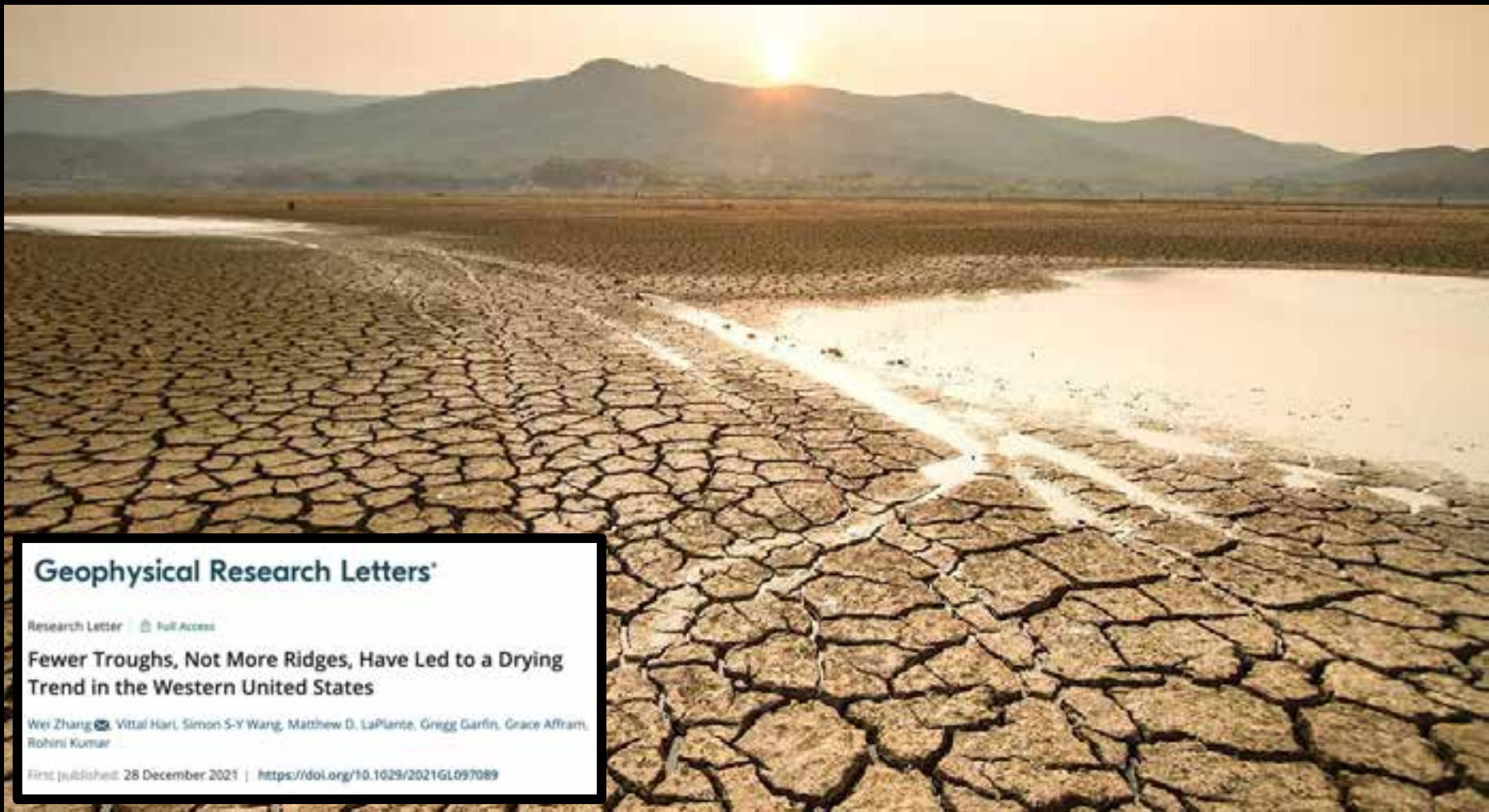


**The wintertime Eastern North Pacific
Subtropical High as a reliable precursor for
summertime pan-Western drought
conditions over two years**

Matthew D. LaPlante
associate professor of journalism
PhD student in climate science
Utah State University





Geophysical Research Letters*

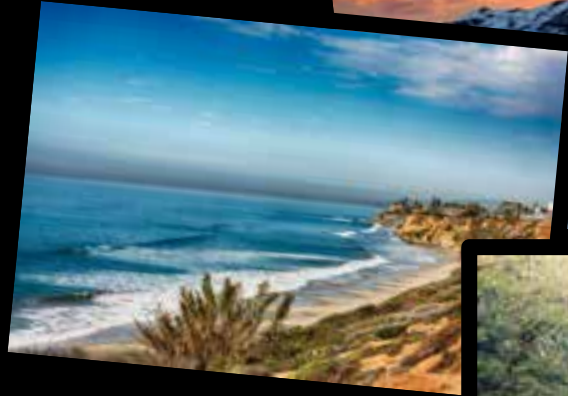
Research Letter  Full Access

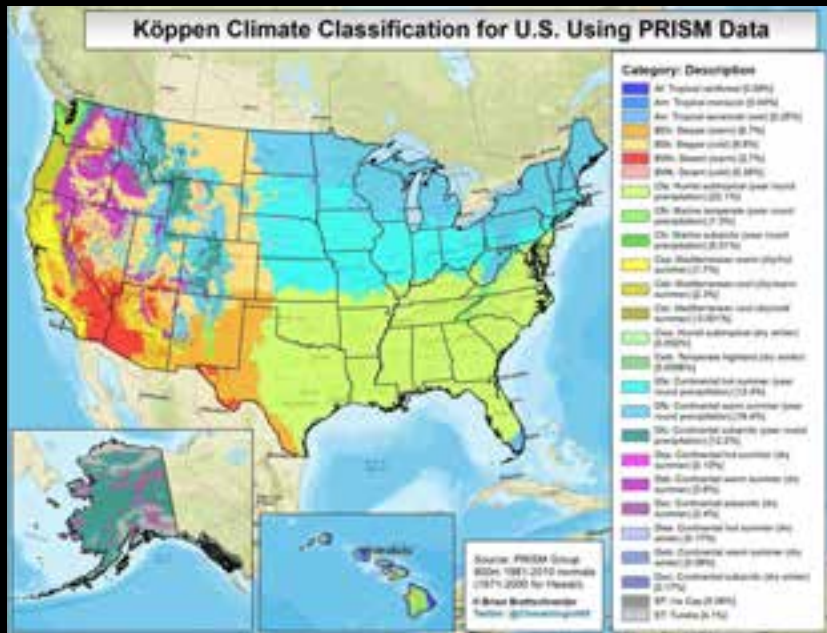
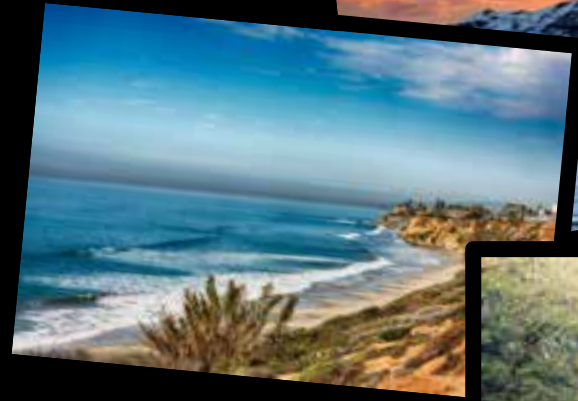
Fewer Troughs, Not More Ridges, Have Led to a Drying Trend in the Western United States

Wei Zhang , Vitali Hart, Simon S-Y Wang, Matthew D. LaPlante, Gregg Garfin, Grace Affram, Rohini Kumar

