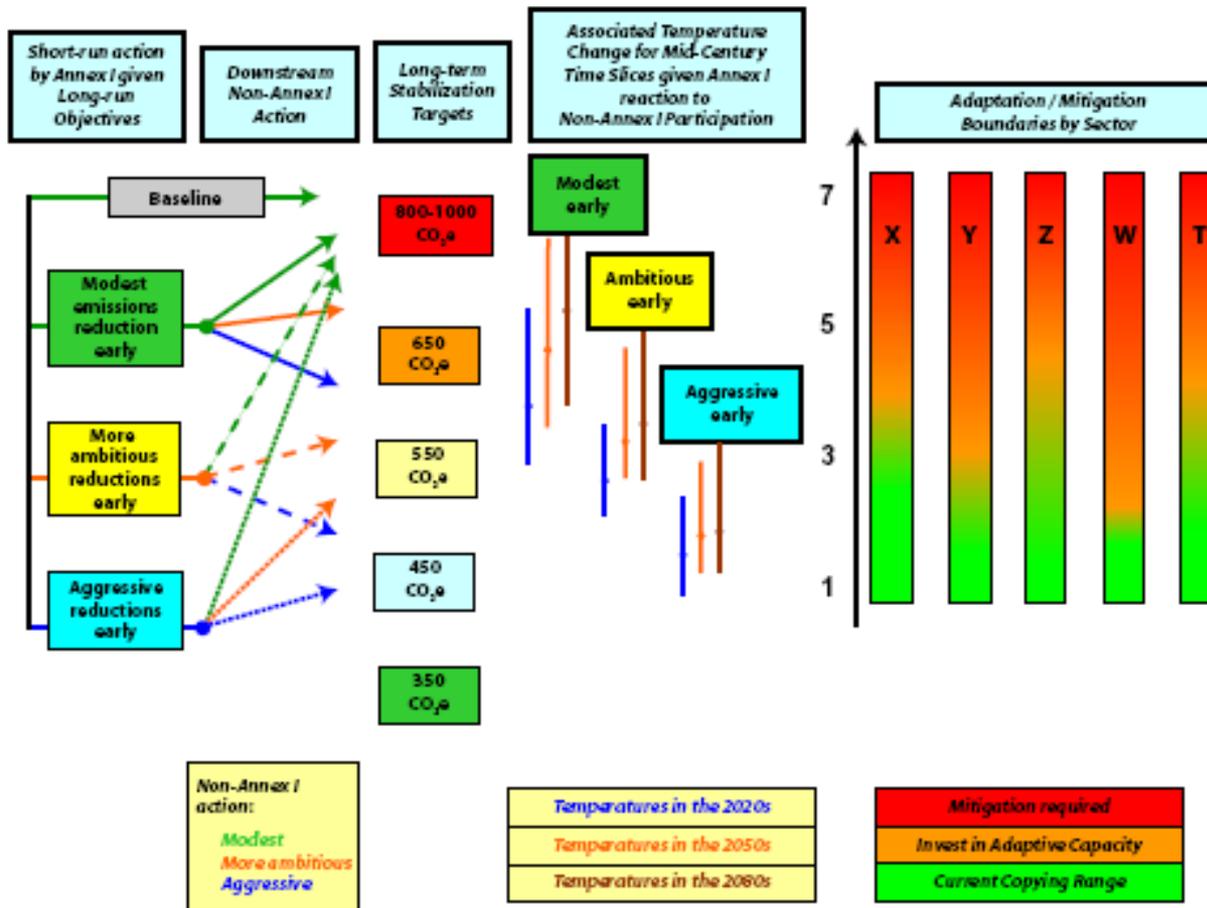
Fig. 1 A schematic portrait of an integrating risk-based framework for evaluating iterative mitigation and adaptation responses to climate change. The left hand portion illustrates an “act then learn then act again” approach to near-term mitigation decisions. Annex I starts the process with the understanding that adjustments will be made as they observe how non-Annex I nations will respond; i.e., they may slow or increase the pace of their emissions reductions if they see non-Annex I countries delaying or accelerating their participation in global mitigation strategies. The results, over the longer-term, produce trajectories of atmospheric concentrations that move toward values in 2100 ranging from 350 ppm CO₂e to perhaps 1000 ppm CO₂e. The middle panel translates these trajectories into time slice portraits of the distribution of global mean temperature change (in the 2020’s, the 2050’s and the 2080’s). The *right-hand side* summarizes vulnerabilities in key sectors and their sensitivity to the aggregate temperature change index of climate change; they are calibrated in terms of current coping ranges for climate variability superimposed on dynamic climate change, the extent to which investment in adaptive capacity might expand those ranges, and levels above which even those investments would be “overwhelmed”. Source: personal communication with Leon Clarke, Linda Mearns, Richard Moss, Richard Richels, Tom Wilbanks, and John Weyant. The figure was produced by M. Yohe

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**Toward an integrated framework derived
from a risk-management approach to climate change**
An editorial comment

