

Miracle Spring Precipitation under the warmer climate in Colorado River Basin

Binod Pokharel¹, S.-Y. Simon Wang¹, Krishna Borhara¹, Kripa Akila Jagannathan², Andrew Jones², and Smitha Buddhavarapu²

¹Utah State University

²Lawrence Berkeley National Laboratory

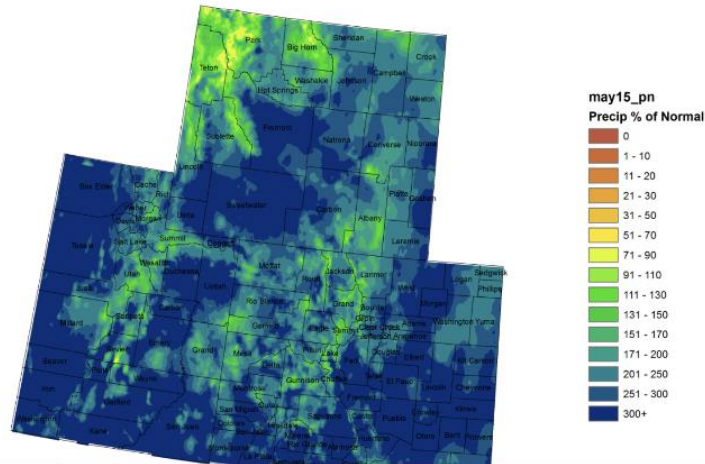
46th CDPW

26-27 October 2021

Water managers dodge bullet with 'May miracle' rains — The Los Angeles Times #ColoradoRiver

July 22, 2015 Coyote Gulch Climate Change, Colorado River Basin, Colorado Water

Colorado, Utah and Wyoming May 2015 Precipitation as a Percentage of Normal



The San Diego Union-Tribune

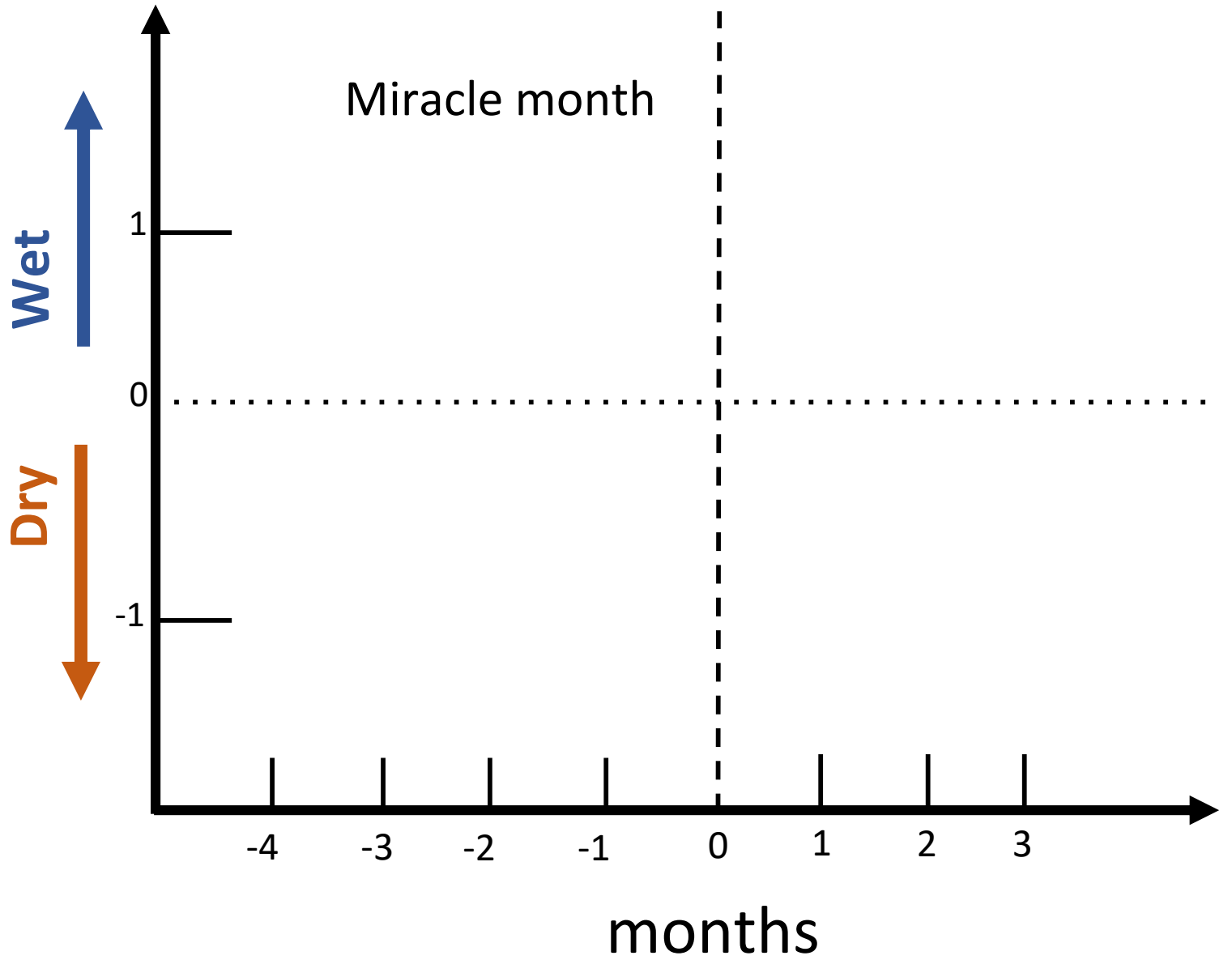
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'Miracle May' boosts river basin



