Teleconnections – part 1

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What are teleconnections? To some, it may sound like talking to someone on the telephone. In a sense, that is what is happening in the upper atmosphere. For instance, a huge ridge in one area of the globe usually means a huge trough is occurring somewhere else in the globe. The common meteorological terms we are used to, such as ridges and troughs, also occur in the upper atmosphere. Teleconnections refer to those patterns associated with the circulation of air in the upper atmosphere. Sometimes a pattern change or occurrence in the upper atmosphere can lead to an increase in winds or even a reversal of those winds. Just a change in direction of winds 100,000 feet off the ground can have a significant effect to the weather on the surface.

These patterns that occur can happen or change on the order of every couple of weeks, months, years, or even a decade. They play a huge role in long term forecasting. Models that forecast the changes, or perturbations, of these patterns help long term forecasts such as the 30 day and the 3 month temperature and precipitation forecast. These patterns tell us if it is going to be hotter or colder than average and whether it will be drier or wetter than average.

The atmospheric circulations that are observed and recognized were given names as well. The El Nino/ La Nina cycle is a well known teleconnection but perhaps, not totally understood. It is the changes in the sea surface temperatures in the Eastern Pacific that affect the upper atmospheric circulations.

Other teleconnections are simply measured as positive or negative. It may be as simple as a ridge in the Western U.S. and a trough in the Eastern U.S. and this would be a positive pattern. One teleconnection known with this definition is the Pacific North American Pattern or the PNA. The PNA simply defines whether a ridge or trough is in the West or East.

There are many other patterns that are present in the upper atmosphere. Some are known, and some are not as well understood as others. These patterns have different effects on different parts of the world. In my next part in the next newsletter, I will explain a little more in depth about these teleconnections and how they can affect northeast Montana.

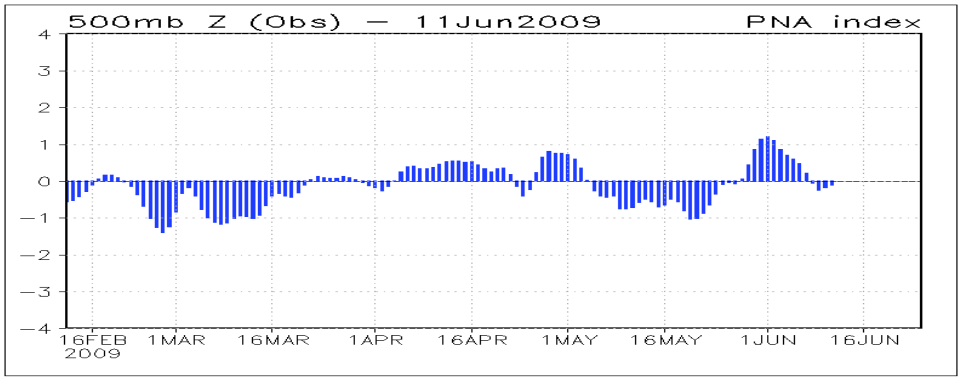

Figure 1. This chart shows how the PNA index has changed over the past 5 months. Negative values indicate more of a trough in the Western U. S. and a ridge in the eastern U. S. A positive PNA indicates a ridge in the west and a trough in the east. Keep in mind that low values mean more of a flat pattern.