First published: 28 December 2021 | <https://doi.org/10.1029/2021GL097089>

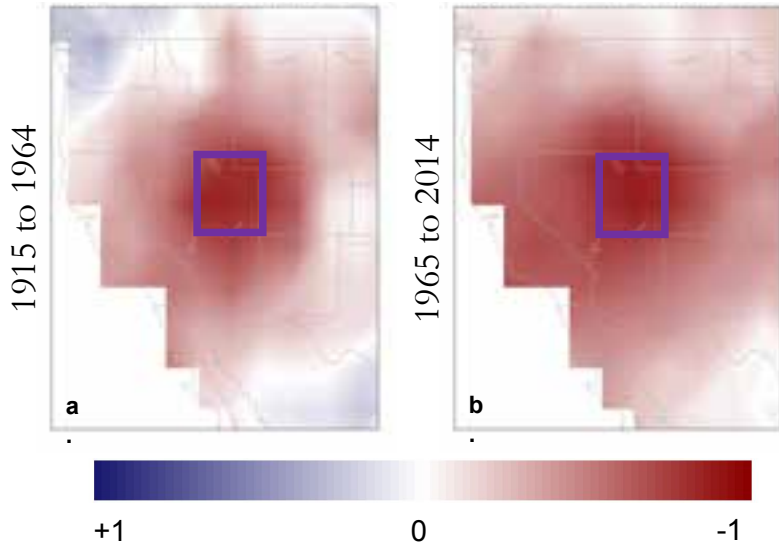






Soil moisture in Utah is increasingly correlated to the wider U.S. West

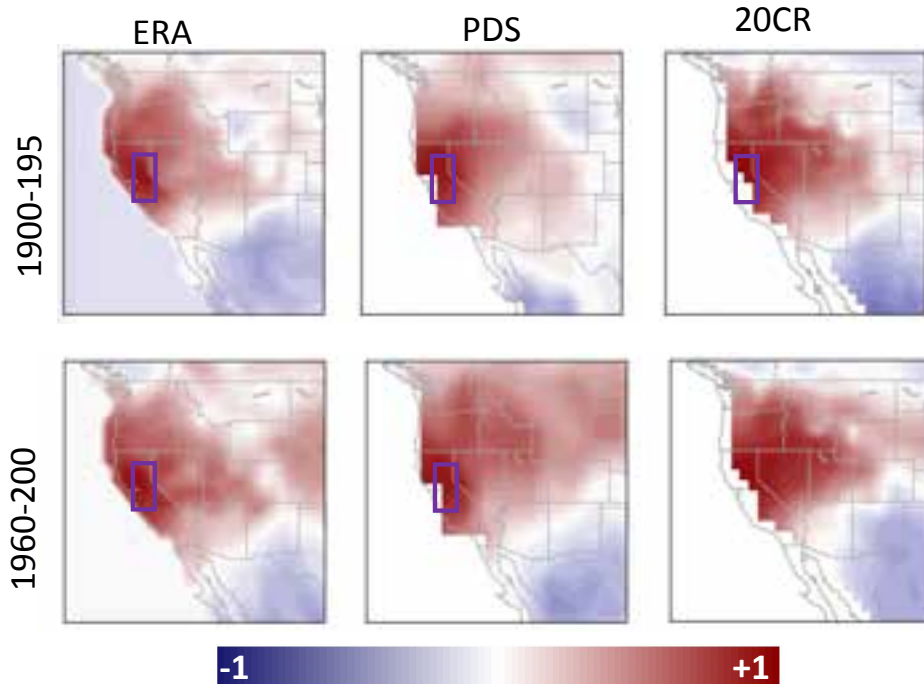
Average Monthly PDSI



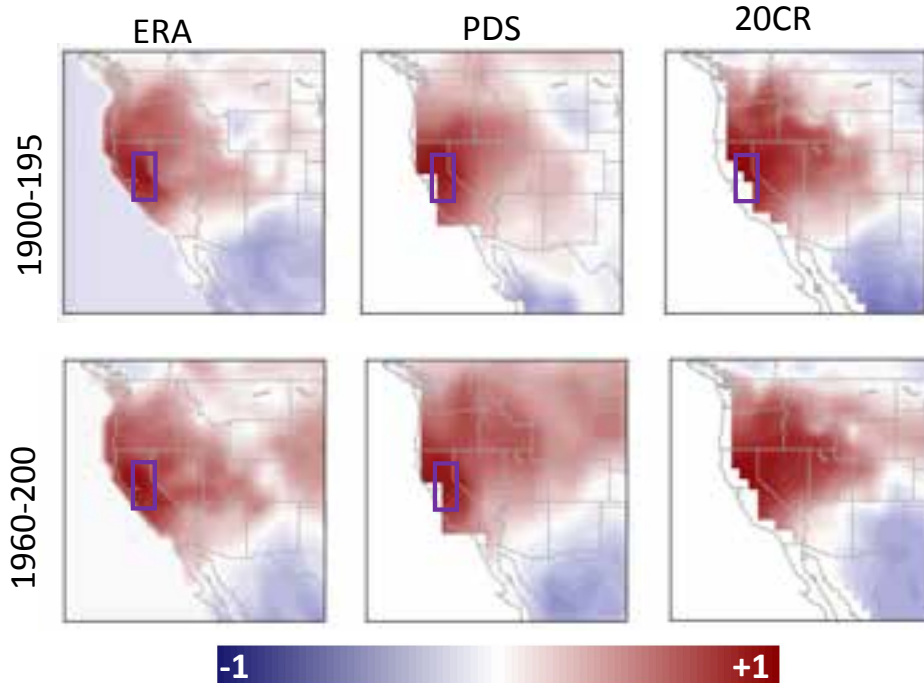
31-year sliding correlation of annual PDSI



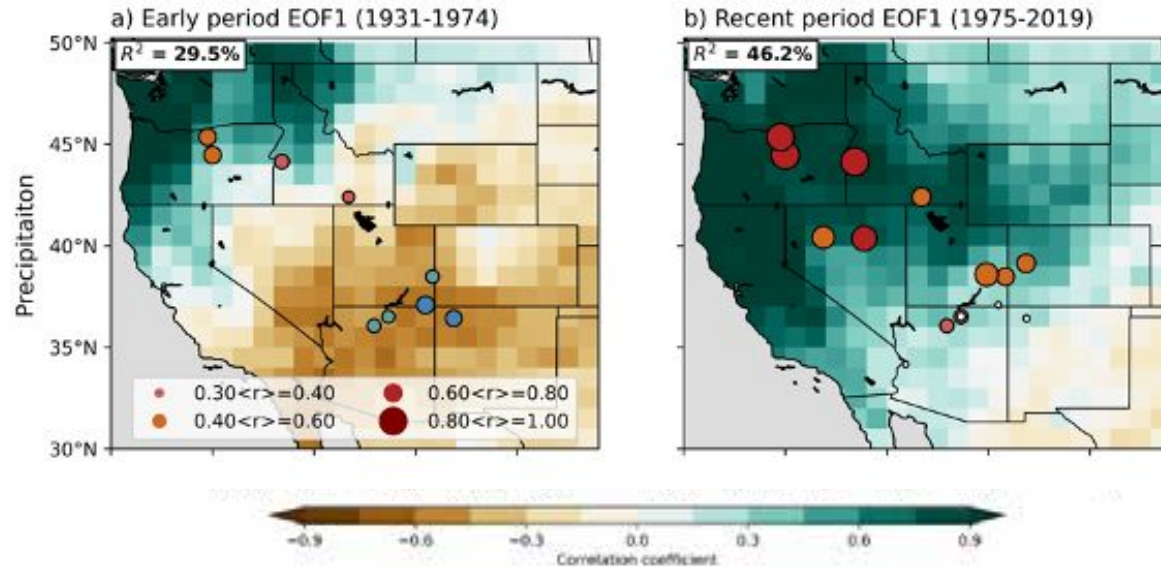
Soil moisture in California is increasingly correlated to the wider U.S. West

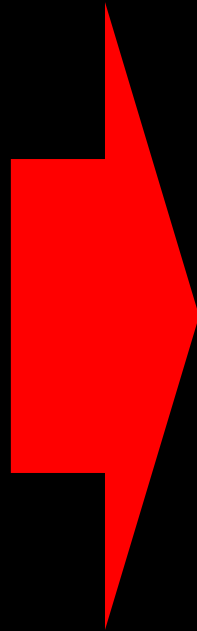


Soil moisture in California is increasingly correlated to the wider U.S. West



Emergence of a decadal hydroclimate regime in the western United States





Drawing the short straw(berry)?



'That's farming!': After facing drought last year, Washington farmers contend with cool delaying crops in the new season



Washington | **By [Name]** | **Updated on [Date]**

Washington farmers are facing a new challenge as the new season begins. After a year of drought, the crops are delayed due to cool weather. The farmers are working hard to get the crops up and running.

CAPITAL PRICES - BROWNS HAVE SEEN EMERGENCY ON THE WING, SPOILING



Washington | **By [Name]** | **Updated on [Date]**

The farmers are facing a new challenge as the new season begins. After a year of drought, the crops are delayed due to cool weather. The farmers are working hard to get the crops up and running.