Gary Yohe

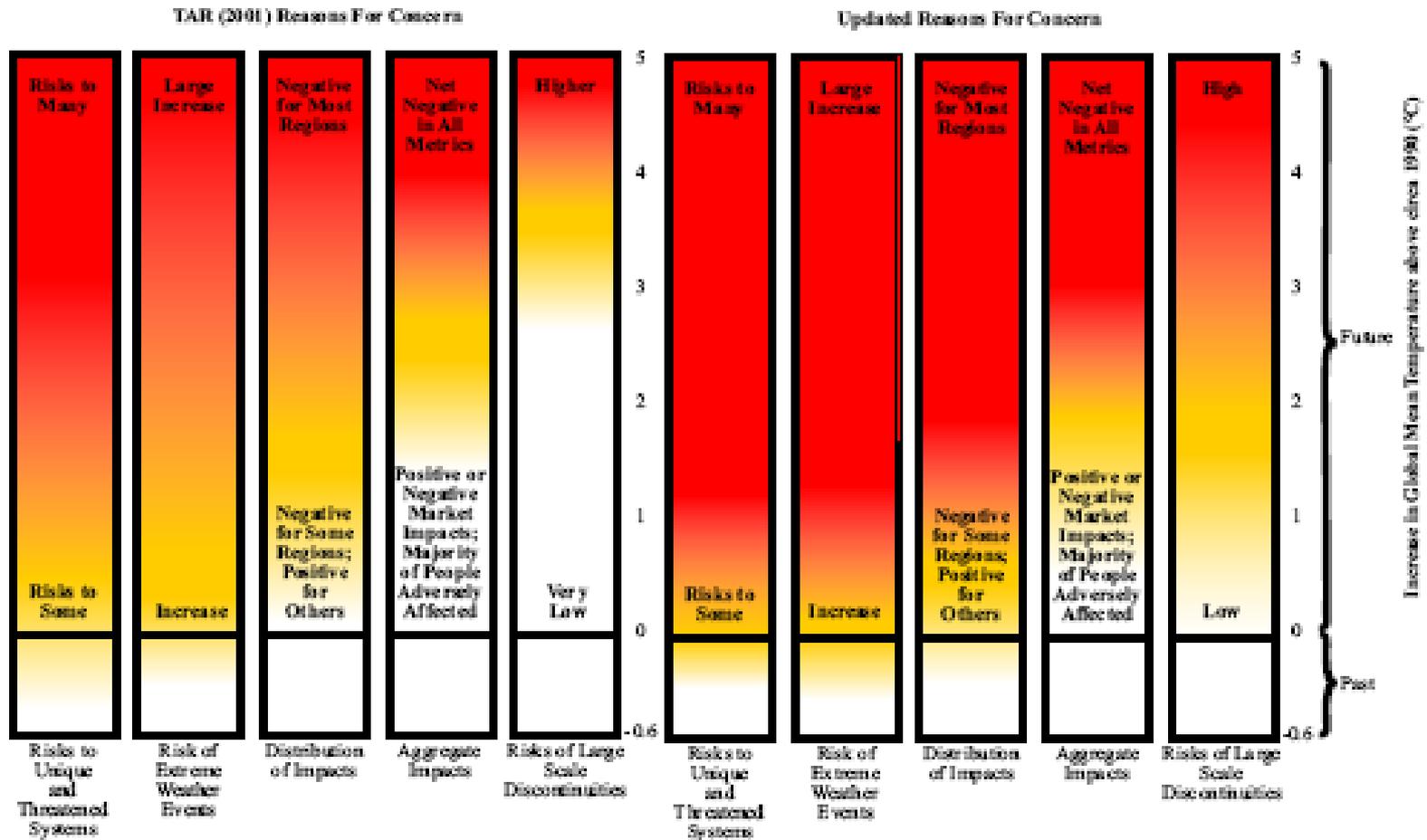
Framing the Policy Discussion from the Top Down



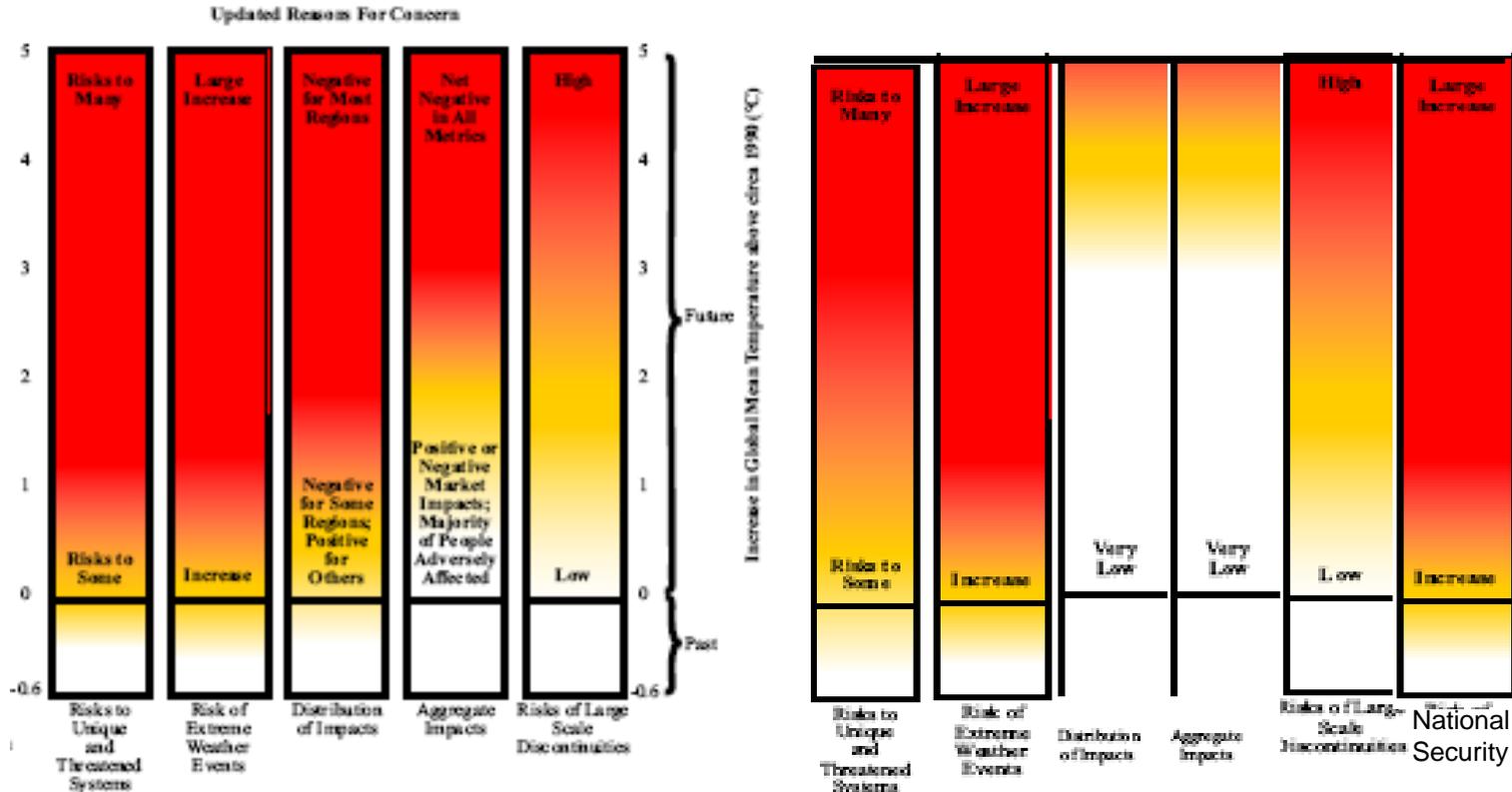
Iterate Policy Perspective with Respect to:

