



A TRADERS GUIDE TO UNDERSTANDING LARGE SCALE WEATHER PATTERNS OR “TELECONNECTIONS”

This brief essay or summary we are providing in order to enhance the basic understanding for traders with regard to how particular atmospheric weather patterns or **Teleconnections** work in determining significant weather trends for North America and Western Hemisphere. There are four specific Teleconnections or weather patterns that drive most of the significant or major weather trends over North America: They are

- The EPO (Eastern Pacific Oscillation)
- The PNA (Pacific North American pattern)
- The AO (the Arctic Oscillation)
- The NAO (North American Oscillation).

A case can be made that there are 2 more (WPO or Western Pacific Oscillation and the AMO or Angular Momentum Oscillation).

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THE EPO

The EPO or Eastern Pacific Oscillation is often referred to in laymen's terms as the Alaskan ridge. The EPO is determined by Upper air patterns (usually at the 500mb level) over the Gulf of Alaska / Alaska/ far Northwest Canada

POSITIVE PHASE EPO (+EPO): When there is an upper Low OR trough in the Gulf of Alaska/ over Alaska /far northwest Canada... the EPO is considered to be in the "Positive phase".

NEGATIVE PHASE EPO (-EPO): When there is a Ridge over eastern Alaska/ the Gulf of Alaska/ far Northwest Canada... the EPO is considered to be in the "Negative Phase".

The effects of a +EPO pattern features a persistent and deep trough over the western third of the

CONUS and a Ridge over the Southeast US. Temperatures over the central and eastern portions of the CONUS are likely to feature Above normal and possibly Much Above Normal as a +EPO pattern cuts off the supply of cold air from the Arctic region and northern Canada into south central and eastern Canada... which in turns means no cold air for the CONUS east of the Rockies . The deep persistent trough over the West Coast implies significant or major weather systems crashing into the West Coast of North America. This usually brings above or much above precipitation for a prolonged period of time along with below and much below normal temperatures from the West coast to the Rockies

The effects of a –EPO pattern; when the atmosphere shows a -EPO pattern it strongly implies that the central and eastern portions of the CONUS are likely to feature Below Normal and possibly Much Below Normal temperatures. This is because the -EPO establishes a flow of Arctic / cold air from Alaska and possibly from Siberia or the Arctic regions into the central and eastern portions of Canada and then into the central and eastern portions of the CONUS. The western third of the country from the Rockies to the West coast are likely feature Above Normal temperatures and possibly Below Normal precipitation. Exactly how warm and dry the western third of the country will be depends on other Teleconnections patterns in addition to the -EPO.

THE PNA

The PNA or Pacific North American Pattern is often referred to in laymen's terms as the "West Coast Ridge". The PNA is determined by Upper air patterns (usually 500mb level) over the West coast of Canada and/or western 25% of the CONUS.

POSITIVE PHASE PNA (+PNA): When there is a Ridge over West Coast/ Great Basin.... the PNA is considered to be in the "Positive Phase

NEGATIVE PHASE PNA (-EPO): When there is deep trough over the West coast of North America (West coast / Great Basin).. the PNA is considered to be in the " Negative phase". "

The effects of a +PNA pattern: strongly implies that the central and eastern portions of the CONUS are likely to feature below normal and possibly much below normal temperatures. This is because the + PNA establishes a flow of cold air from eastern Alaska and northwest Canada into the central and eastern portions of the CONUS. The western third of the country from the Rockies to the West coast are likely feature above or much above normal temperatures and below and or much below normal precipitation.