Drought pushes California farmers and ranchers to adapt to a drier future



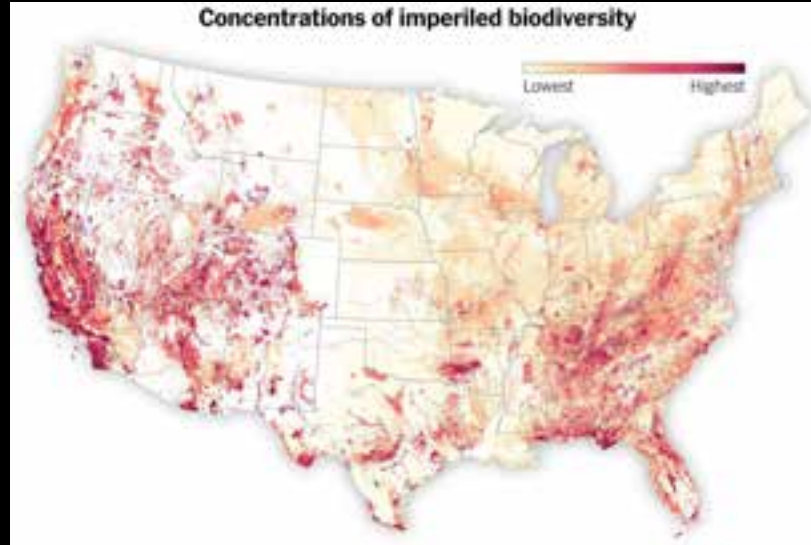
California | **By [Name]** | **Updated on [Date]**

The farmers are facing a new challenge as the new season begins. After a year of drought, the crops are delayed due to cool weather. The farmers are working hard to get the crops up and running.

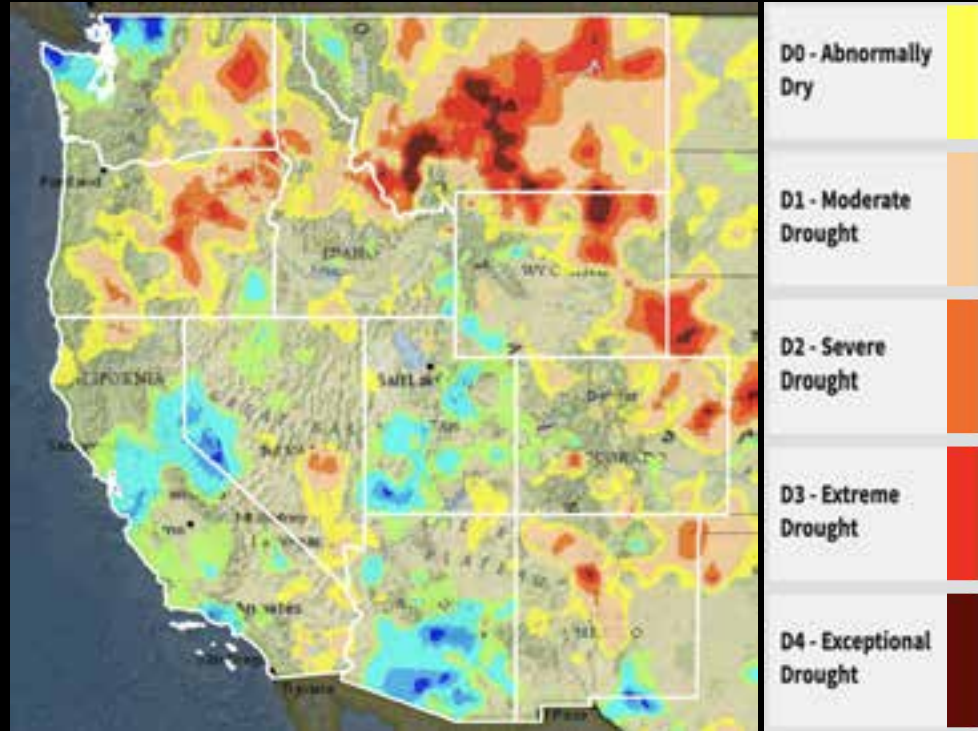
Agriculture at (widespread) risk



Species at (widespread) risk

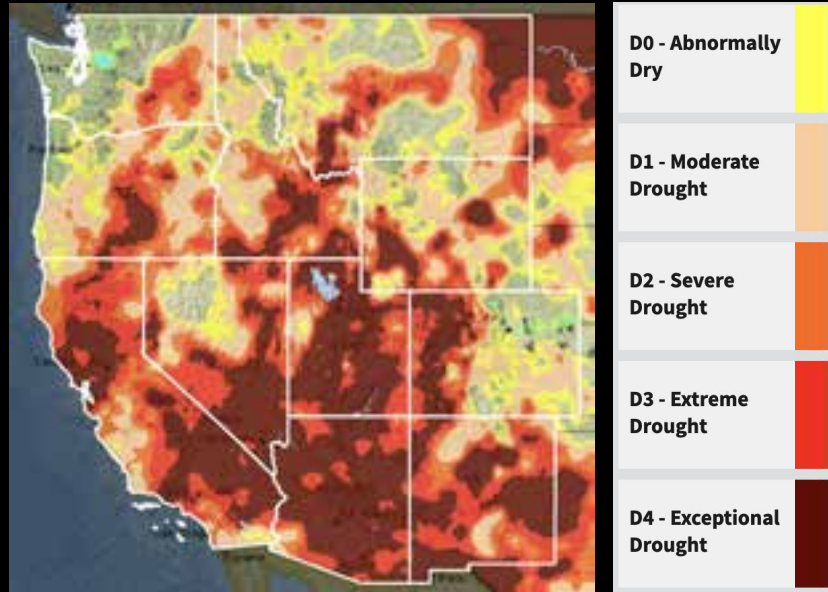


Sub-regional drought

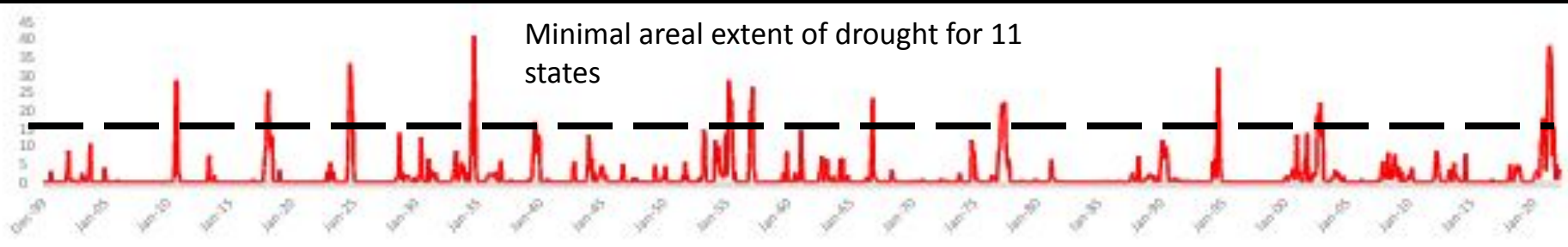
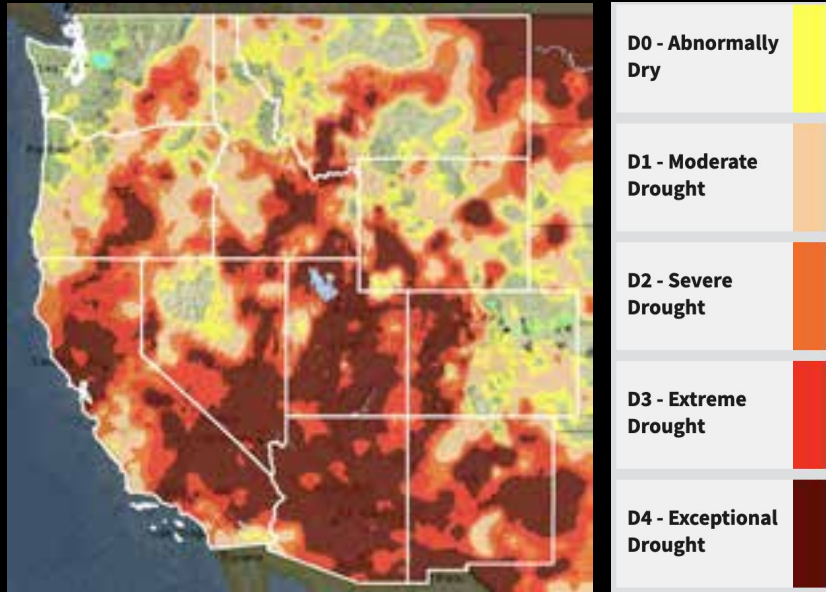