Water intake pipes that were once underwater sit above the water line along Lake Mead in the Lake Mead National Recreation Area, Monday, May 18, 2015, near Boulder City, Nev. A series of storms in May are projected to keep Lake Mead's level high enough for the next two years to forestall

Miracle Spring

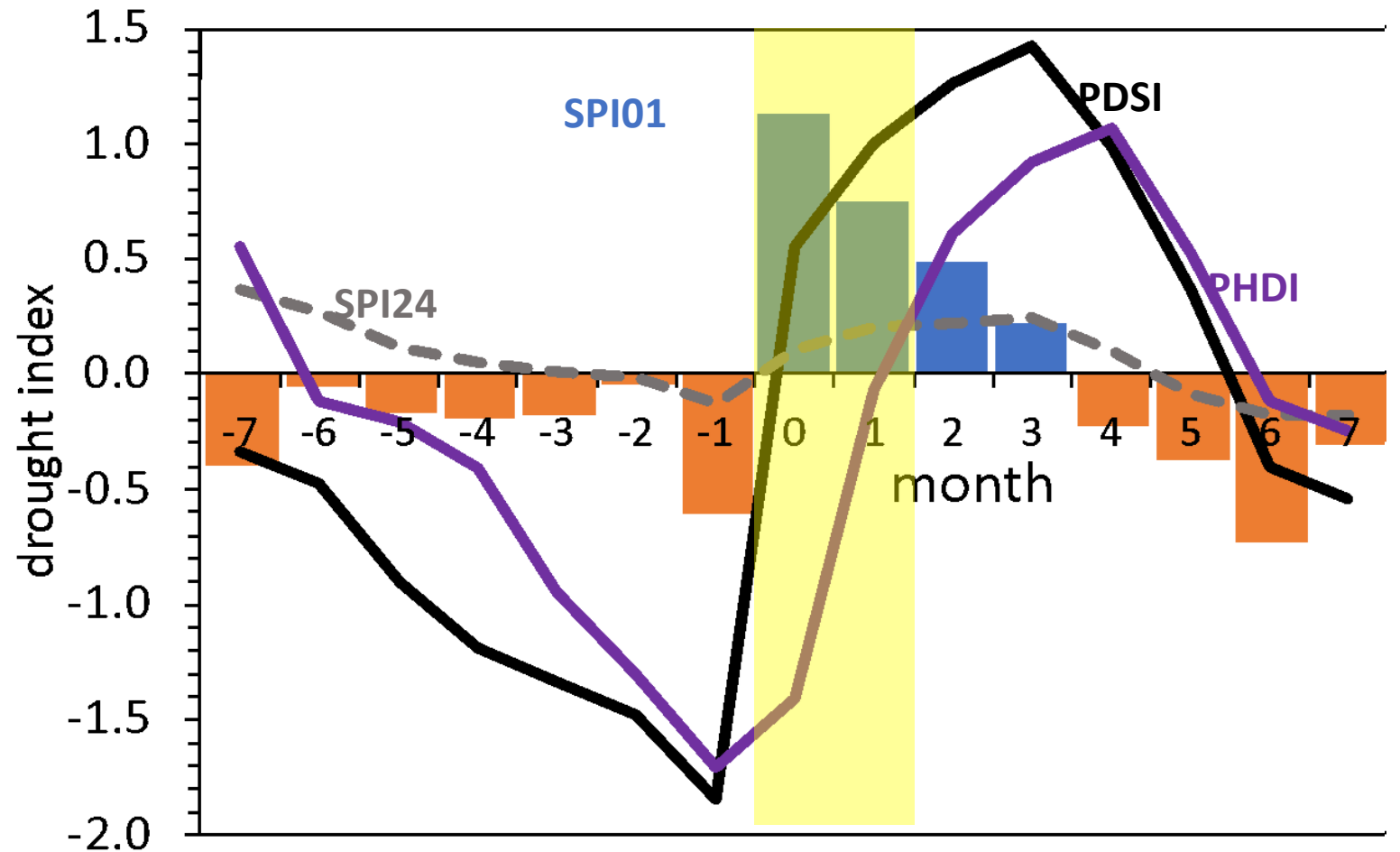


Miracle Composite: Upper Basin

Palmer Drought Severity Index (PDSI)

Standardized Precipitation Index (SPI)

Palmer Hydrological Drought Index (PHDI)

