The Current State of CLIMATE FORECAST SKILL
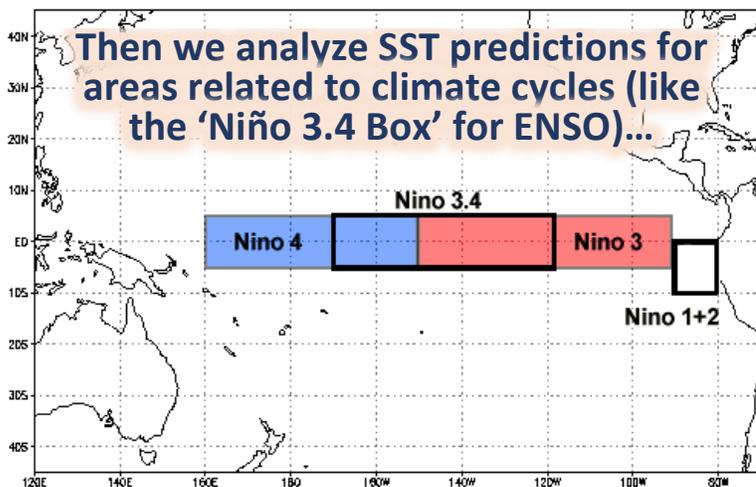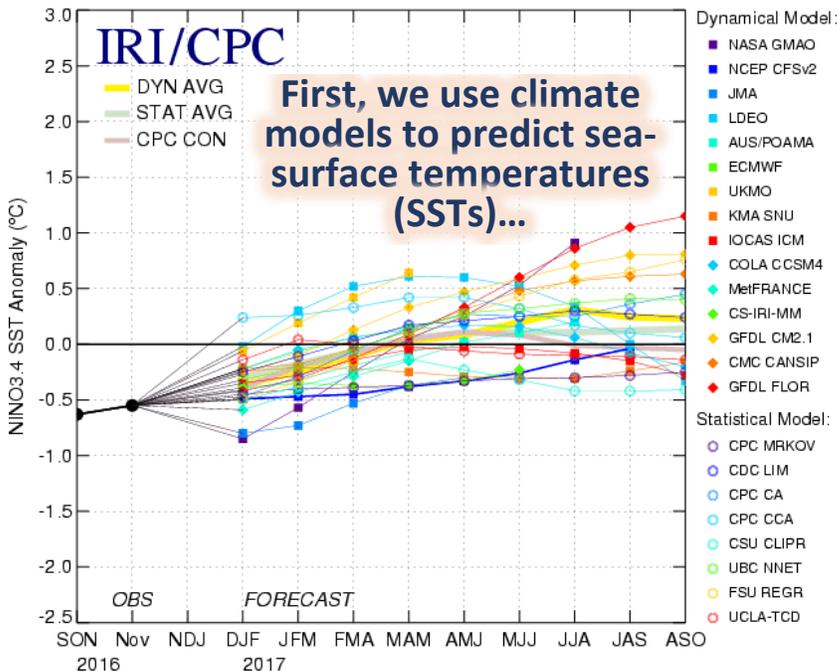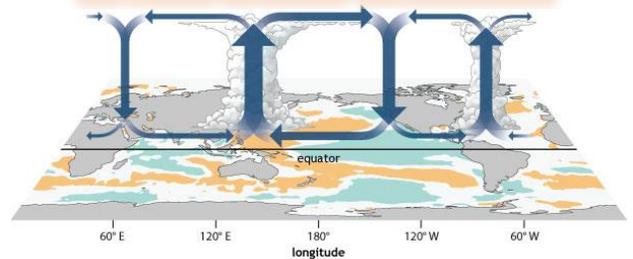
1. HOW DO WE FORECAST CLIMATE CYCLES?
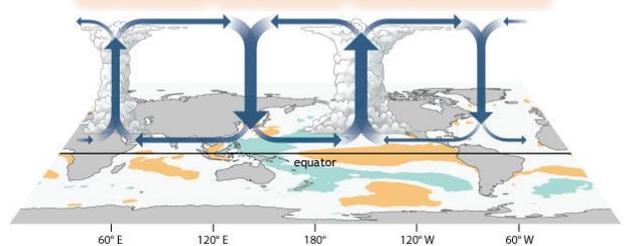
Mid-Dec 2016 Plume of Model ENSO Predictions

First, we use climate models to predict sea-surface temperatures (SSTs)...

