Synoptic Modulation of the Prairies Drought (1999-2005)

John Gyakum, Eyad Atallah
And
Alain Roberge

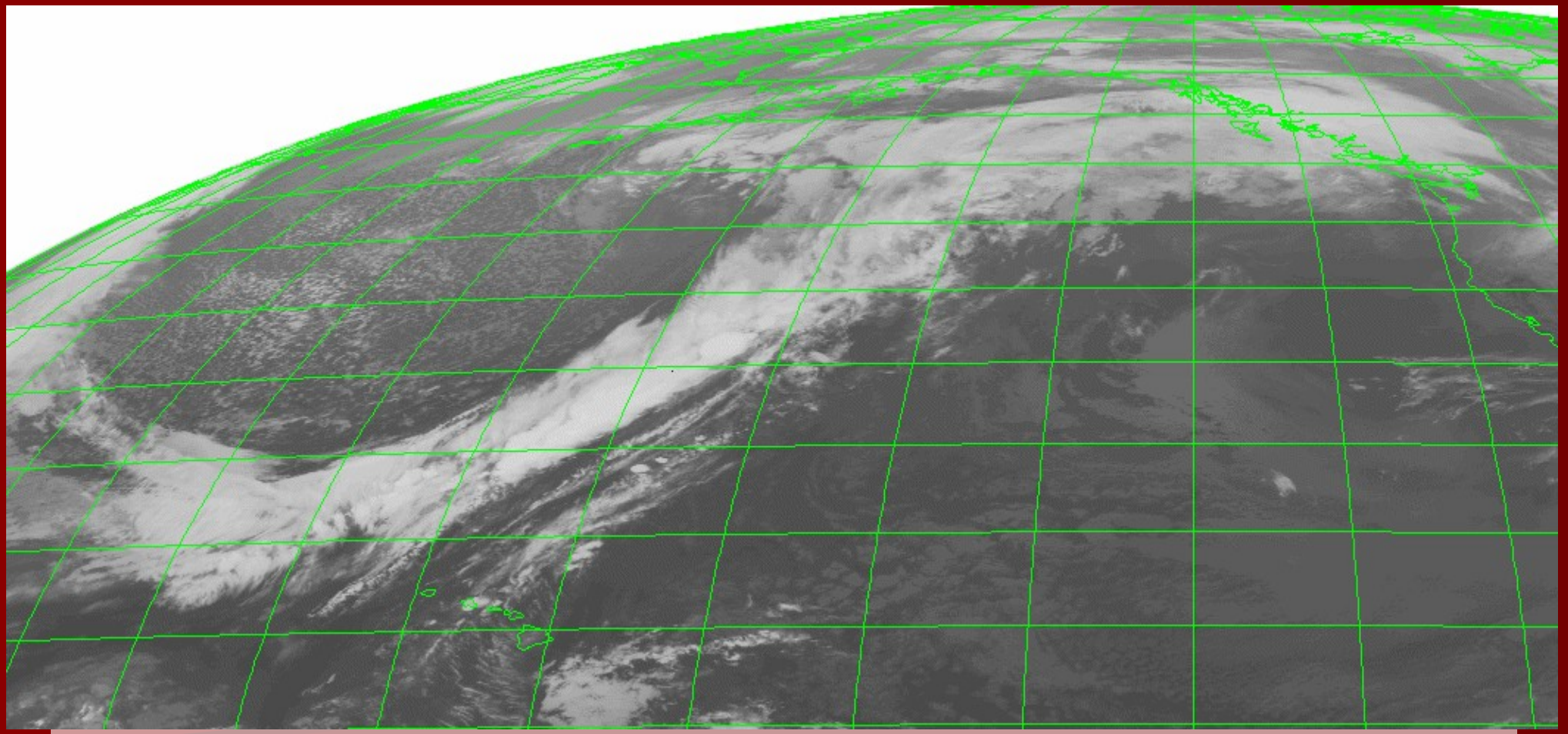
Theme 1

The Pineapple Express

Basic Definition

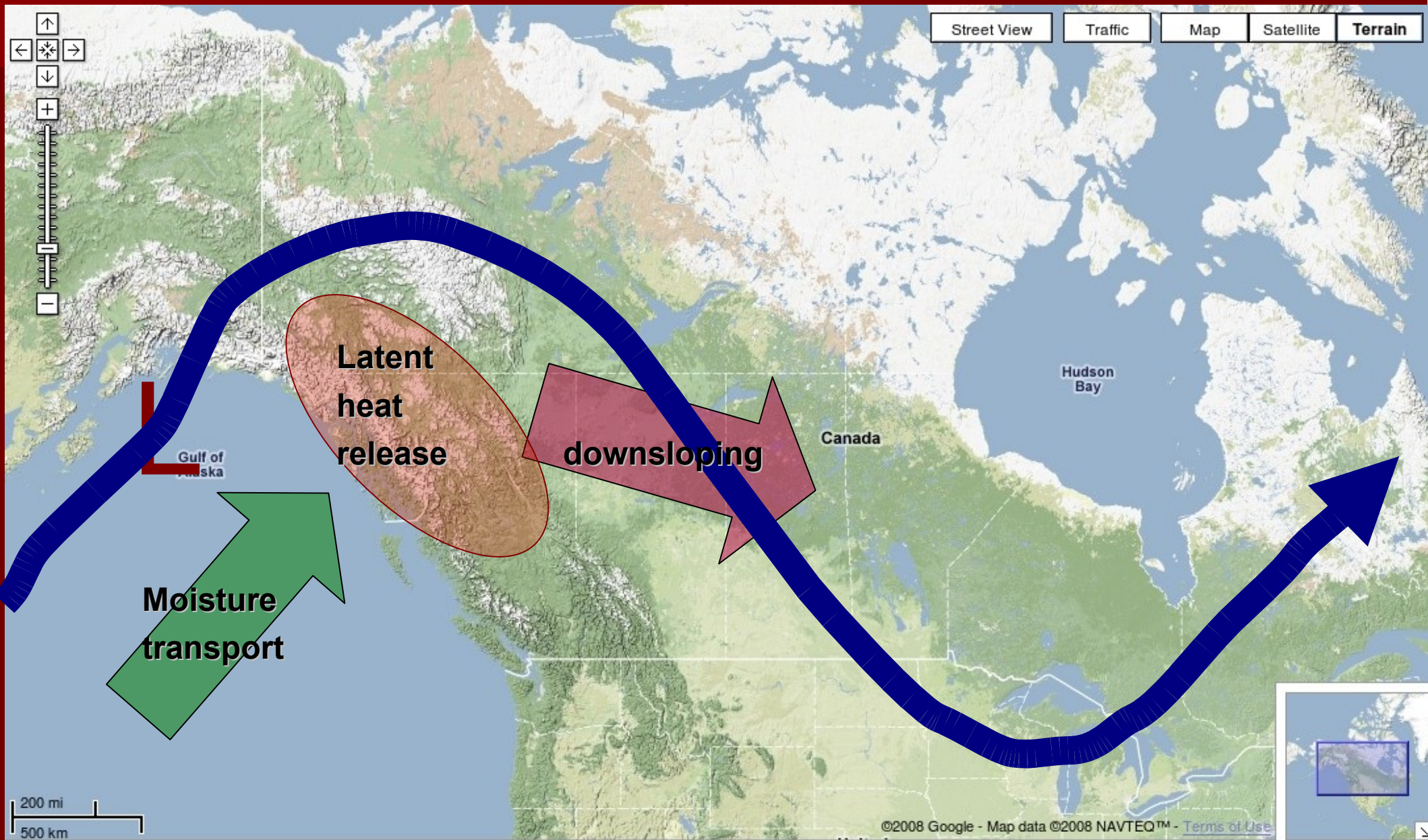
- Pineapple Express events are elongated plumes of moisture extending from the tropics to northern latitudes(NH).
- They are found within the warm conveyor belt next to intense polar cold front of extra tropical cyclones.
- The amount of heat and moisture transported can be significant enough to produce intense precipitation and flooding over orographic terrain and warm dry conditions over the Prairies.