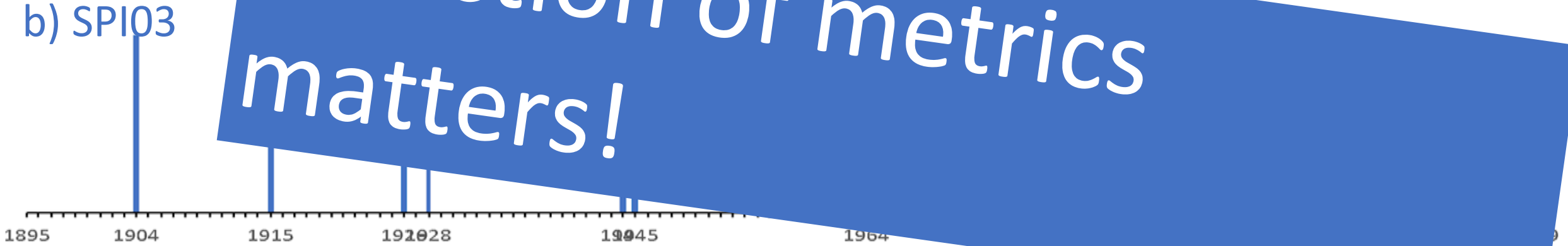


Miracle Years: Differs with drought indices