September 2022

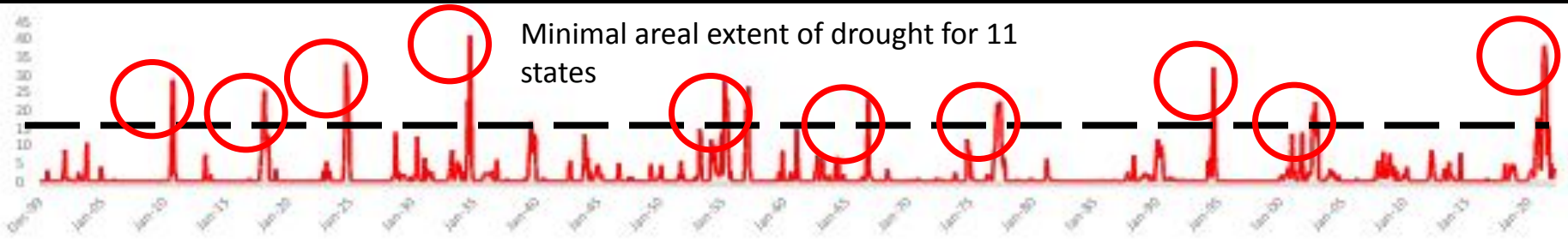
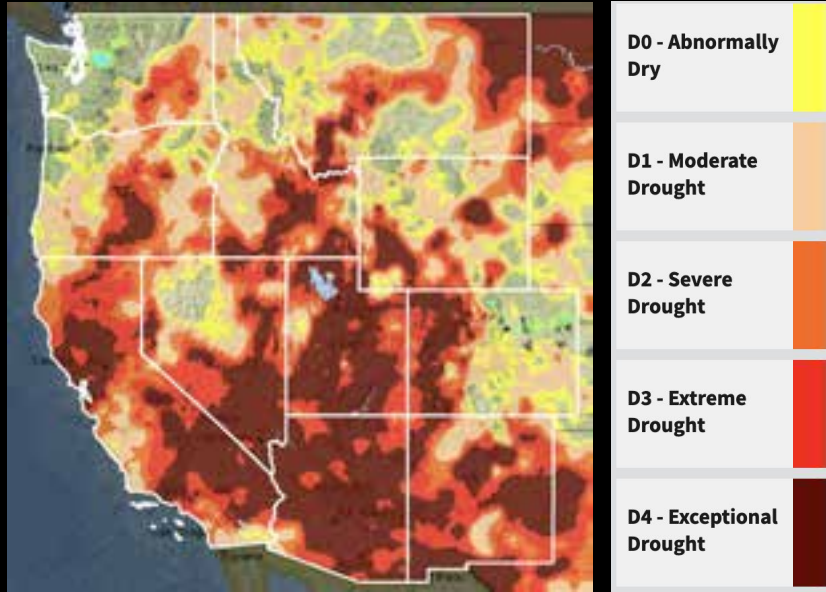
2021 as an archetype for 'droughternauts'



2021 as an archetype for 'droughternauts'

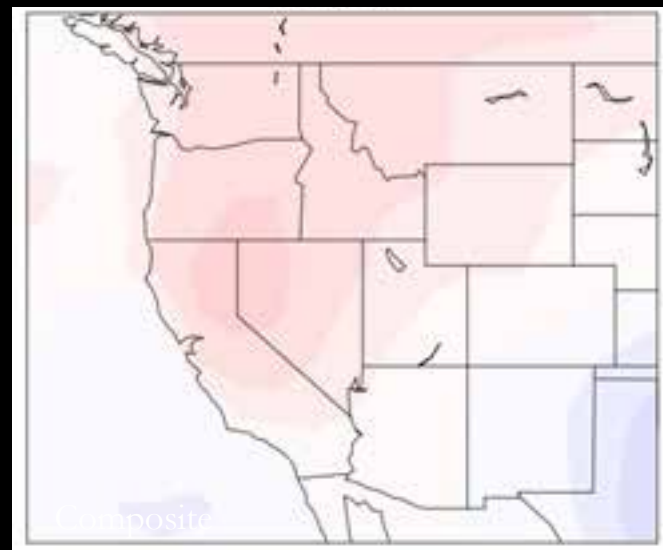
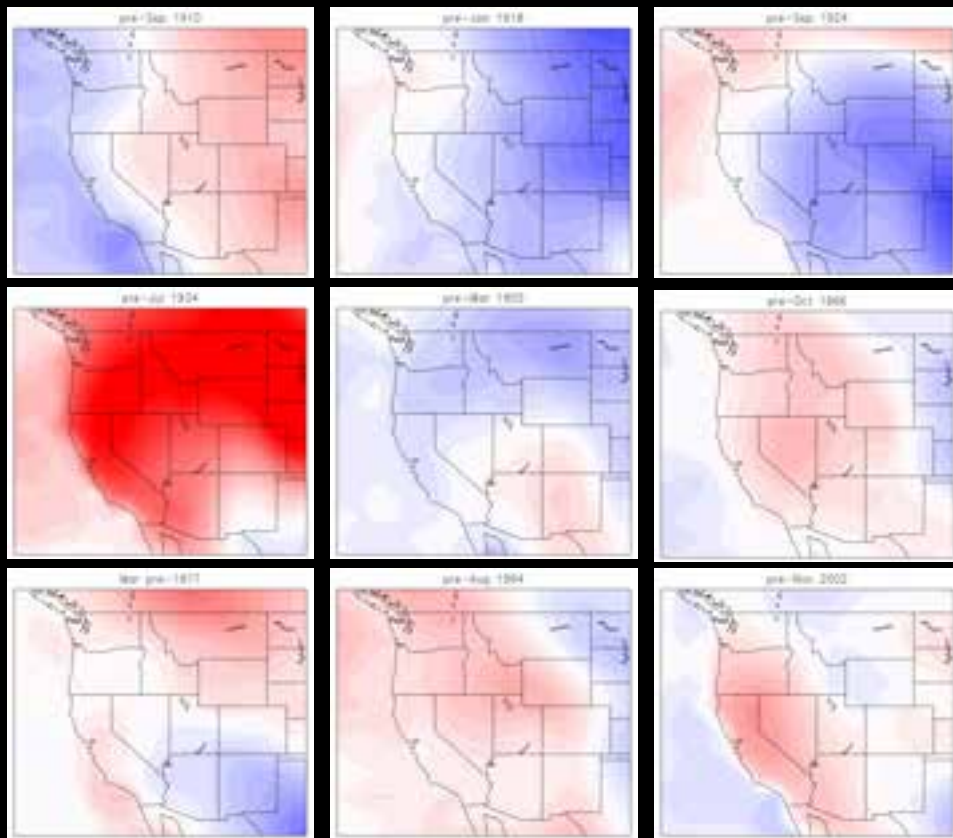


2021 as an archetype for 'droughternauts'



Temp anom^s* 1-yr avg preceding proto-apex months

(NOAA-CIRES-DOE 20th Century Reanalysis V3)



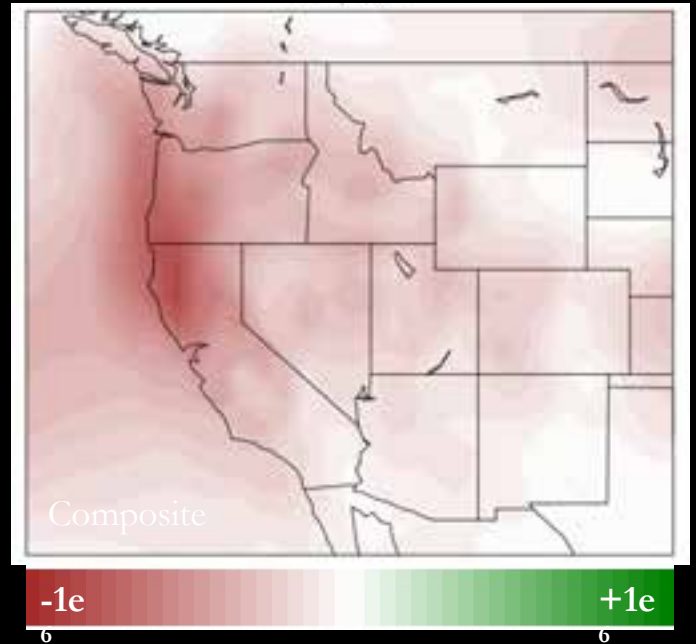
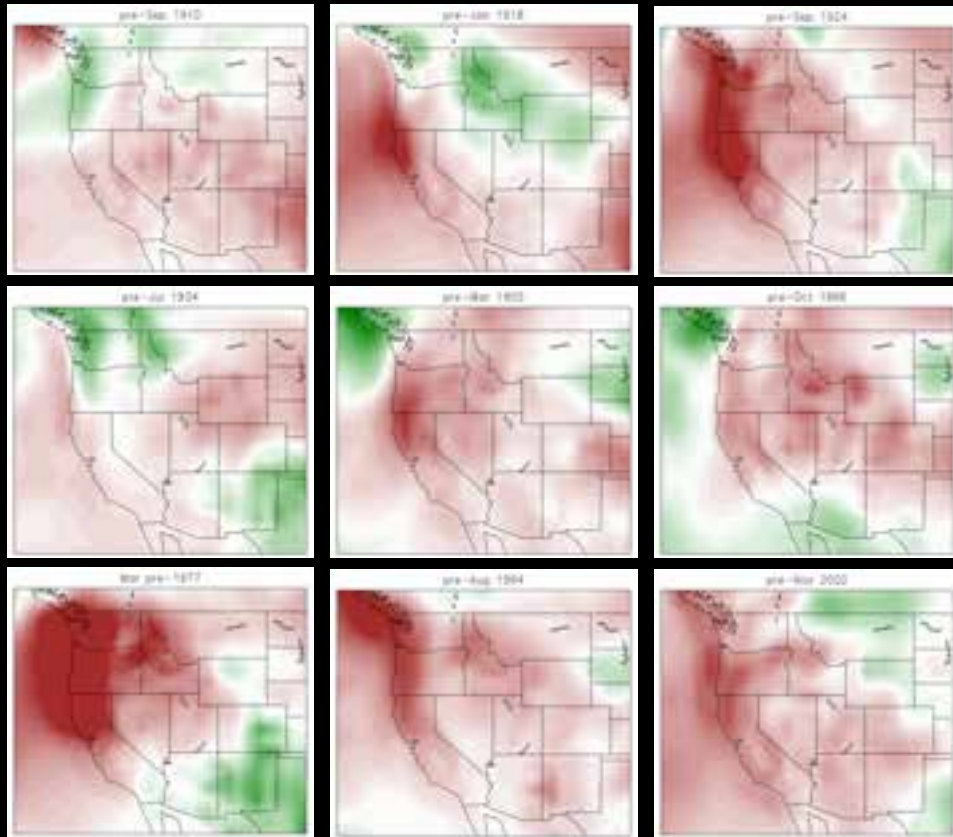
-4