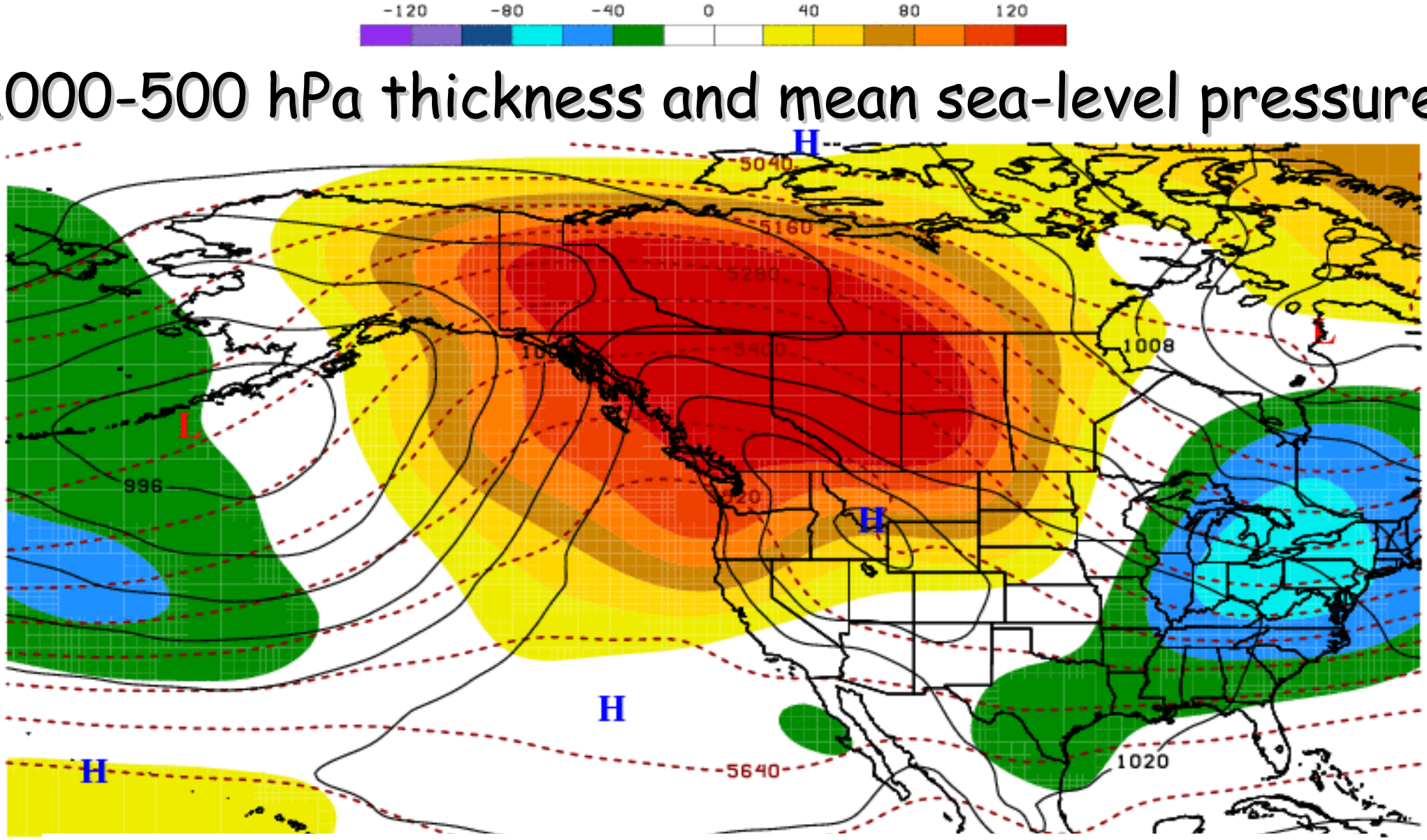
Satellite Image



Infrared Image, October 24th 2003

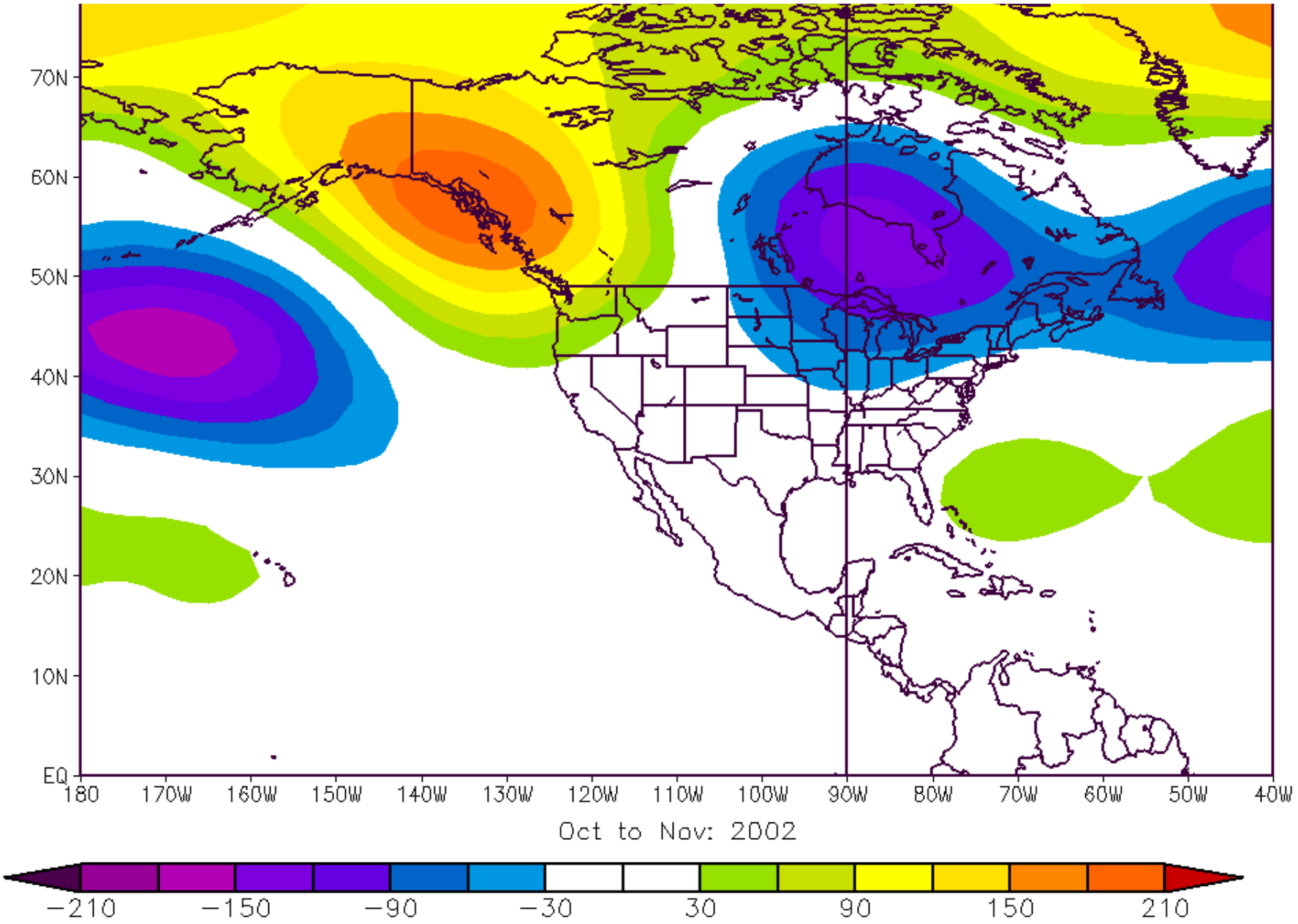
Basic Schematic



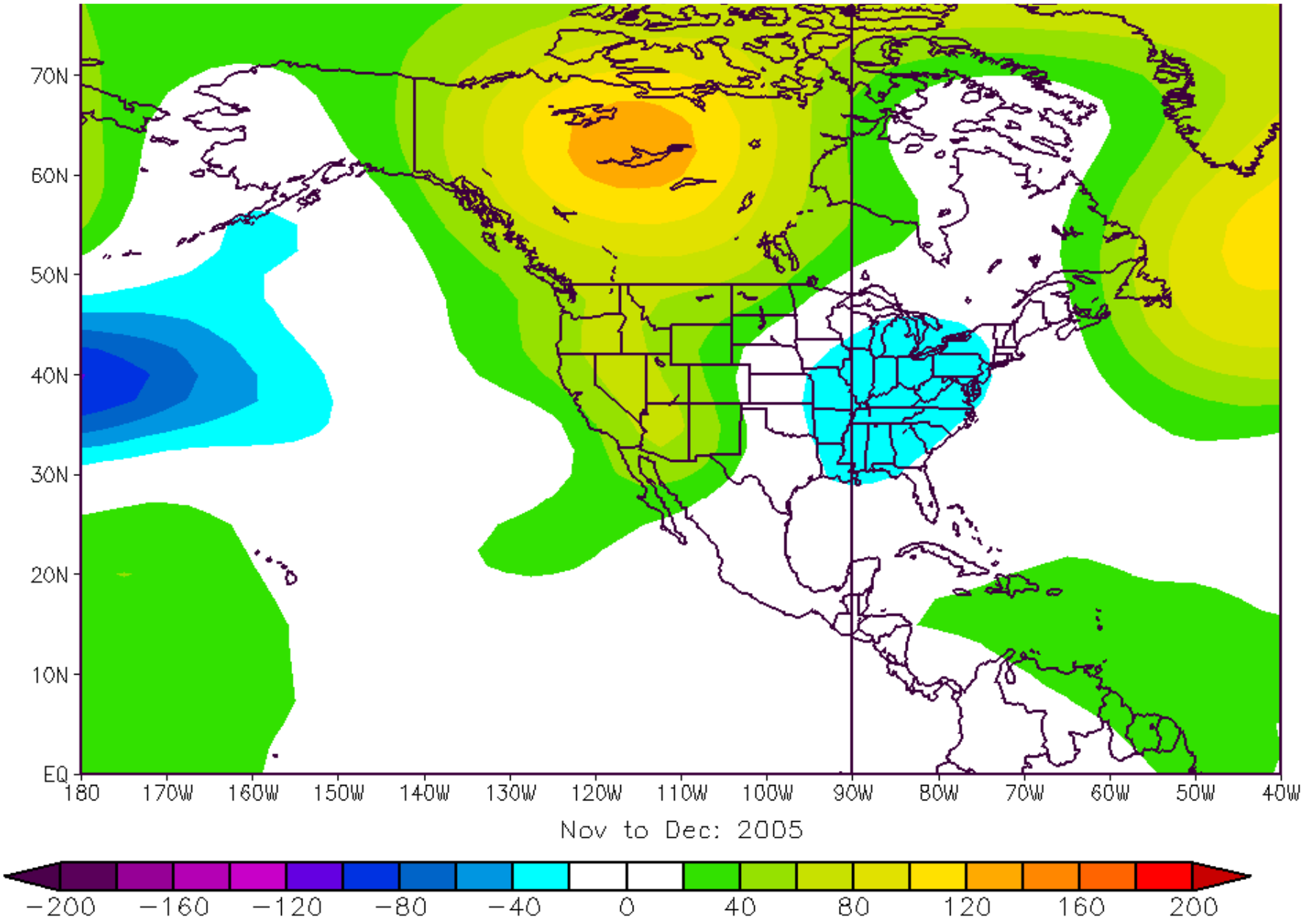


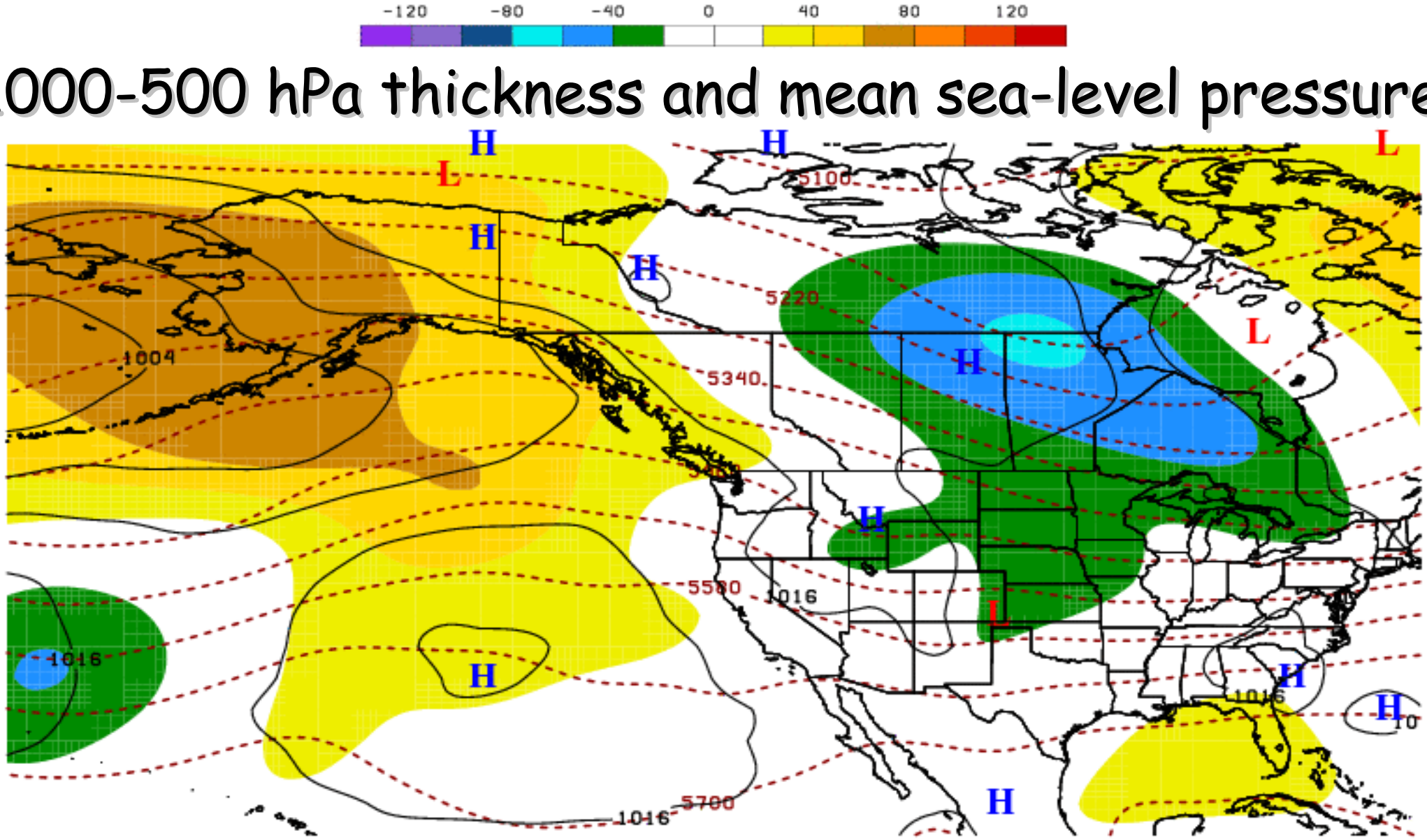