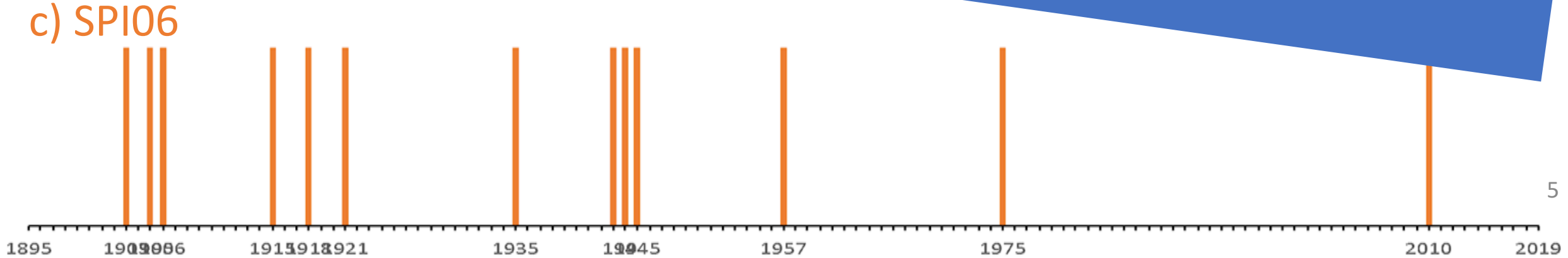
a) PDSI



b) SPI03

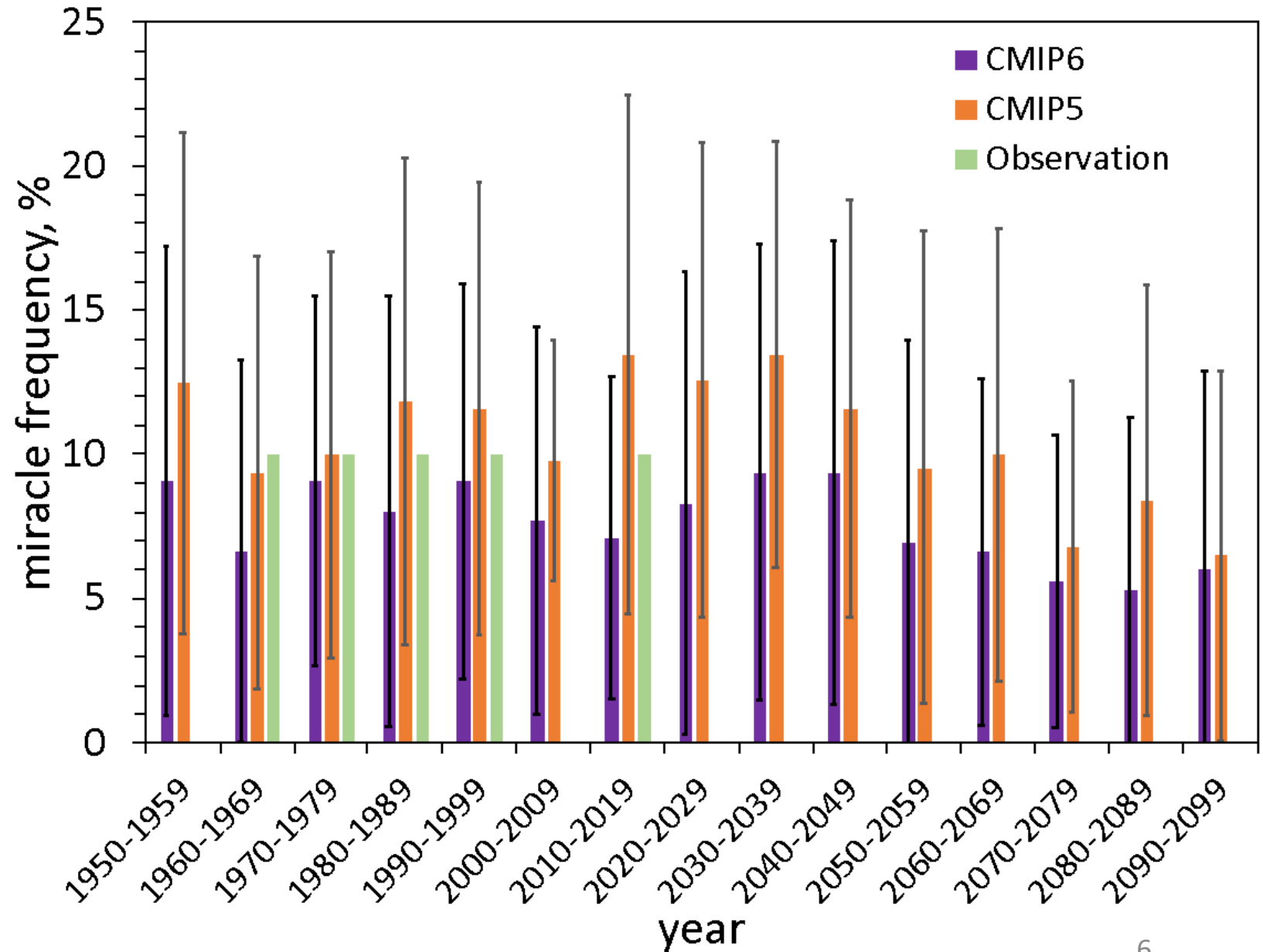


