Lessons learned about lessons learned about forecasting El Niño and its impacts: Shades of Chaos

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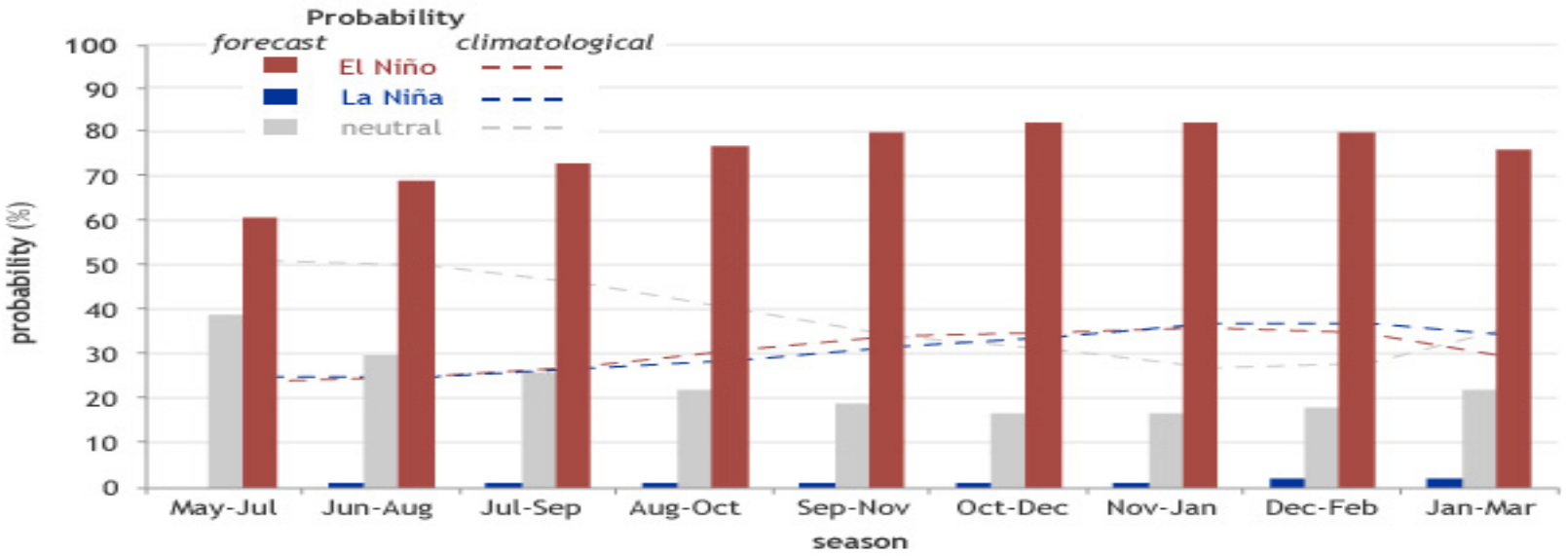
Summary of Questions from an outsider

1. Should forecasting El Nino's onset be distinguished from forecasting its post-onset locked-in phase?
2. If an El Nino occurs in December 2014, is it the same one forecast earlier in 2014?
3. Should the forecast of El Nino's onset be considered experimental?
4. Should the post-onset forecasts be considered operational?
5. To what extent do the various oscillations impact the forecasting of El Nino's onset and teleconnections?

- **In early 2014 the media reported forecasts of a possible major El Niño event, based on information from forecasters.**
- **Several El Niño watchers believed a major El Niño was due.**
- **The probability for a major El Niño event was as high as 80% to 90%.**
- **Some forecasters compared the 2014-15 El Niño as shaping up like the 1997-98 "El Nino of the Century".**

"During the latter part of 2014 its probability is near or above 80%. This is a fairly confident forecast for El Niño, but it does still leave about a 20% (1 in 5) chance of it not happening."
https://www.climate.gov/news-features/blogs/enso/why-do-enso-forecasts-use-probabilities



Headlines Before Mid-June 2014

Forecasting a major El Nino 2014

El Niño: Is 2014 the new 1997? (May 19)

2014 El Niño Warming Up to Be a Mighty One (April 7) ?

Unusual Fish Catches Off San Diego Signal Large-Scale El Niño, Researcher Says (June 11)

Kevin Trenberth on El Nino: The Only Question is How Big (April 28)

2014 El Niño Warming Up to Be a Mighty One (April 7) ?

"Super El Nino" possible this fall and winter (May 5)

If El Niño Comes This Year, It Could Be a Monster (April 14, 2014)

El Nino is coming: Epic event ahead?