Composite of Warm/Dry Events

300 hPa anomalies for 3 dry events in consecutive months

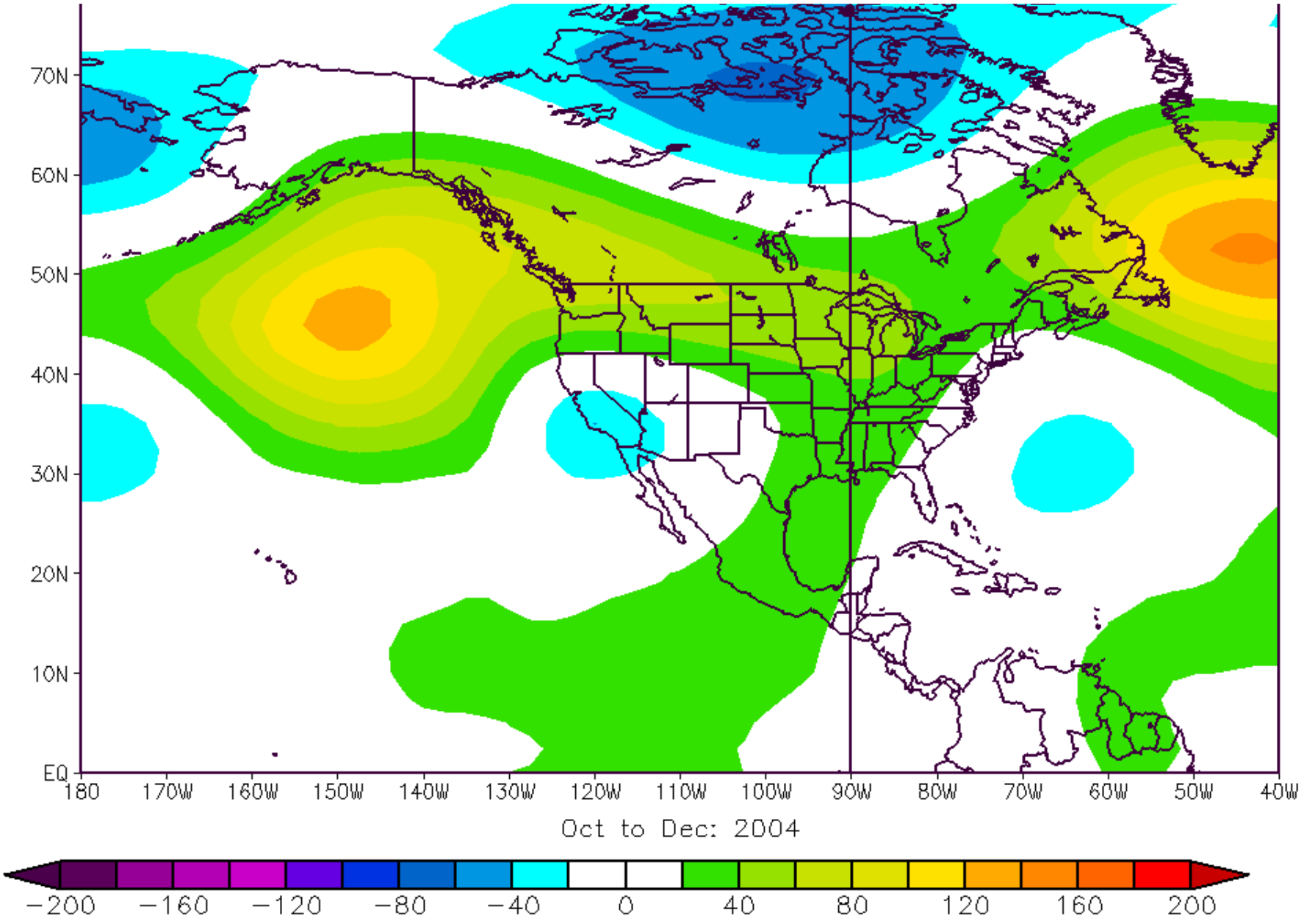


300 hPa anomalies for 2 dry events in consecutive months




-120
-80
-40
0
40
80