+4

* Subtracted from immediately preceding 30-year

Precip rate anom^s* 1-yr avg preceding proto-apex months

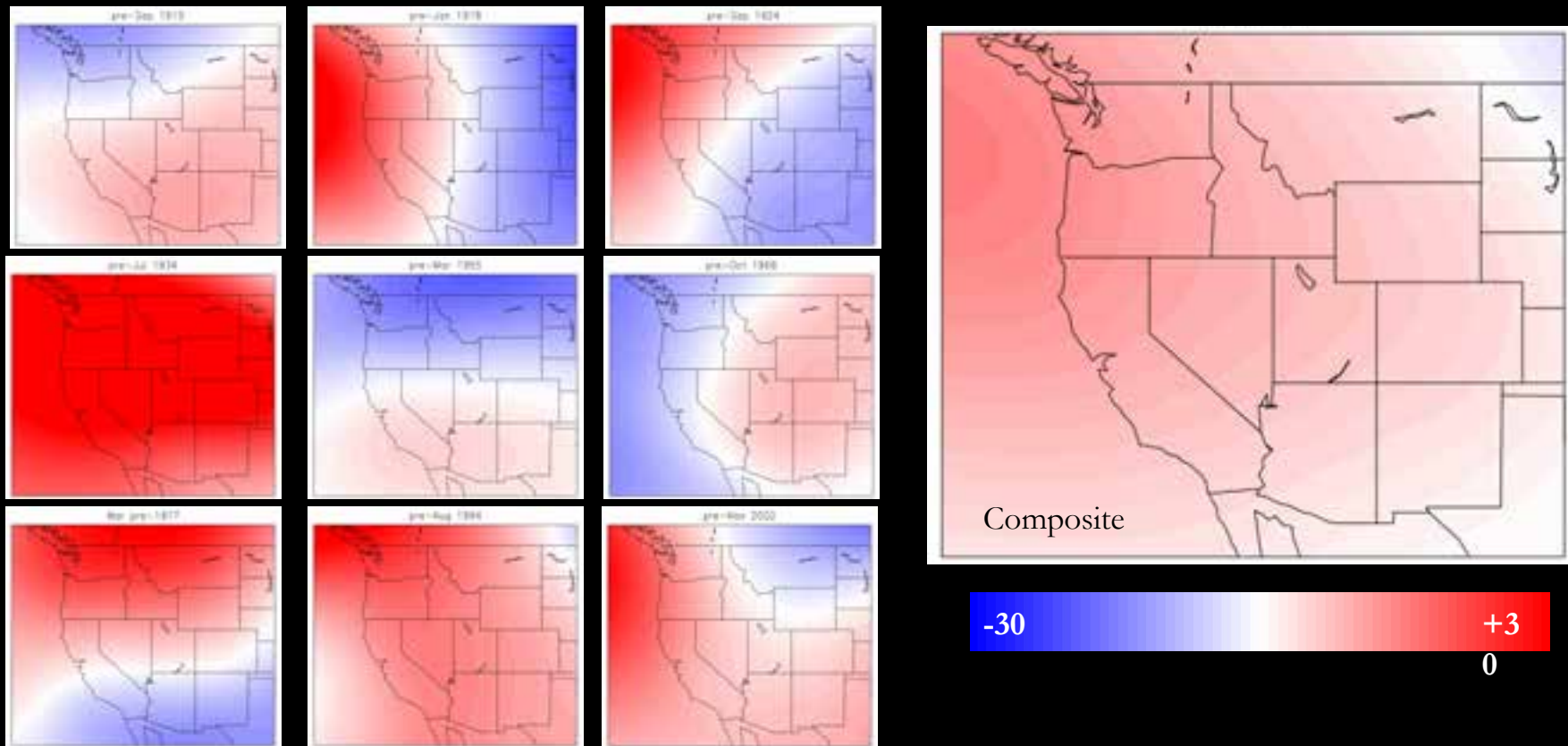
(NOAA-CIRES-DOE 20th Century Reanalysis V3)



* Subtracted from immediately preceding 30-year

GPH@500mb anom* 1-yr avg preceding proto-apex months

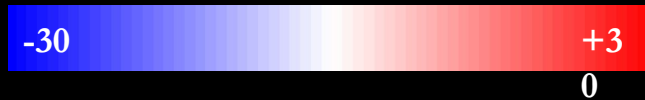
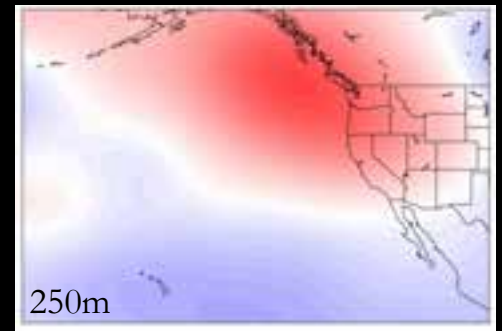
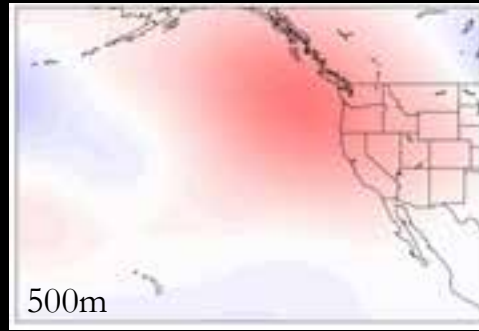
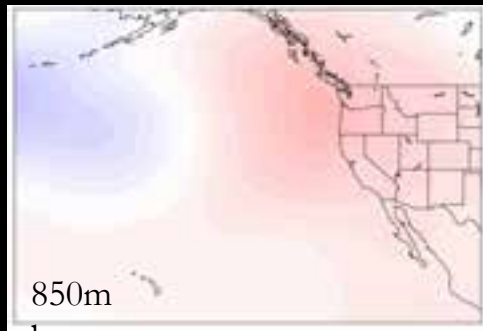
(NOAA-CIRES-DOE 20th Century Reanalysis V3)



* Subtracted from immediately preceding 30-year

GPH anom^{*} 1-yr avg preceding proto-apex months

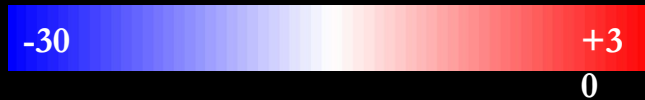
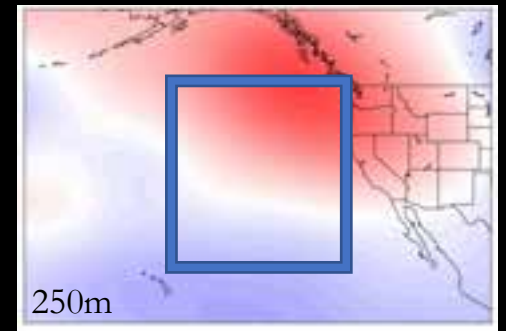
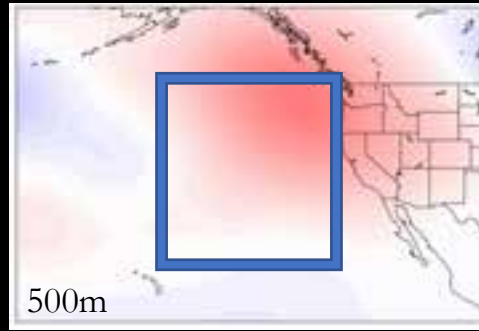
(NOAA-CIRES-DOE 20th Century Reanalysis V3)



