Understanding ENSO Weather Patterns and Their Impact on Oklahoma

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How most people see ENSO

NO! It’s more than just El Nino
What is ENSO?

- ENSO stands for El Nino/Southern Oscillation
  - 3 phases: El Nino, La Nina, and Neutral Conditions
  - Southern Oscillation refers to seesaw changes in equatorial pacific surface pressures
- ENSO is one of the most important climate phenomena on Earth since it can change the global circulation pattern (i.e., the planet’s temperature and precipitation patterns)
- Why scientists like it? It can be predicted several months (even seasons) in advance of its possible impacts
- Switches irregularly between the 3 phases every 2-7 years
**El Nino-Southern Oscillation (ENSO)**

- ENSO actually has THREE phases, based partly on the sea surface temperature changes in the equatorial Pacific
  - El Nino (warm anomaly, >0.5C)
  - La Nina (cool anomaly, <-0.5C)
  - Neutral (the “middle” phase, within +/-0.5C of average)
- ENSO is a COUPLED phenomenon. Requires certain change in the atmosphere to be classified as El Nino or La Nina (this is the “Oscillation” part)
- SST anomaly WITHOUT the atmospheric component is just an anomaly
- ENSO switches irregularly between the three phases every 2-7 years
HOW DOES ENSO CHANGE WEATHER PATTERNS AROUND THE GLOBE? TELECONNECTIONS

- It changes the pressure and storm patterns along equator, which changes the trade winds (Walker Circulation).

- It then influences the Hadley circulation, which leads to changes in the circulation patterns worldwide, including the position of the jet stream over North America.
El Niño Impacts

- Bigtime droughts in Australia and northern South America
- Southern US benefits
- Hurricane season is worse in Pacific, better in Atlantic

- Warmer across north
- Wetter along southern tier
- Dry in the Upper Midwest into the Southeast
- October through March
- STRENGTH MATTERS!
El Nino Precipitation

Weak (0.5-0.9°C)

Moderate (1.0-1.4°C)

Strong (1.5-2.0°C)

Very Strong (>2.0°C)
La Nina Impacts

- Australia and Central America benefit
- Southern US and parts of Asia and South America have problems
- Hurricane season is worse in Atlantic, better in Pacific

- Drier/Warmer along southern tier
- Wetter in Pac NW and Ohio Valley
- Impacts are Oct-Apr, but strongest Jan-March
- STRENGTH MATTERS!
La Nina Precipitation

Weak (0.5-0.9°C)

Moderate (1.0-1.4°C)

Strong (1.5-2.0°C)

Temperatures

Strong (1.5-2.0°C)
ENSO: Important points

- Impacts are more likely during ENSO events, but not certain to occur
- The stronger the ENSO event, the more likely the teleconnection impacts become
- There is some correlation between strength of the event and the severity of the effects
- These are generally cool season impacts
- Scientists have LOW confidence in exactly what will happen to ENSO in the future even while they have HIGH confidence that ENSO itself will continue
- Climate change could strengthen or weaken the typical weather patterns associated with ENSO
MORE RESOURCES

• Scientific Mumbo-Jumbo: CPC’s ENSO page

• Easier to understand: Climate.gov’s ENSO blog
  – https://www.climate.gov/news-features/department/8443/all

• CPC’s main page: All the outlooks and other info
  – https://www.cpc.ncep.noaa.gov/

• The OCS/Mesonet Ticker
  – Or send e-mail to gmcmanus@Mesonet.org