120
1000-500 hPa thickness and mean sea-level pressure
H
L
5100
5220
5340
5580
5700
1004
1016
Composite of Wet/Cool Events

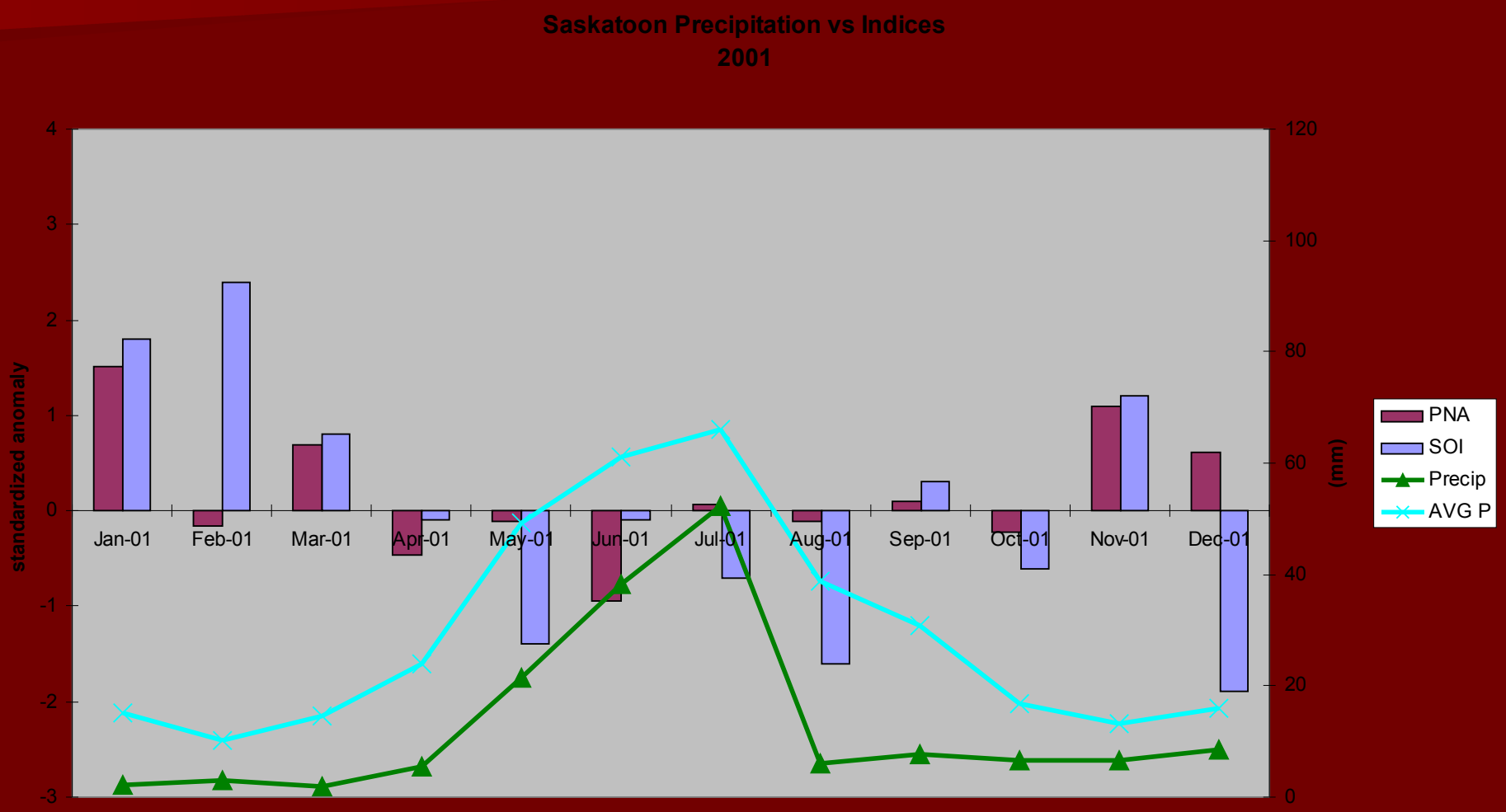
300 hPa anomalies for 3 wet events in consecutive months