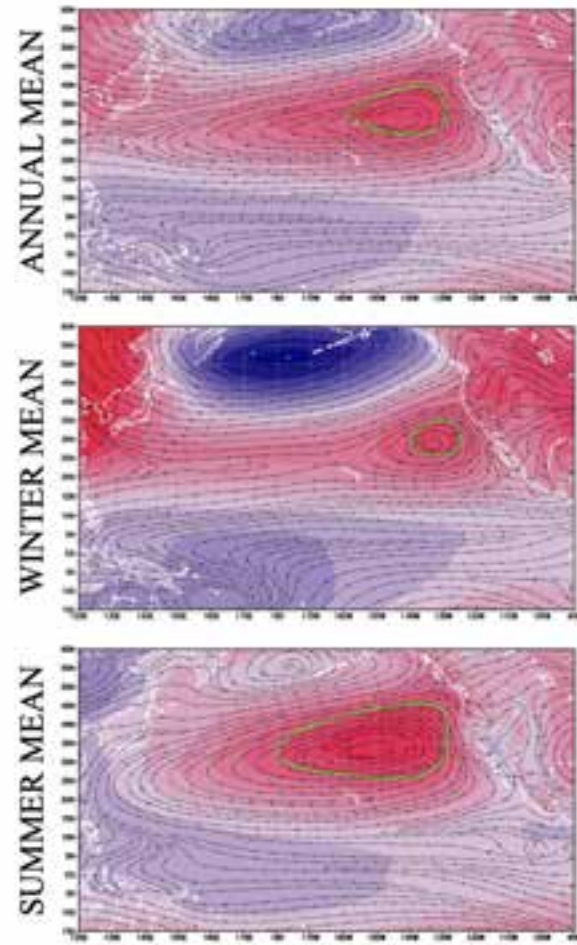
* Subtracted from immediately preceding 30-year

GPH anoms* 1-yr avg preceding proto-apex months

(NOAA-CIRES-DOE 20th Century Reanalysis V3)

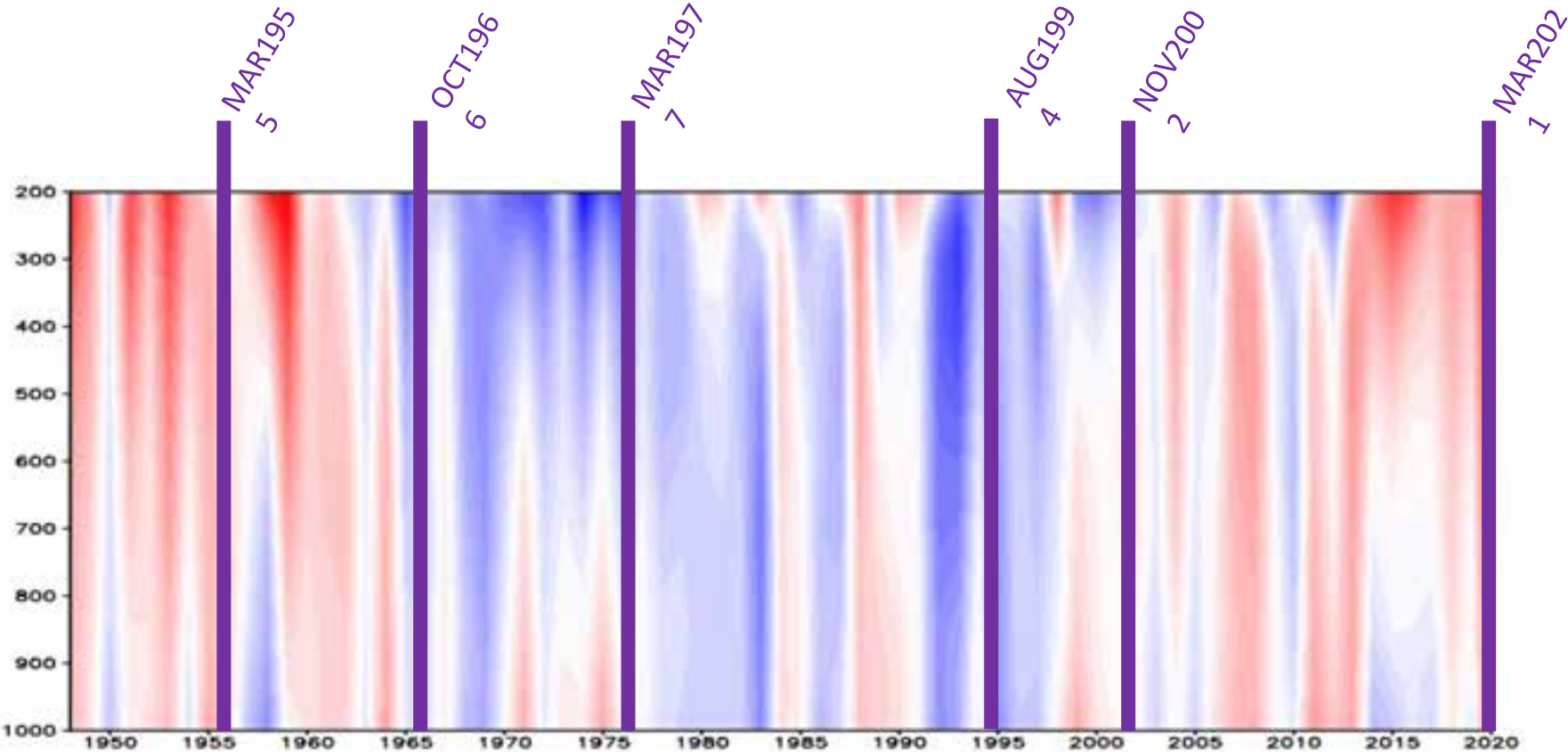


* Subtracted from immediately preceding 30-year



Green — sea level pressure
intensity center
Black — Circulations at 850
mb

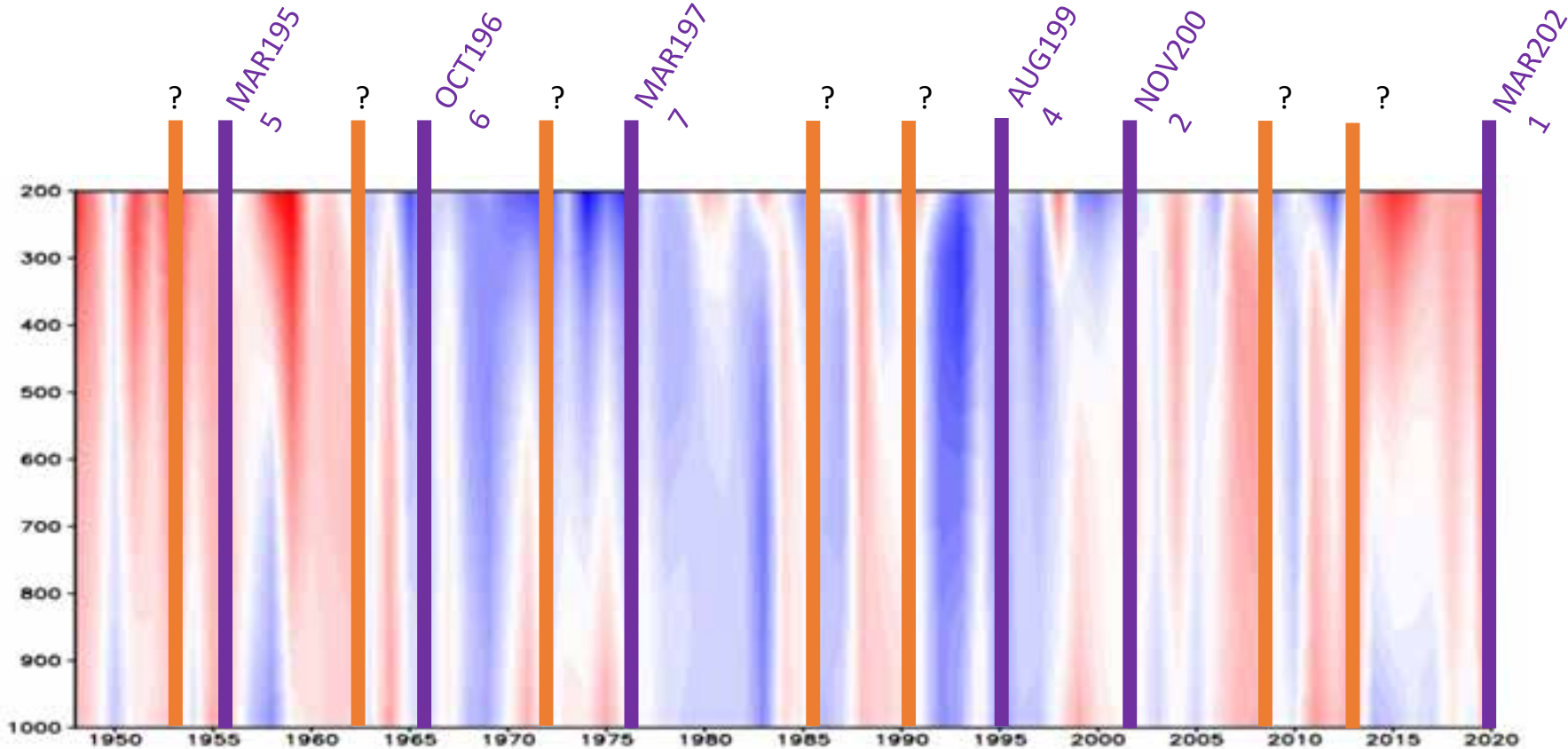
Pressure anomalies in the Eastern North Pacific High