- Progress (success to failure) toward meeting short-term targets (informed by long-term objectives)
- Cost of short-term initiatives
- Projected costs of possible new approaches and technologies
- *New science and new ideas about what is dangerous that could lead to changes in long-term objectives.*

The Right Hand Side - Science Evolves



The Right Hand Side – US Embers (tentative)

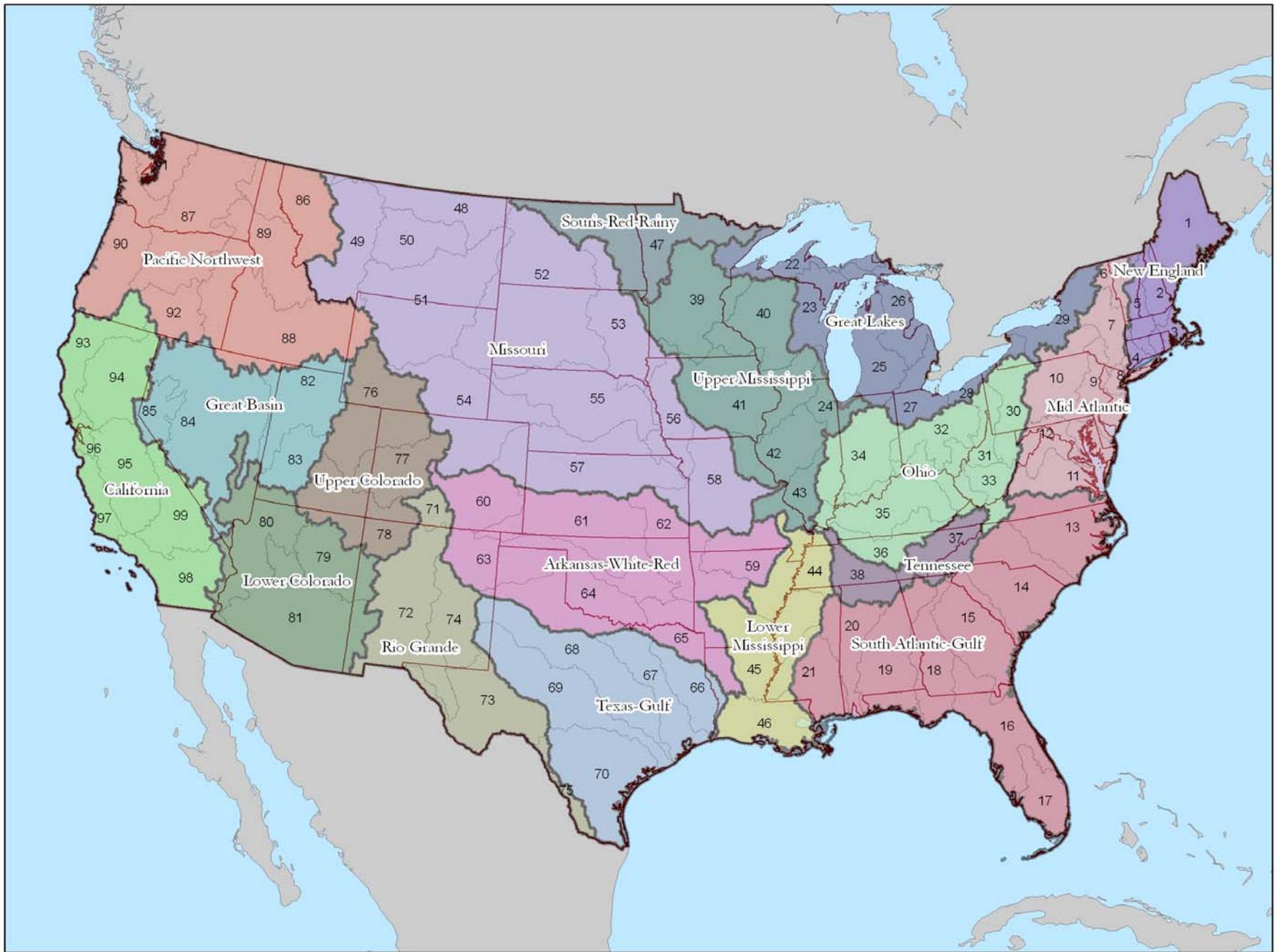


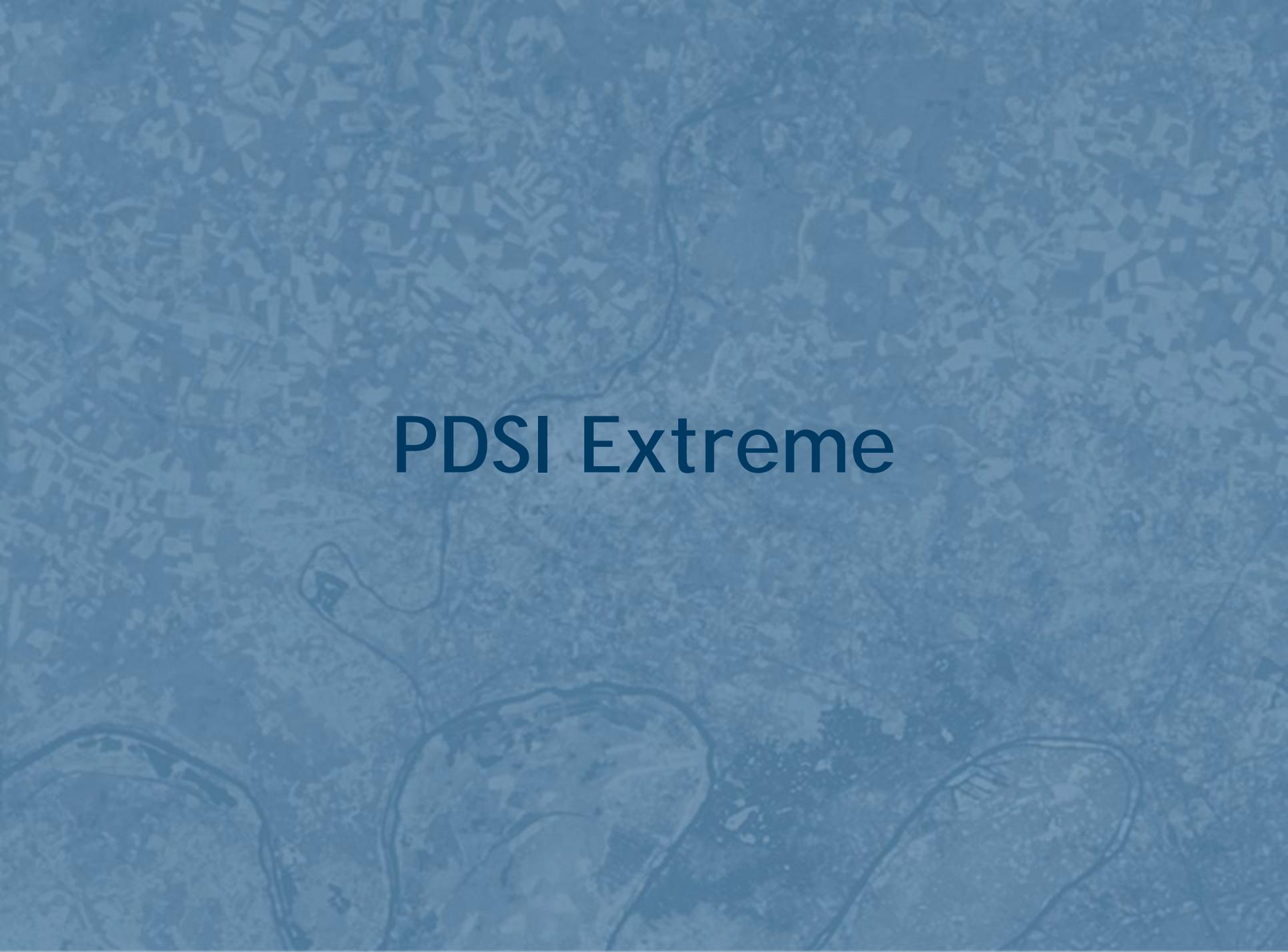
Messages

- Science evolves and graphic portraits change can inform policy perspectives for the long-term.