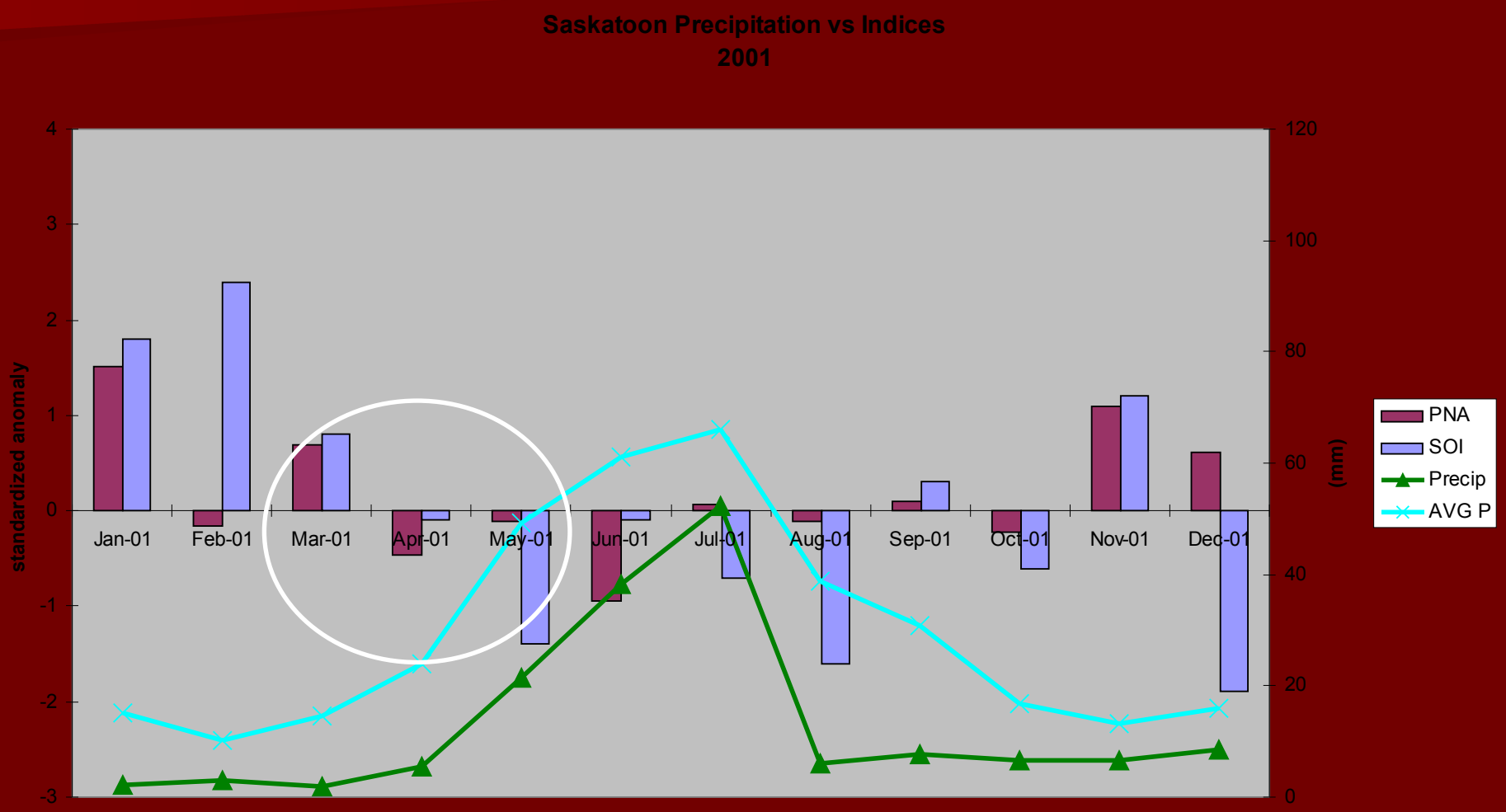
Theme 2

A Series of Unfortunate Events

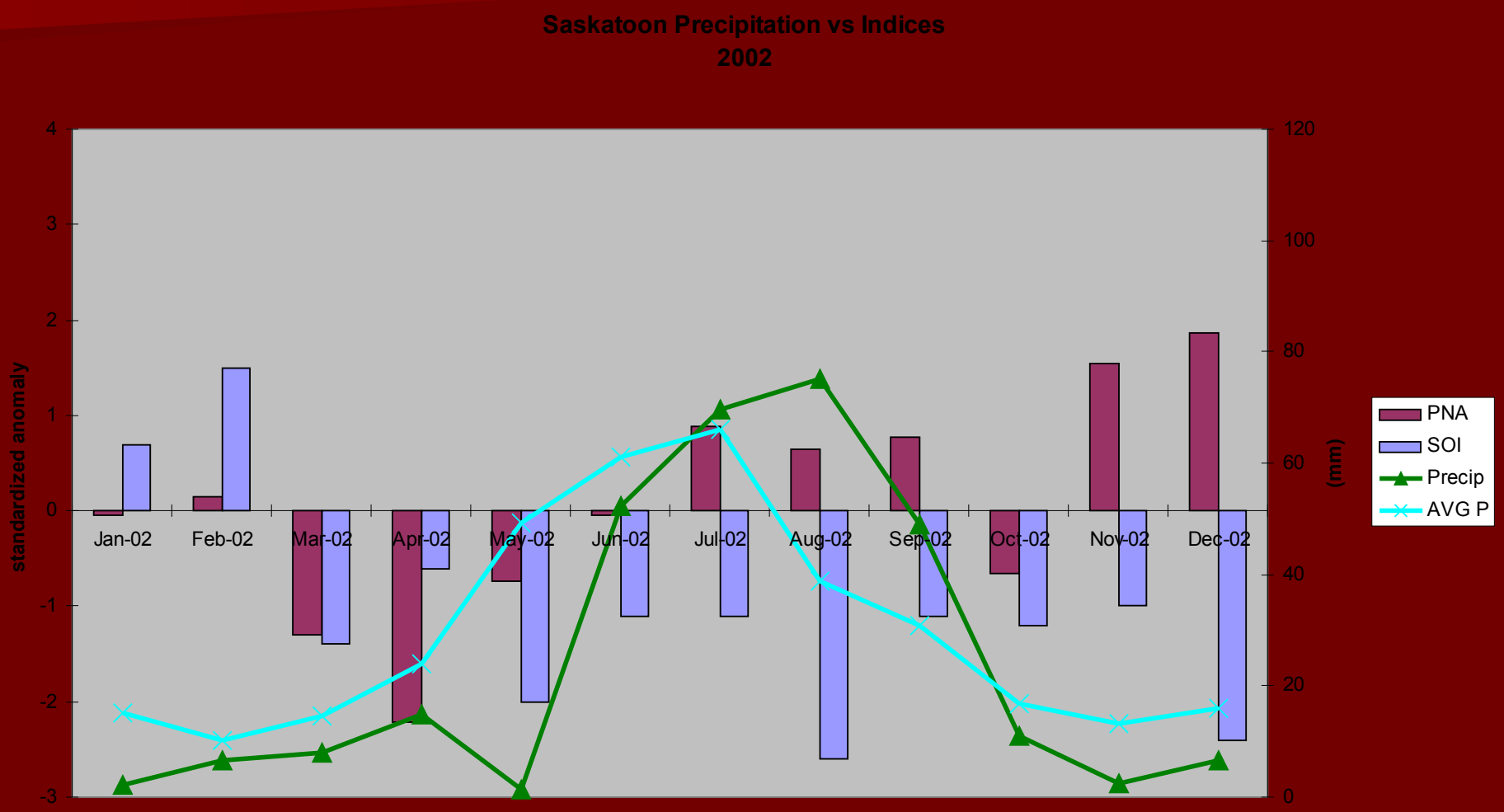
Drought Evolution



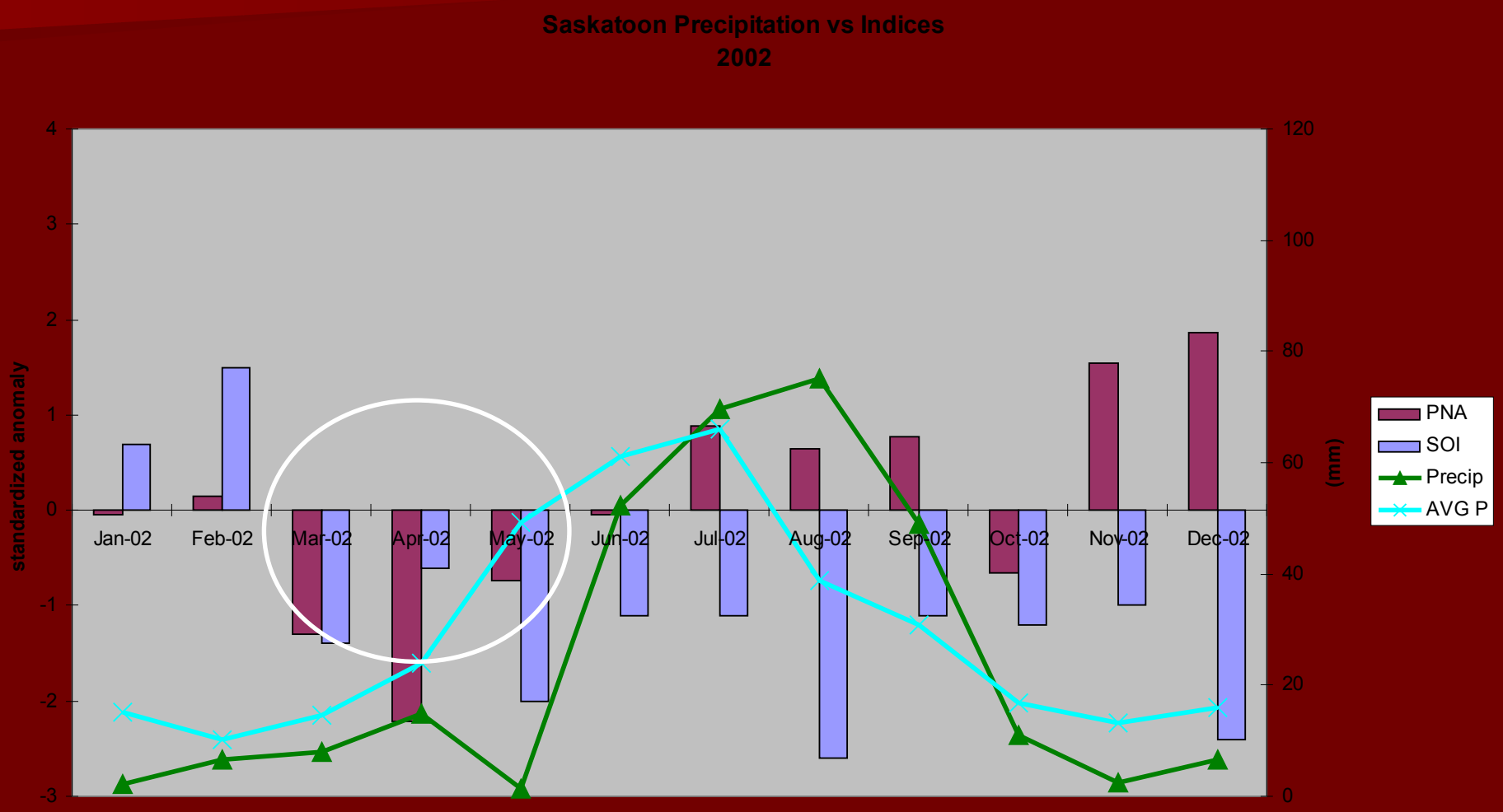
Drought Evolution



Drought Evolution



Drought Evolution

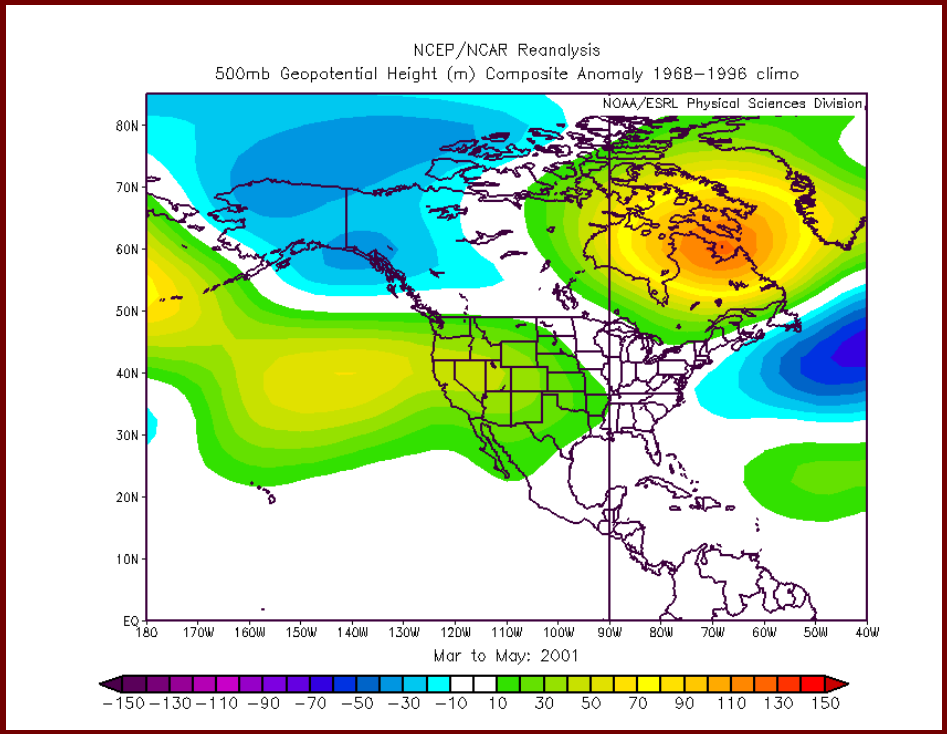