■ +20% of each of 11 states in

D1:

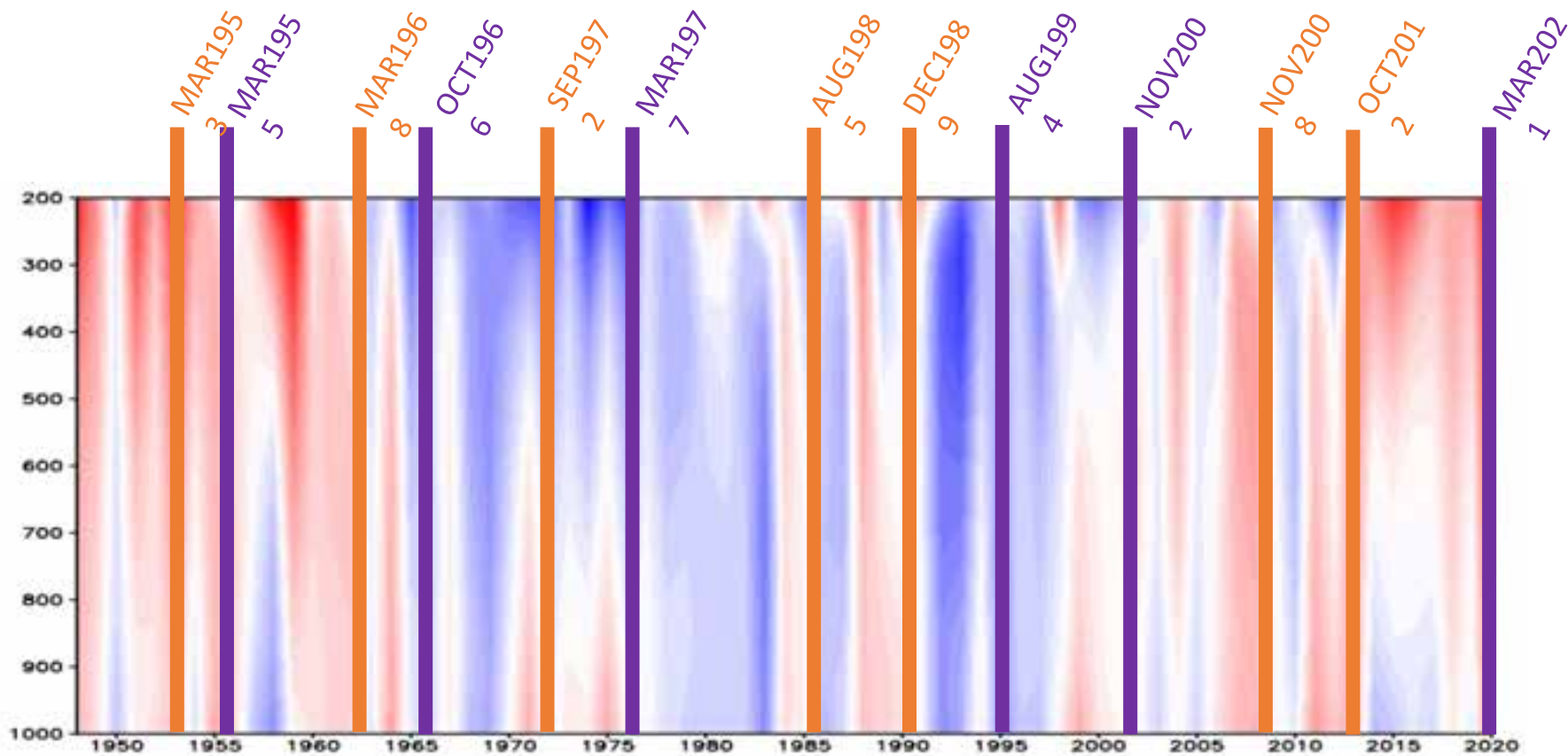
Pressure anomalies in the Eastern North Pacific High



■ +20% of each of 11 states in D1

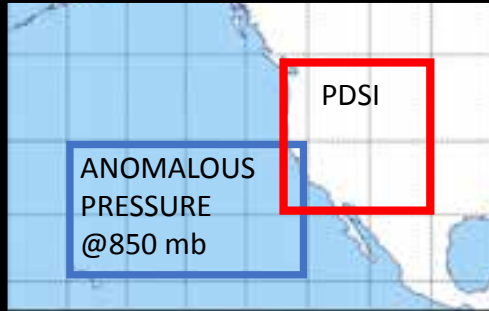
■ ?

Pressure anomalies in the Eastern North Pacific High



■ +20% of each of 11 states in D1

■ Average of 11 states is +35% in D1



Dark blue: .01
 Blue: .05
 Light blue: .1

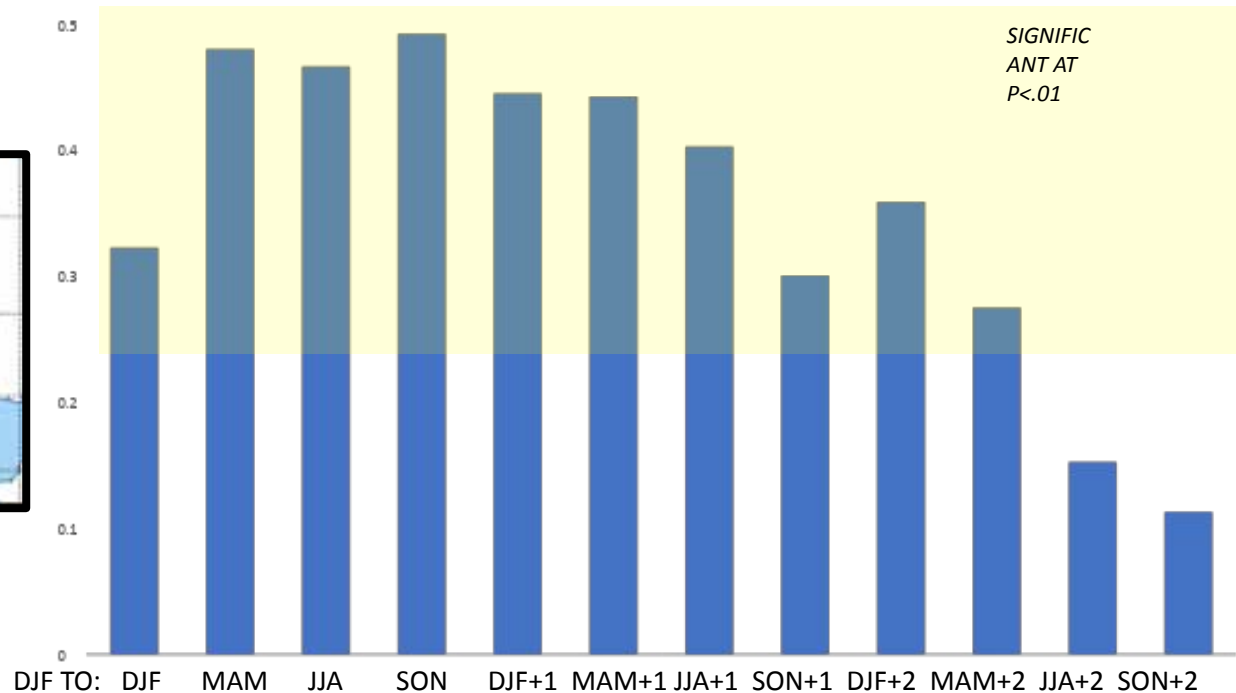
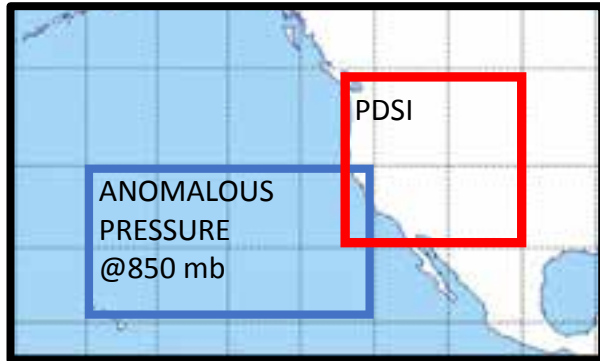
| | |
|----------------|--------------|
| DJF TO DJF | -0.322810402 |
| DJF TO MAM | -0.480277744 |
| DJF TO JJA | -0.466293428 |
| DJF TO SON | -0.492522086 |
| DJF TO DJF + 1 | -0.445114885 |
| DJF TO MAM +1 | -0.442850576 |
| DJF TO JJA +1 | -0.402875209 |
| DJF TO SON + 1 | -0.300754494 |
| DJF TO DJF + 2 | -0.358942967 |
| DJF TO MAM +2 | -0.275232533 |
| DJF TO JJA +2 | -0.152796401 |
| DJF TO SON + 2 | -0.112881674 |