- The United States will never discover anything dangerous concentrating on economic metrics.

A very little bit on Vulnerability and the Bottom Up

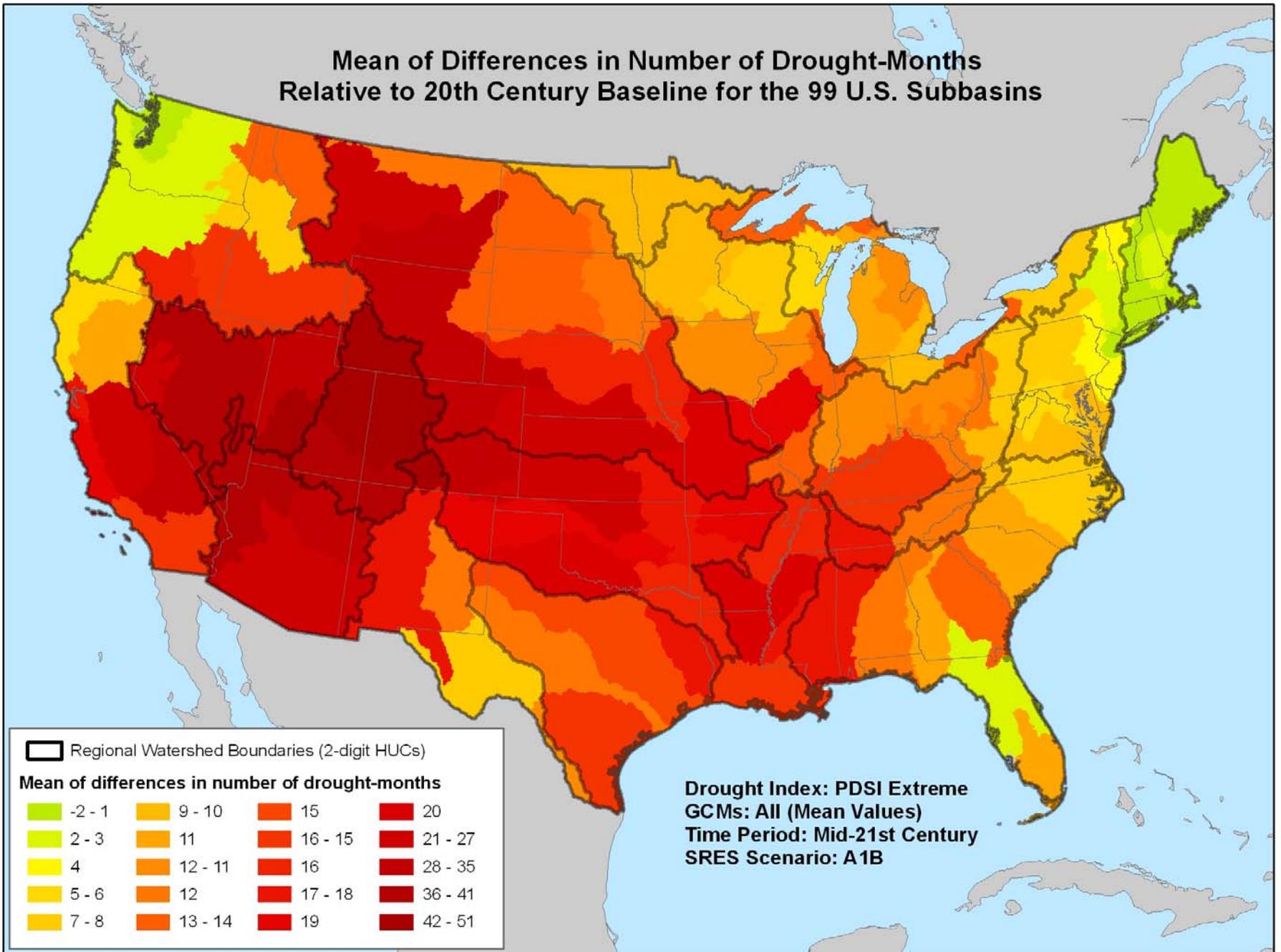
- GCM's provide input to vulnerability analyses.
- We cannot do everything at the same time with the same degree of accuracy.
- So.... We need tools to allocate scarce resources – researchers' time
- Suggest taking a first cut with broad coverage followed by more detailed analyses where it matters – determined perhaps by applying the AR4 criteria for “key vulnerabilities”.