Why a series of Unfortunate Events?

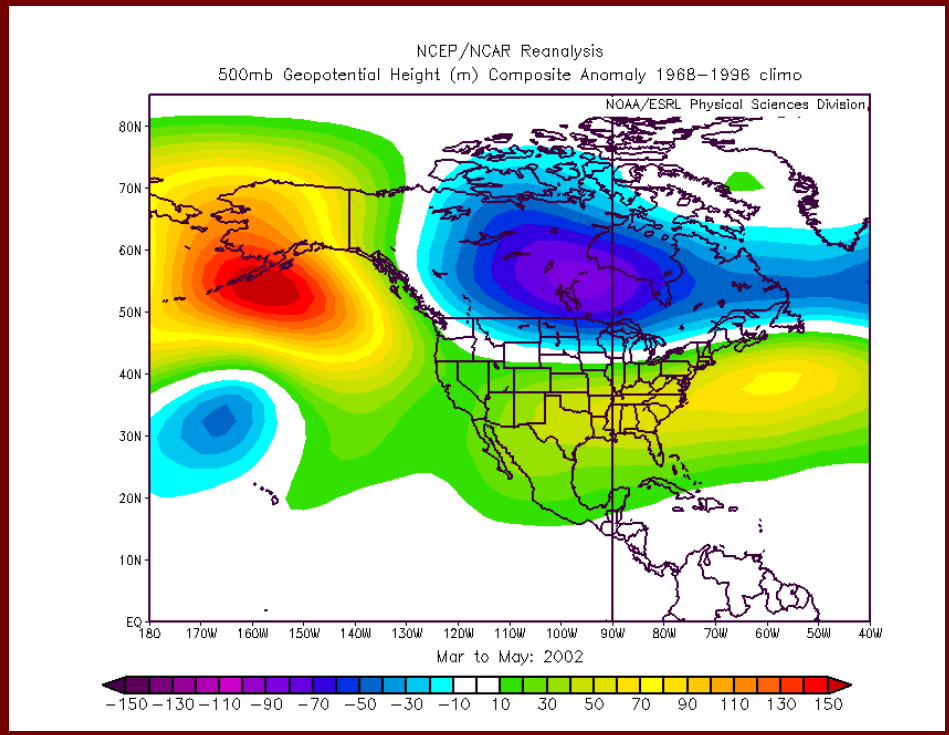
- Analysis on seasonal time scales suggests that the drought can not really be described by a typical pattern.
- Completely different flow regimes, can end up having the same results. As an example, consider the months of May 2001 and May 2002.