c) SPI06

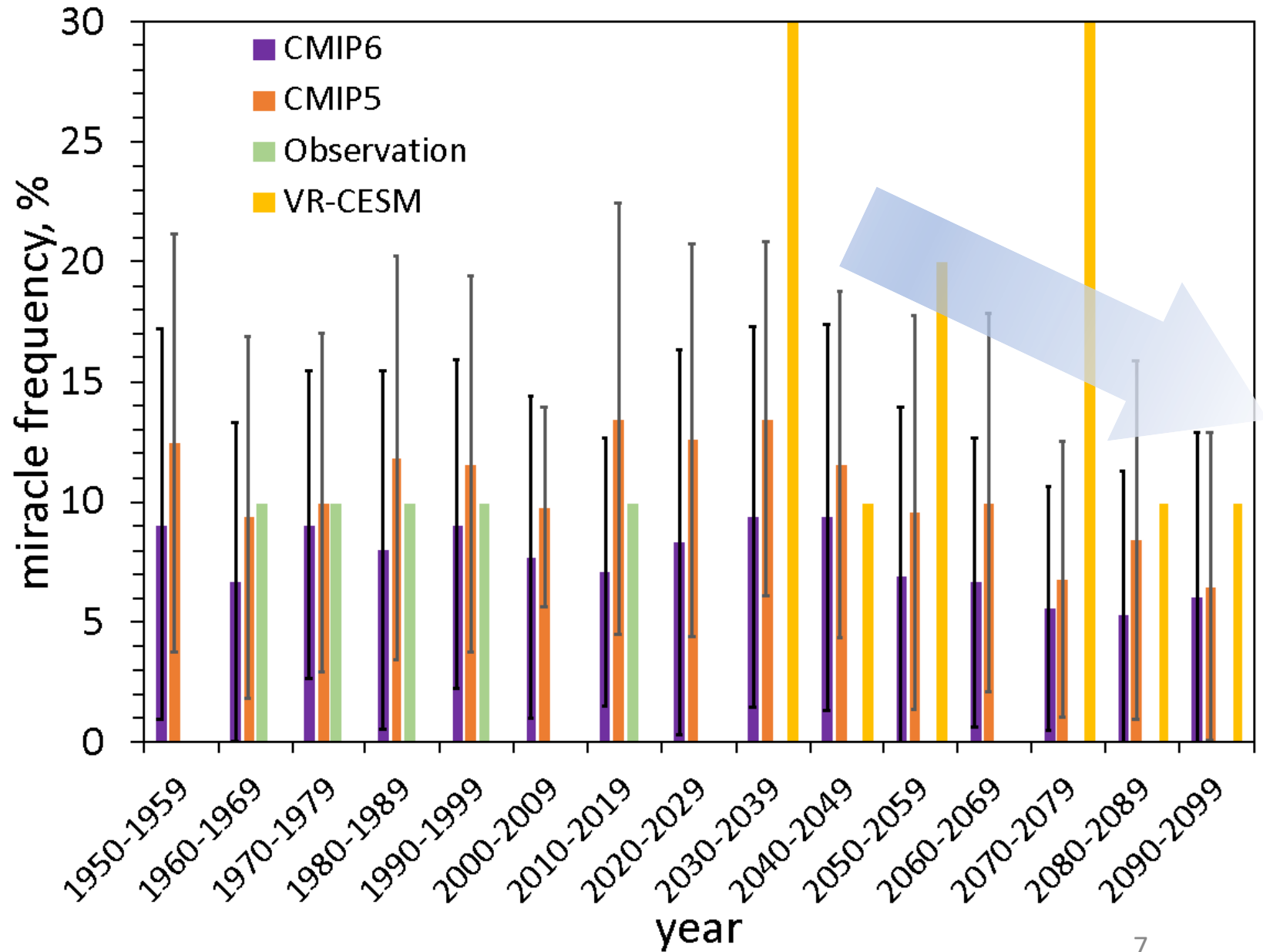


Selection of metrics matters!