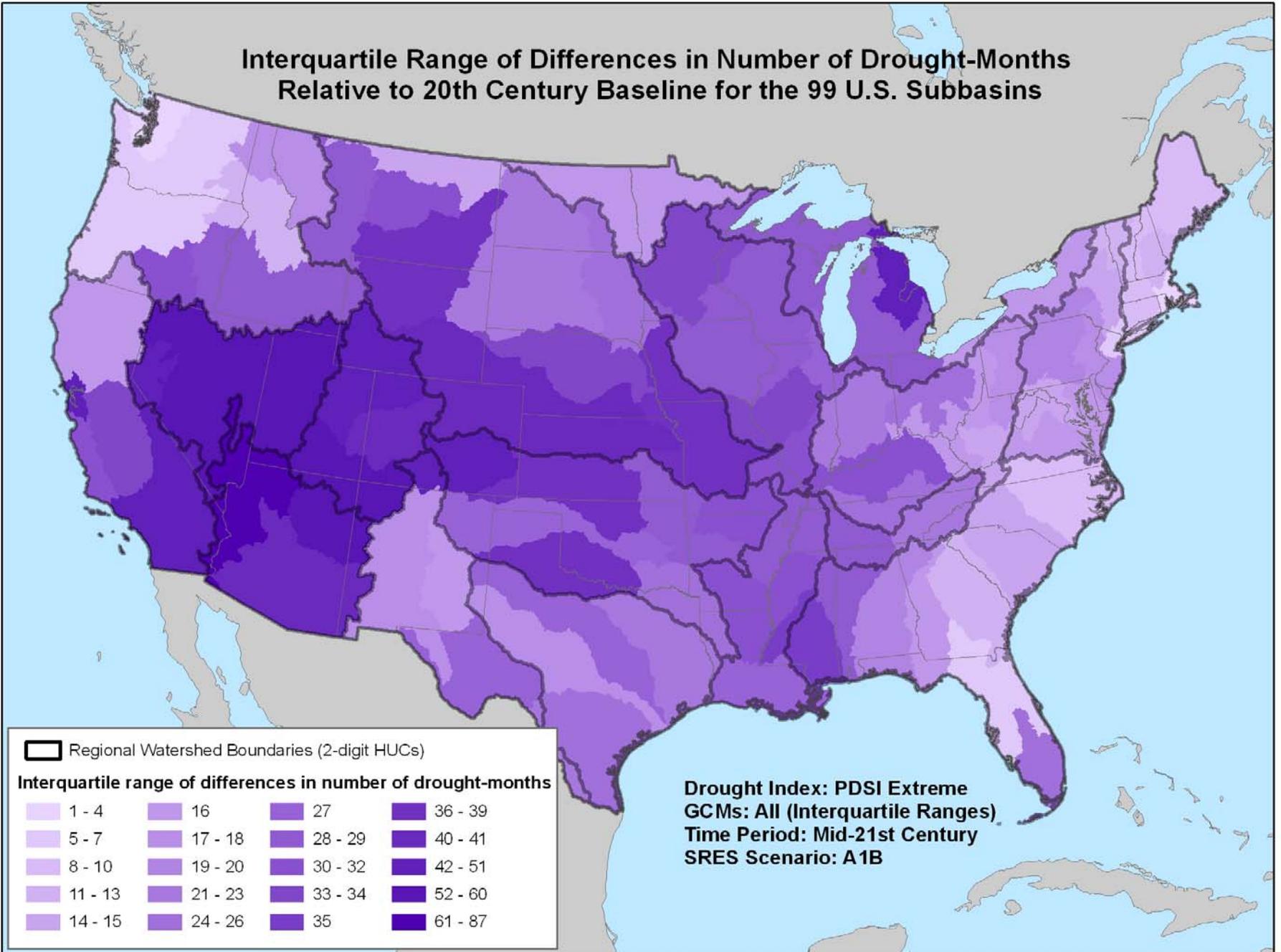
The background of the slide is an aerial photograph of a landscape, possibly a coastal or riverine area, with a semi-transparent blue overlay. White contour lines are visible, indicating topographic features. The text 'PDSI Extreme' is centered in a bold, dark blue font.