Cases

- Actual 500 hPa height anomaly Spring 2001/2002



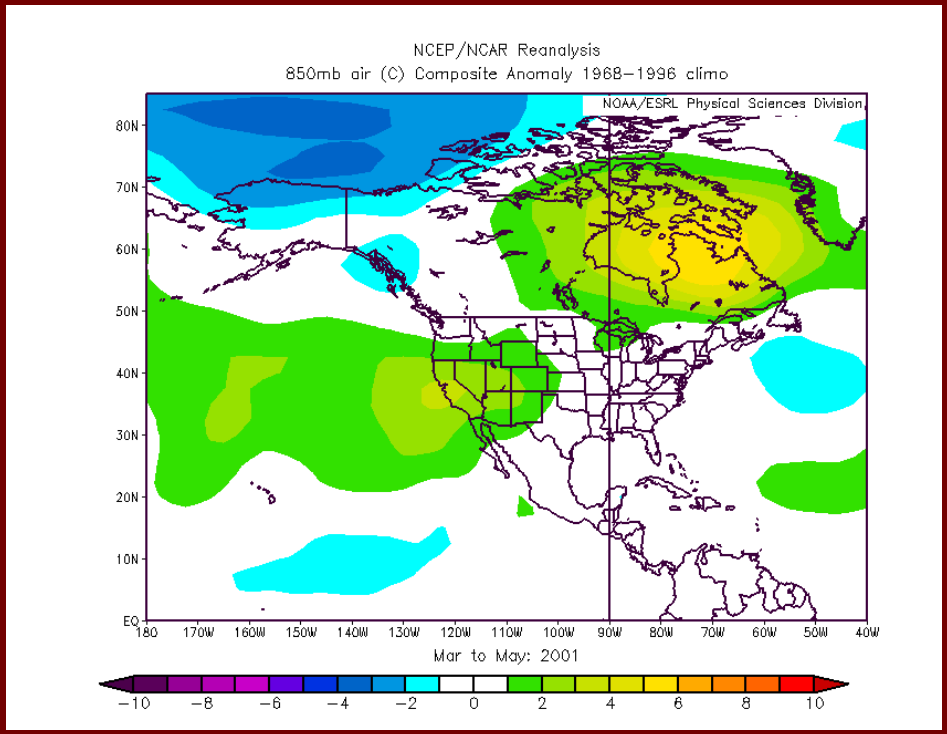
2001



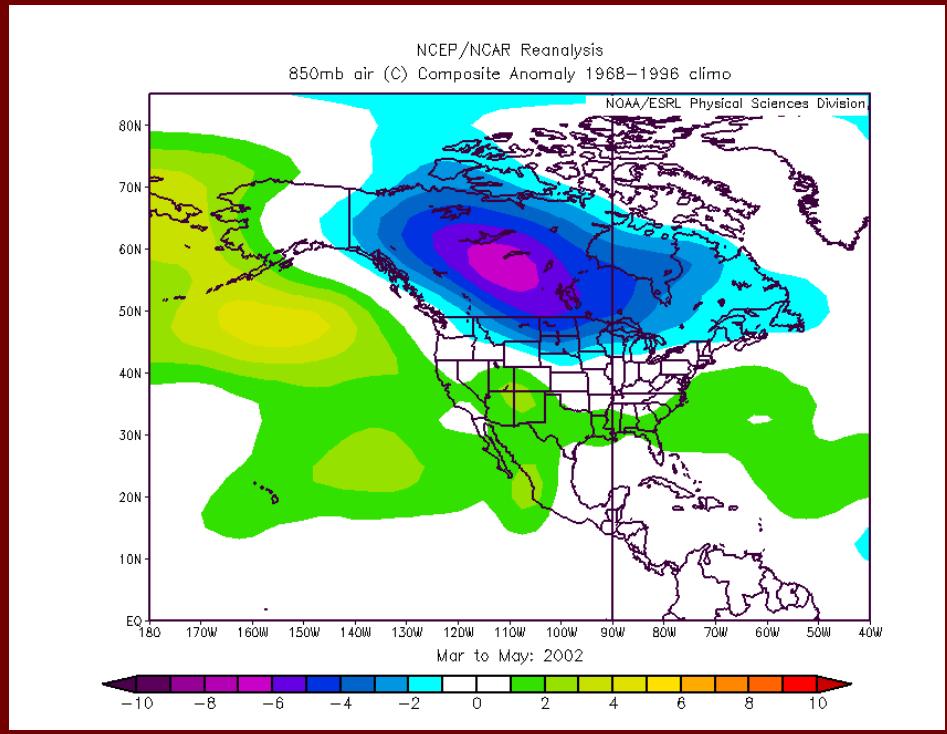
2002

Cases

- Actual 850 hPa temperature anomaly Spring 2001/2002



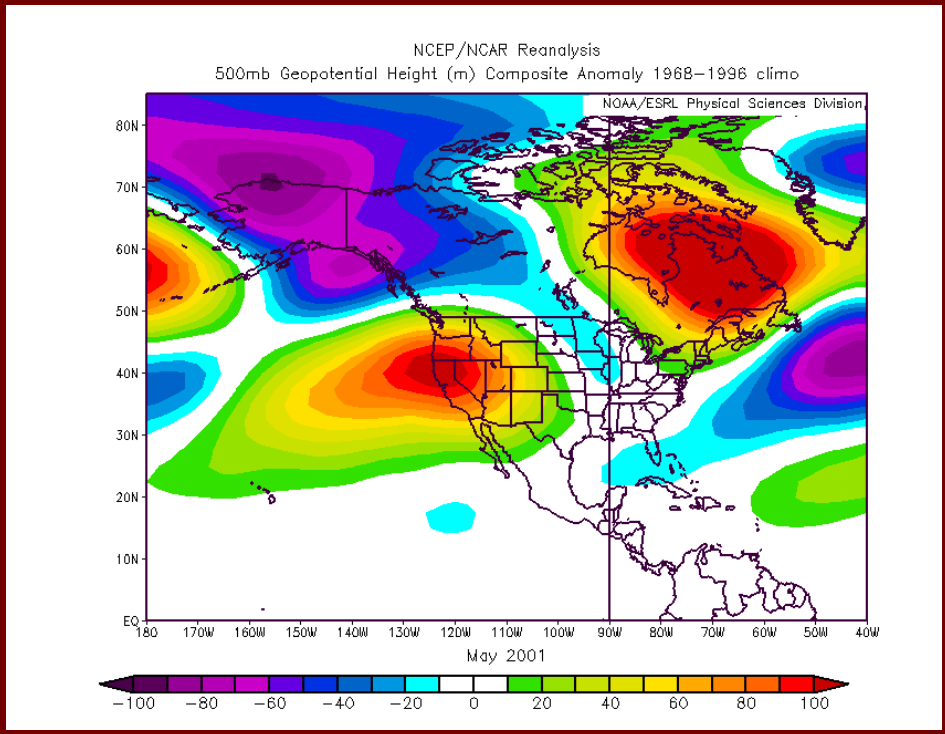
2001



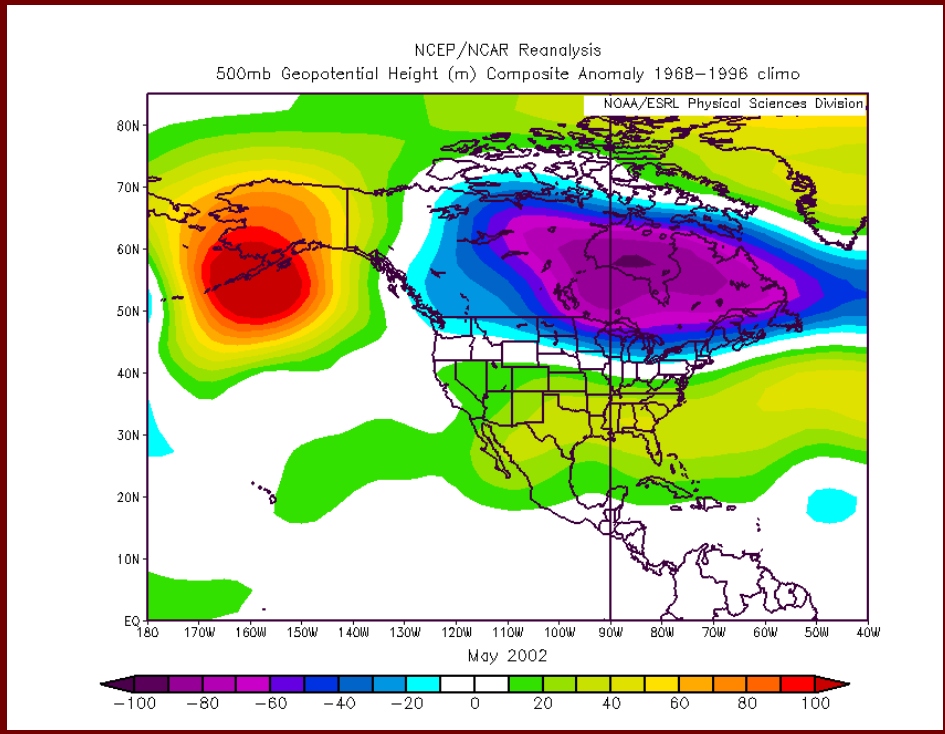
2002

500 hPa Height Anomaly May 2001/2002

2001

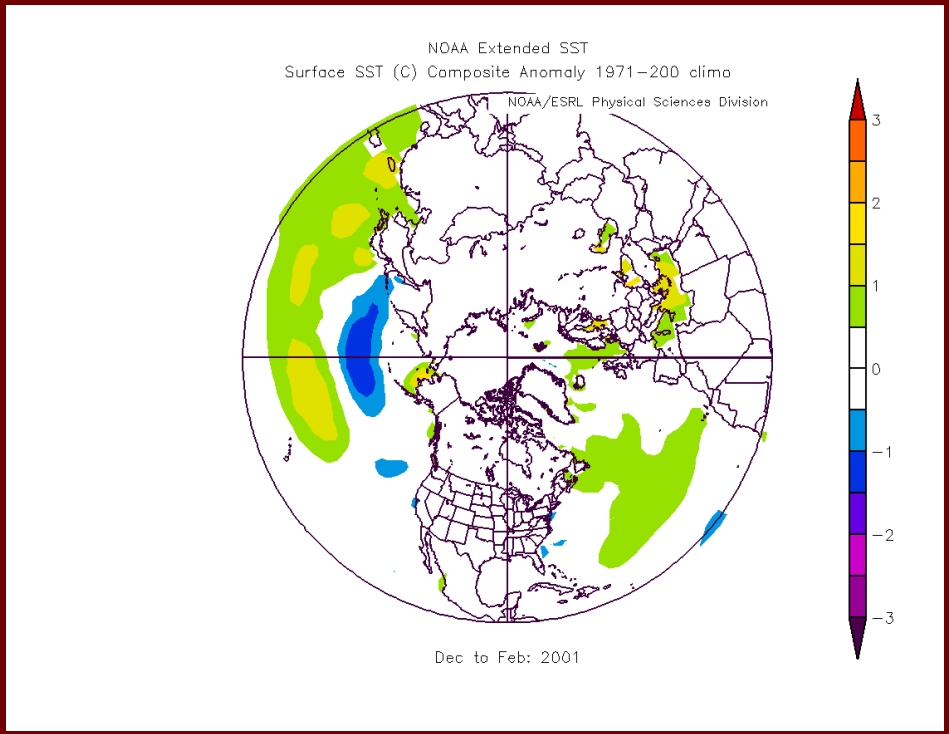


2002

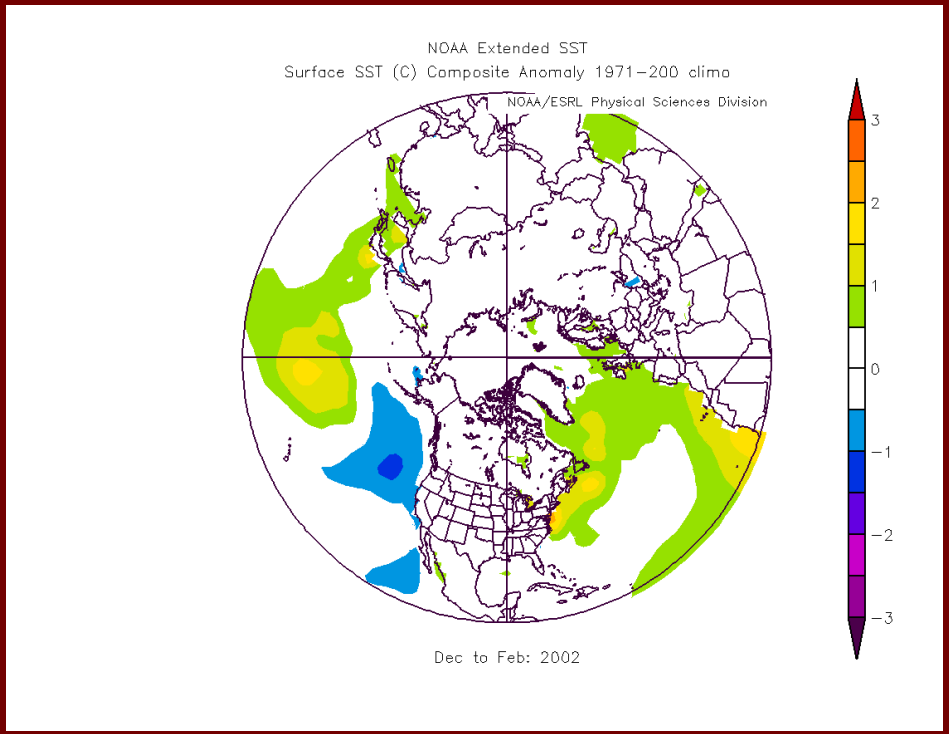