Miracle Freq: CMIP5, CMIP6 models vs. the Observation

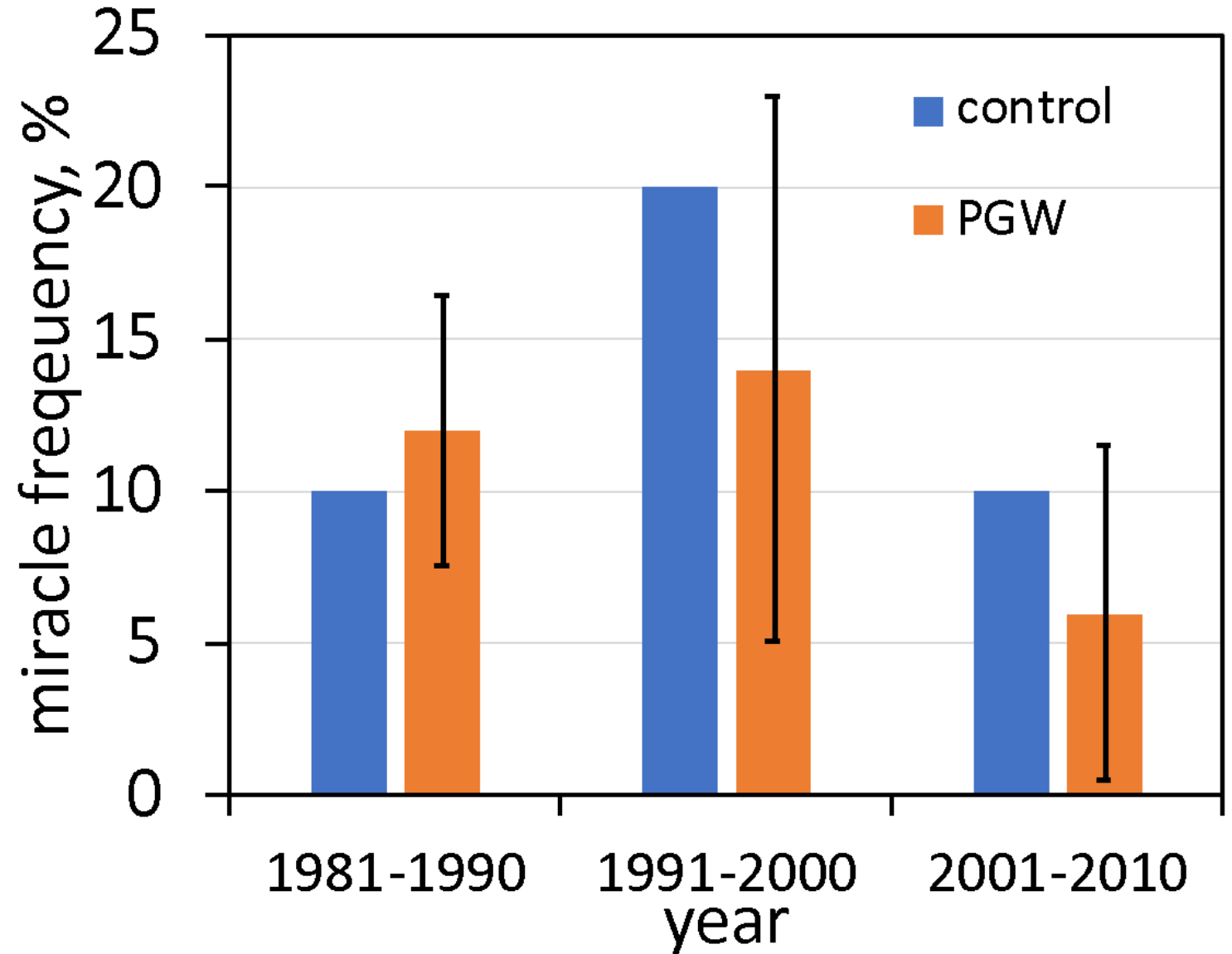


Miracle Freq:
CMIP5, CMIP6,
VR-CESM
vs.
Observation



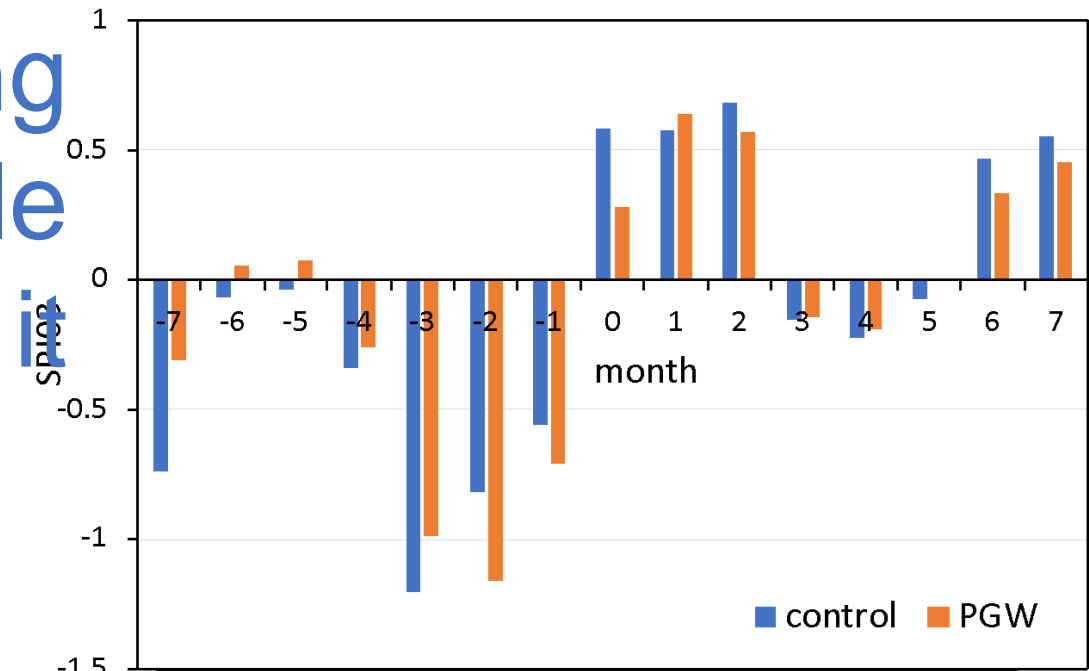
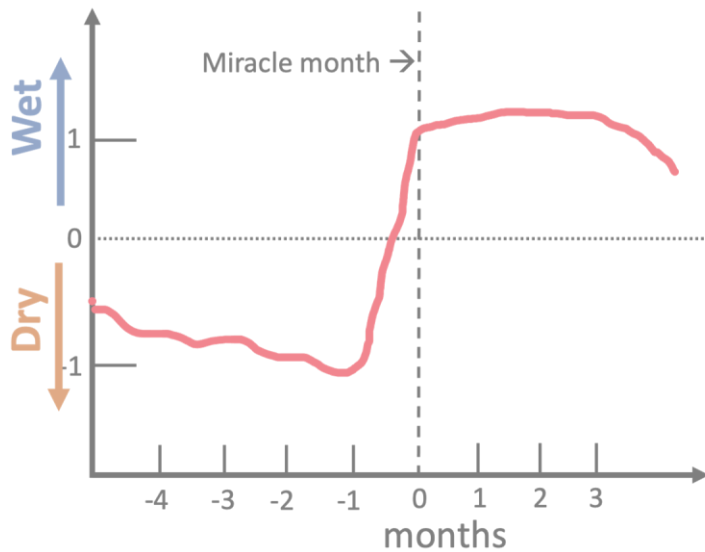
Miracle
Frequency:
A regional
climate model

Global warming
reduces the odd
of miracles



WRF control and PGW 5 simulations (1981-2010)

Global warming weakens the miracle as we know it



	control	PGW
dry index	-2.92	-3.1075
wet index	1.8475	1.49125
miracle strength	-1.0725	-1.6163
change in miracle strength, %	-50.6993007	