PDSI Extreme

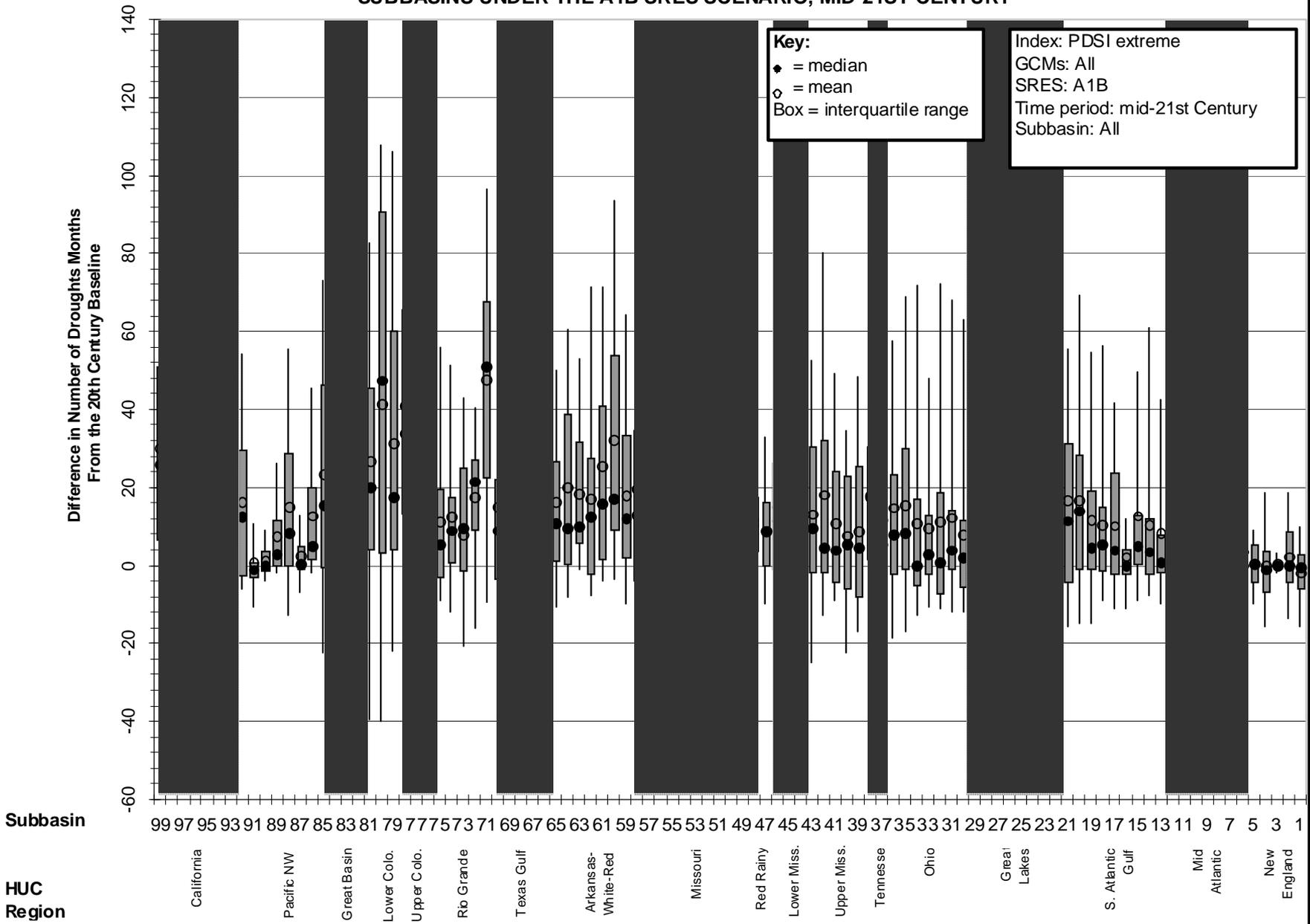
Mean of Differences in Number of Drought-Months Relative to 20th Century Baseline for the 99 U.S. Subbasins