Winter Sea Surface Temp Anomaly Winter 2001/2002

2001

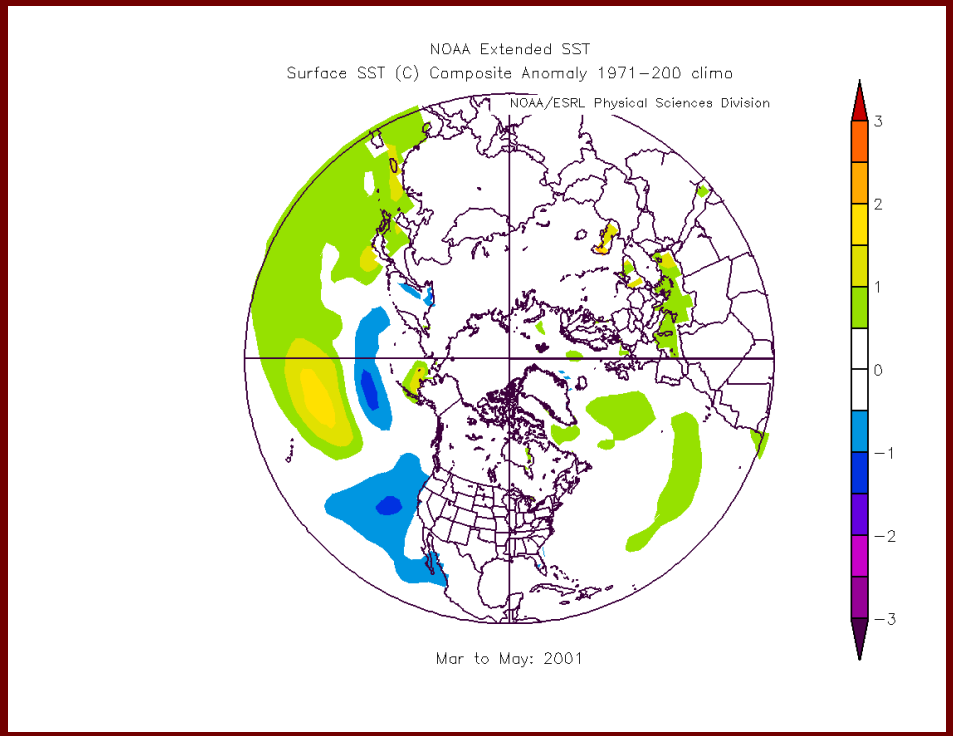


2002

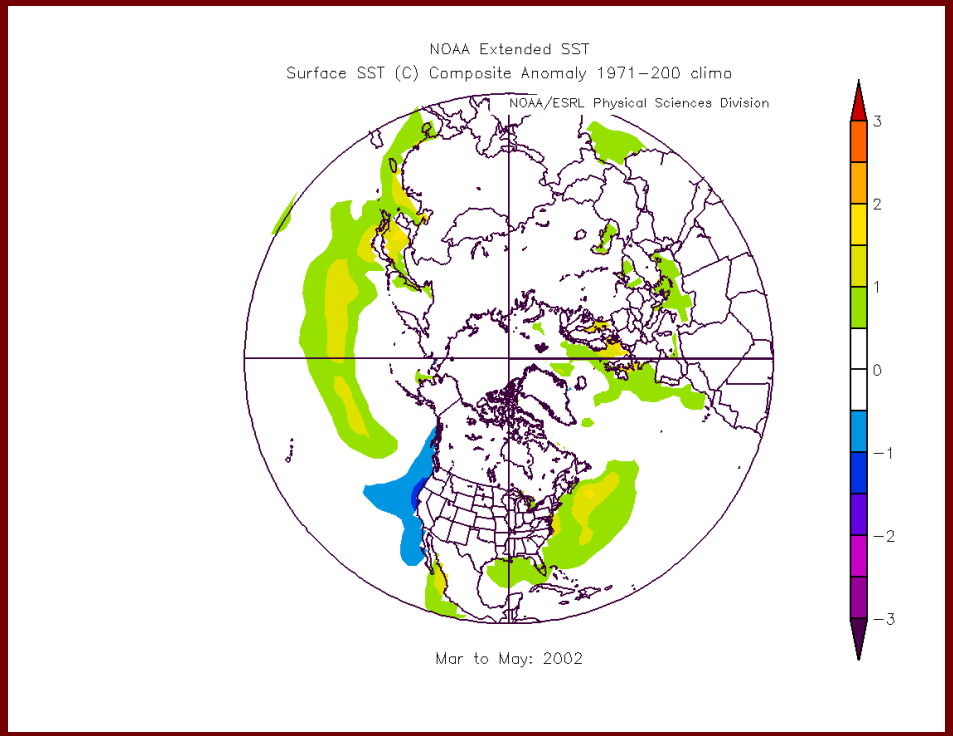


Spring Sea Surface Temp Anomaly Winter 2001/2002

2001



2002



Conclusions

- There is not really one pattern that typified the drought.
- Multi-year drought can not be blamed on a single index such as the SOI and/or PNA.
- Drought conditions can be accompanied by either warm or cold temperatures.