Headlines After Mid-June 2014

Backtracking on the El Nino 2014 Forecast

- Bad News For California: NOAA Lowers Chance Of El Niño To 65%, Predicts A Weak One (August 7)
- **El Nino 2014 on hold? Odds of development take a hit (August 9)**
- **El Nino Seen Delayed to End of Year as Australia Stays on Watch (August 26)**
- National Weather Service backtracking some on El Nino forecast (August 7)
- **Drought-busting El Niño looking less likely (August 8)**
- Dry Western U.S. May Not Get Help From El Niño, Forecasters Say (August 8)
- **El Niño Fizzle: No Relief Likely for California Drought (August 8)**
- Odds Against Formation of a 'Super El Nino,' Experts Say (June 17)
- **Scientists were expecting a big El Niño this year. So where did it go? (August 13)**

Public confidence in forecasts

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- **The public relies on hydromet forecasters for reliable & credible estimates of potential hazards, such as an El Niño.**

- **The public is not well versed in probabilities associated with climate-related forecasts, e.g. El Niño**
  - **It may not correctly distinguish between scientific statements and scientific hype (wishful thinking) about El Niño's onset**

- **The public must have confidence in their climate-related forecasters to take their forecasts seriously.**

- **Missed forecasts of climate hazards erode societal trust in the credibility of El Nino forecasts.**

V. Mehta (2004) identified several decadal and multi-decadal scale climate variabilities.

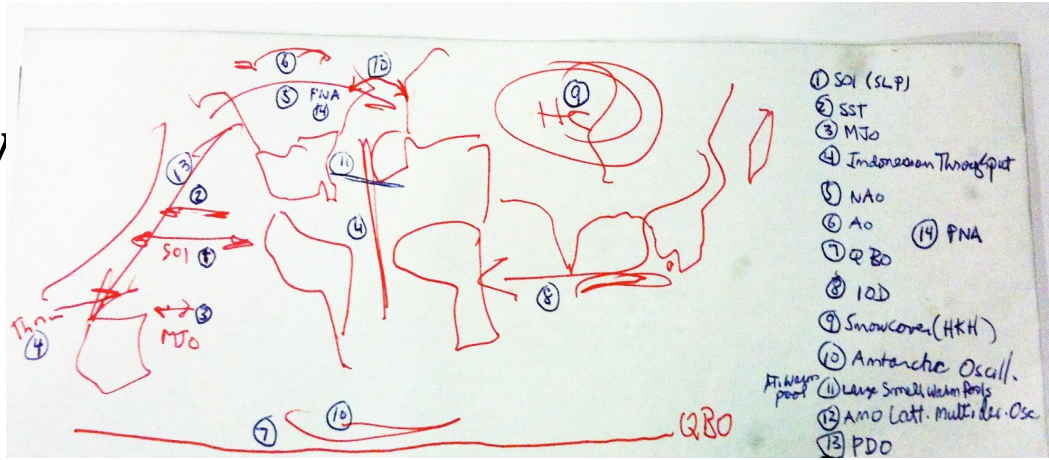
- **"Success in understanding and prediction of short-term climate variability and long-term climate change…depends crucially on success in understanding and prediction of decadal and multi-decadal climate variability."**
- **Decadal climate predictability is a function of external forcings and internal variability.**

- **Isn't this also true for climate predictability at annual time scales?**

Oscillations in the Climate System

Note the following "oscillations" :

- **North Atlantic Oscillation (NAO)**
- **Arctic Ocean circulation regime**
- **Atlantic Multidecadal Oscillation (AMO)**
- **Pacific Decadal Oscillation (PDO)**
- **Indo-Pacific Warm Pool (IPWP) Oscillation**
- **Tropical Atlantic decadal variability (the Atlantic dipole)**
- **Solar Radiance anomaly**
- **Antarctic dipole**



Oscillations create shades of chaos for forecasting …

- **El Niño's onset**
- **El Niño's behavior of after it "locks in"**
- **El Niño's teleconnected impacts**

Oscillations --- in different phases, at different times, in different ways and with varying intensities --- influence El Niño processes

Concluding Comments

Should El Niño researchers acknowledge that they are forecasting two different aspects of the warm phase of the ENSO cycle?

- **El Niño onset forecasts are still experimental forecasts.**
  - **They are forecasting El Niño's onset, a specific event.**
- **Once El Niño's onset has occurred and the event "locks in, forecast reliability improves for El Niño's behavior and impacts. It can be considered an "operational forecast."**
  - **They are forecasting El Niño's life-cycle, a process.**
- **Bottom line : Treat and evaluate separately forecasting (1)the onset and (2)the post-onset "locked in" phases**