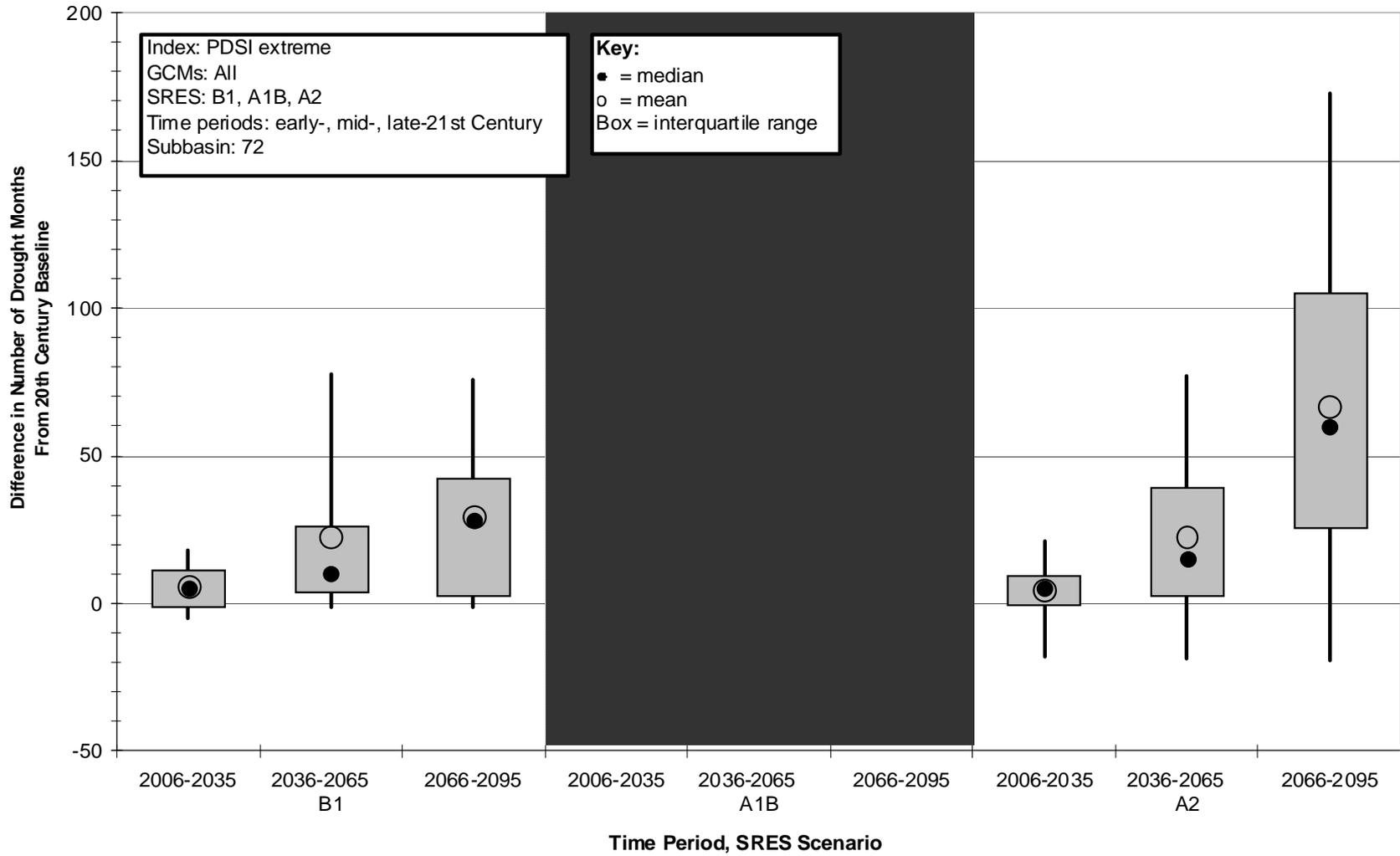
Interquartile Range of Differences in Number of Drought-Months Relative to 20th Century Baseline for the 99 U.S. Subbasins



**UNCERTAINTY DISTRIBUTIONS ACROSS GCMS FOR THE PDSI EXTREME DROUGHT INDEX
DIFFERENCE IN NUMBER OF DROUGHT MONTHS FROM 20TH CENTURY BASELINE FOR THE 99
SUBBASINS UNDER THE A1B SRES SCENARIO, MID-21ST CENTURY**



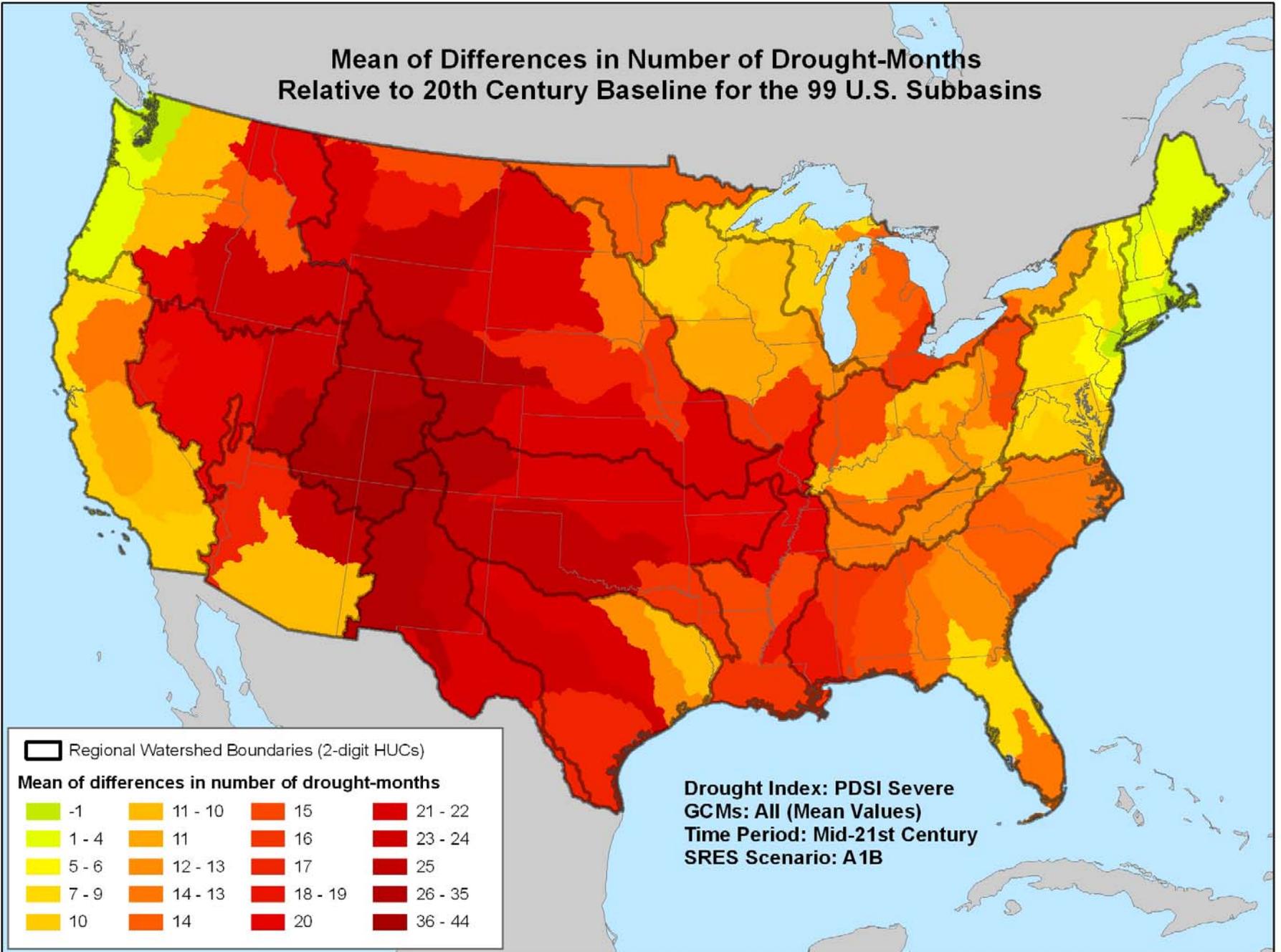
**UNCERTAINTY DISTRIBUTIONS ACROSS GCMS FOR THE PDSI EXTREME DROUGHT INDEX
DIFFERENCE IN NUMBER OF DROUGHT MONTHS FROM 20TH CENTURY BASELINE FOR SUBBASIN 72 UNDER
THREE SRES SCENARIOS AND THREE TIME PERIODS**