Then we analyze SST predictions for areas related to climate cycles (like the 'Niño 3.4 Box' for ENSO)...
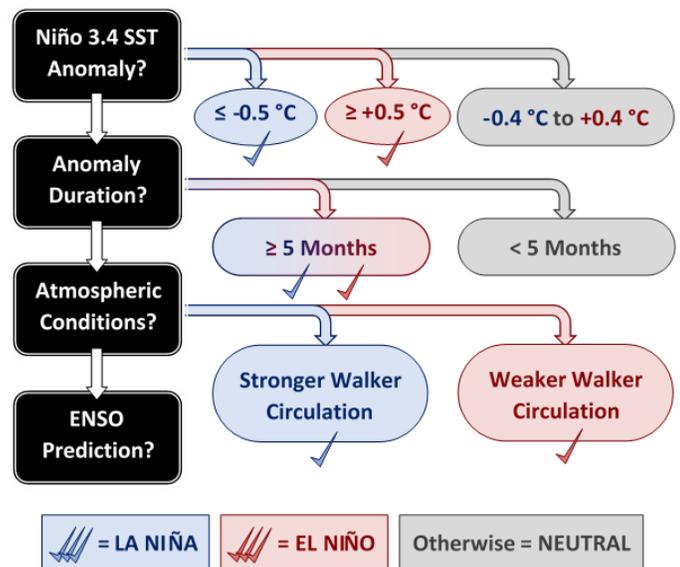

La Niña Walker Circulation

El Niño Walker Circulation

Lastly, we confirm the strength of Walker Circulation in the atmosphere before issuing a prediction.

Niño 3.4 SST Anomaly? → ≤ -0.5 °C / ≥ +0.5 °C / -0.4 °C to +0.4 °C

Anomaly Duration? → ≥ 5 Months / < 5 Months

Atmospheric Conditions? → Stronger Walker Circulation / Weaker Walker Circulation

ENSO Prediction?

= LA NIÑA   = EL NIÑO   Otherwise = NEUTRAL

El Niño Southern Oscillation (ENSO) is forecasted and available at: **cpc.noaa.gov**

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LOOK FOR OUR OTHER FACTSHEETS AND EDUCATIONAL MODULES ON **DROUGHT.GOV** AND **AAES.AUBURN.EDU/WRC**

2. HOW RELIABLE ARE FORECASTS?

Dynamical Models

El Niño predicted, didn't develop

El Niño predicted, but will it develop?

7-month lead

4-month lead

1-month lead

forecasts

roughly on target

observations

winter cooling missed by forecasts

Statistical Models

bigger lag in predicted warming

forecasts

4-month lead

1-month lead

7-month lead

El Niño still predicted

observations

cooler on average than dynamical models

Performance of Dynamical and Statistical Models

Model Type	Correlation Coefficient			Mean Absolute Error		
	Lead 1	Lead 4	Lead 7	Lead 1	Lead 4	Lead 7
Dynamical	0.89	0.6	0.14	0.17	0.32	0.44
Statistical	0.79	0.46	0.12	0.22	0.29	0.31

Note: Lead 1, 4, and 7 refer to 1-, 4-, and 7-month lead times.

3. ARE THEY USEFUL?

General Climate Forecasts:
- Vary significantly in their reliability and usefulness.
- Cover several climate cycles that impact regions all around the globe.
- Are currently focused on short-term climate cycles such as ENSO, MJO, AAO, AO, etc.
- May or may not be derived similarly to ENSO forecasts.

The ENSO Climate Forecast:
- Lead times up to 4 months can be considered reliable.
- Is already utilized by the Army Corps of Engineers to manage reservoirs in the ACF River Basin.
- Can be improved by coupling with forecasts of long-term climate cycles such as AMO, PDO, and NAO.
- Is particularly useful for drought early warning and planning activities.