When the EPO is negative and the PNA is Positive the result is likely to feature a deep trough over the eastern third of the CONUS and/ or dry conditions over the Western third of the CONUS. During the cold season months (October to March) -EPO/ +PNA often result in large scale arctic air outbreaks for the central/ eastern portions of the CONUS

The effects of a -PNA pattern: features a persistent moderate / deep trough over the western third of the CONUS and a ridge over the southeast CONUS. Temperatures over the central and eastern portions of the CONUS are likely to feature either Above Normal and possibly Much above Normal and Below Normal over the western CONUS with Above Normal precipitation. The moderate/ deep persistent trough over the West Coast implies significant or major weather systems crashing into the West Coast of North America. This usually brings above or much above precipitation for a prolonged period of time along with below and much below normal temperatures from the West coast to the Rockies

When the EPO is Positive and the PNA is Negative... the result is likely to feature a deep trough over the West Coast and/ or Western of the CONUS with Below/ Much Below temps and Above Normal Precipitation. However the Eastern third of the CONUS will see mild/ warm temperatures along with dry conditions. During the cold season months (October to March) +EPO/ -PNA often result in large scale cold / arctic air outbreaks for the Pacific Northwest/ Great Basin/ Rockies and significant or heavy precipitation

THE AO

The AO or Arctic Oscillation Pattern is determined by Upper air patterns (usually 500mb level) over the Arctic circle . Often the position... shape...and intensity of the AO is connected to the shape... position... of the PV (Polar Vortex).

POSITIVE PHASE PNA (+PNA): When there is an Upper level trough or Upper levelLows over the Arctic region ... the AO is considered to be in the "Positive Phase".

NEGATIVE PHASE PNA (-PNA): When there is Ridging or Blocking features in the Jet stream over the Arctic region... the AO is considered to be in the "Negative Phase"

The effects of a +AO pattern: features a distinct lack of Arctic cold air for most of the central and eastern portions of the CONUS. Sometimes.. Depending on the shape and size of the +AO... the lack of cold air can encompass most of the CONUS. When the AO is positive and the Polar Vortex is position over northwest... north central or northeast Canada this often allows for Pacific mild air to overrun most of the country. There can still be transient "shots" of cold air over the central and eastern with a +NAO but these are often followed by mild intervals. It is also uncommon for large intense Low pressure areas to develop over the central & eastern CONUS when the AO is positive.

The effects of the -AO pattern: feature results in large areas of below and / or Much Below Normal temperatures over much of the central and / or eastern CONUS. The -AO occurs when usual Jetstream configurations develop over the High Latitudes which in turn can cause deep and persistent large scale troughs to exist for days or weeks at a time. Moderate and strong -AO has a strong correlation to above average chances of seeing significant or major winter storms over the central/ eastern CONUS.

THE NAO

The NAO or North Atlantic Oscillation Pattern is determined by Upper air patterns (usually 500mb level) over the northeast Canada/ Greenland/ Iceland. Often the position... shape... and intensity of the NAO is connected to the shape... position... of the PV (Polar Vortex).

NEGATIVE PHASE PNA (+PNA): When there is strong Ridging or blocking features in the Jet stream over northeast Canada/ Greenland/ Iceland... the NAO is considered to be in the "Negative Phase".

POSITIVE PHASE PNA (+PNA): When there is an Upper level trough or Upper levels Lows over northeast Canada/ Greenland/ Iceland... the NAO is considered to be in the "Positive Phase".

The effects of a +NAO pattern: features a tendency for prolonged cold/ cool air outbreaks to not last long. There can be significant Arctic cold air outbreaks for the central and eastern portions of the CONUS but these tend to be transient "shots" of cold air over the central and eastern CONUS. They are often followed by mild intervals. Low pressure systems tend to favor the Midwest/ Great Lakes/ Northern New England regions when the NAO is Positive. For the western third of the CONUS a +NAO pattern (by itself) does not have a bias or tendency towards Below or Above normal temperatures.

The effects of a -NAO pattern features a tendency for prolonged cold/ cool air outbreaks to be of some duration and rather long lasting if/ when there is an also a -AO. Low pressure systems tend to favor the lower Midwest/ Tenn valley/ Middle Atlantic regions when the NAO is Negative. For the western third of the CONUS ...a -NAO pattern (by itself) does not have a bias or tendency towards below or above normal temperatures.