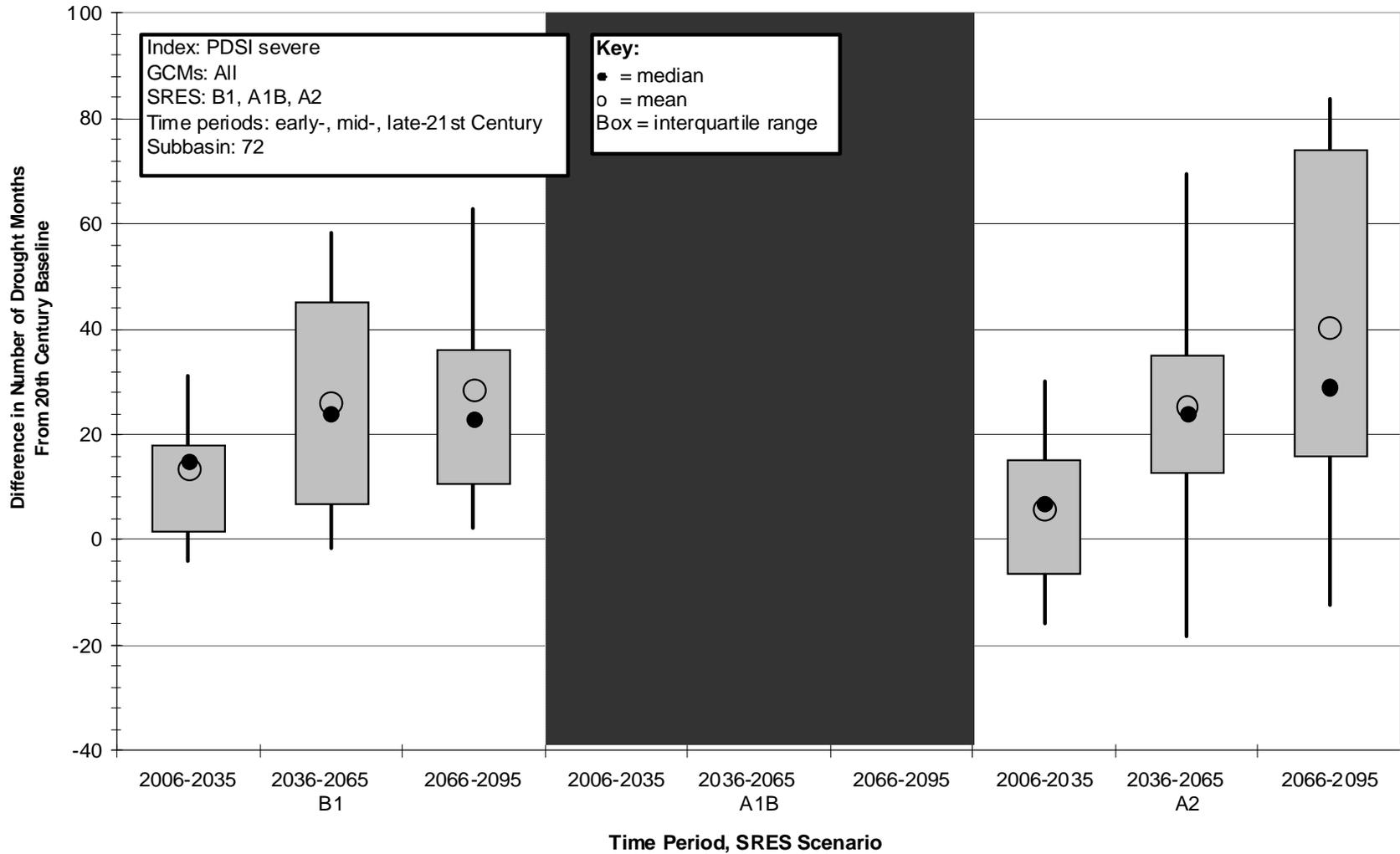


PDSI Severe

Mean of Differences in Number of Drought-Months Relative to 20th Century Baseline for the 99 U.S. Subbasins



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DIFFERENCE IN NUMBER OF DROUGHT MONTHS FROM 20TH CENTURY BASELINE FOR SUBBASIN 72 UNDER
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Messages

- Nature does a lot of “averaging” for us; might as well take advantage when possible especially for first-cut assessments of where “key vulnerabilities” might be identified.
- It follows that the value of providing projections of climate change over smaller grids depends on user needs and is not uniformly distributed.
- The design of iterative adaptation may depend, in large measure, on the relative skill of current spatially focused projections for adaptation-specific climate variables and the potential for improving that skill over time; this could be quantified as a “value of information” exercise.

Thanks for your attention...

Comments welcome, especially on the US
Embers.