| | |
|----------------|--------------|
| MAM TO MAM | -0.250177723 |
| MAM TO JJA | -0.269103677 |
| MAM TO SON | -0.278965666 |
| MAM TO DJF | -0.320140948 |
| MAM TO MAM +1 | -0.250177723 |
| MAM TO JJA +1 | -0.34026712 |
| MAM TO SON + 1 | -0.236421927 |
| MAM TO DJF + 1 | -0.282253761 |
| MAM TO MAM + 2 | -0.212170549 |
| MAM TO JJA + 2 | -0.123363688 |
| MAM TO SON + 2 | -0.063773319 |
| MAM TO DJF + 2 | -0.102493435 |

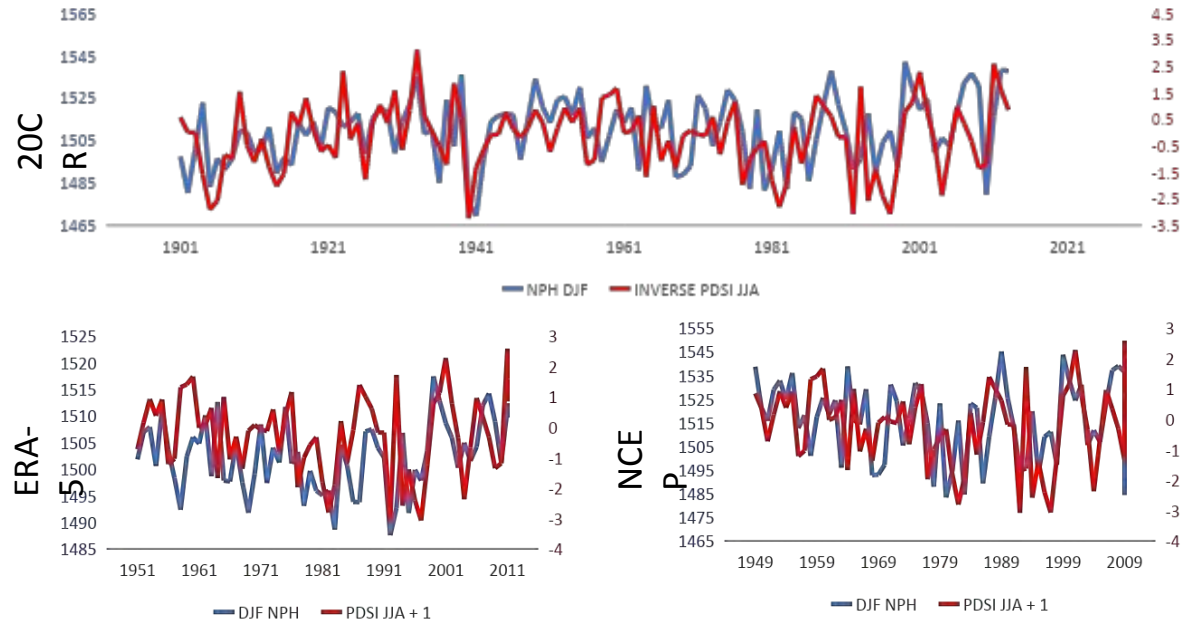
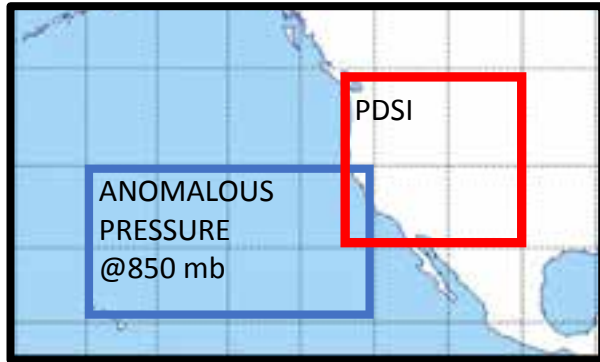
| | |
|----------------|--------------|
| JJA TO JJA | -0.21024898 |
| JJA TO SON | -0.2010945 |
| JJA TO DJF | -0.214652395 |
| JJA TO MAM | -0.28040872 |
| JJA TO JJA + 1 | -0.217486526 |
| JJA TO SON + 1 | -0.164547353 |
| JJA TO DJF + 1 | -0.2274889 |
| JJA TO MAM +1 | -0.207921722 |
| JJA TO JJA + 2 | -0.151751294 |
| JJA TO SON + 2 | -0.039060907 |
| JJA TO DJF + 2 | -0.01269312 |
| JJA TO MAM +2 | -0.04264767 |

| | |
|----------------|--------------|
| SON TO SON | -0.113691531 |
| SON TO DJF | -0.073233653 |
| SON TO MAM | -0.177486692 |
| SON TO JJA | -0.202564176 |
| SON TO SON + 1 | -0.235281834 |
| SON TO DJF + 1 | -0.274435022 |
| SON TO MAM +1 | -0.27436541 |
| SON TO JJA + 1 | -0.25930981 |
| SON TO SON + 2 | -0.160551234 |
| SON TO DJF + 2 | -0.149822867 |
| SON TO MAM +2 | -0.106065063 |
| SON TO JJA + 2 | -0.085357817 |

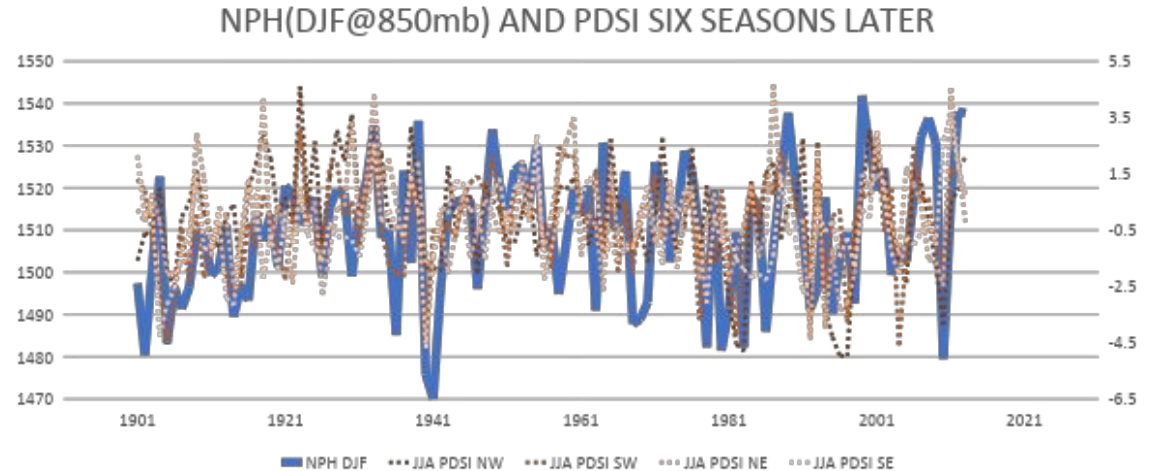
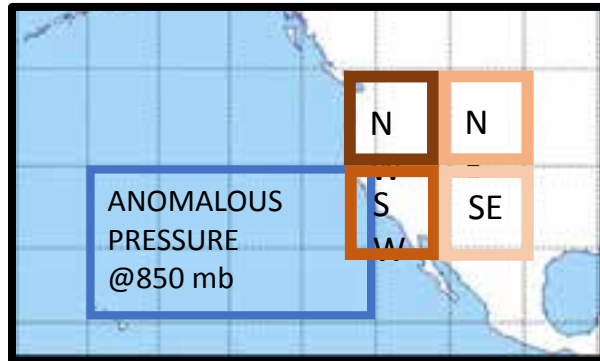
The wintertime Eastern North Pacific Subtropical High as a reliable precursor for summertime pan-Western drought conditions over two years



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The wintertime Eastern North Pacific Subtropical High as a reliable precursor for summertime pan-Western drought conditions over two years





What's the story?

- **When it comes to drought in the West, we're increasingly in this together**
- **Conditions in the East Pacific may offer some warning that things are about to "hit the fan"**

**The wintertime Eastern North Pacific
Subtropical High as a reliable precursor for
summertime pan-Western drought
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