Predictions of returning La Niña for next winter using CESM1

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NCAR
The strongest El Niño on record were followed by: strong thermocline discharge and 2-year La Niña

Will La Niña return next winter?
CESM simulations (LENS version)

1. Long control
   – Statistical analysis of predictors of 2-yr La Niña.

2. Decadal Prediction Large Ensemble (CESM-DP-LE)
   – 40 member ensembles initialized on November of each year since 1954.
     • Includes forecast initialized on Nov 2015 used to predict current event.
   – Drift corrections applied.
   – Retrospective skill verified against AR1 process.
2-year La Niña are related to thermocline discharge in the CESM control

Each dot corresponds to an ENSO event from the long control

DiNezio et al. 2017
Highly likely 2-year La Niña after strong thermocline discharge

DiNezio et al. 2017
80% chance of 2-year La Niña according to observed precursors

DiNezio et al. in prep
Consistent with previous 2-year La Niña preceded by strong El Niño

Each dot corresponds to an observed La Niña
Ellipses indicate observational uncertainty

DiNezio et al. in prep
CESM-DP-LE predicts 2-year La Nina when preceded by strong thermocline discharge

Each dot corresponds to a predicted La Nina

Ellipses indicate forecast spread

DiNezio et al. in prep
The current event is not a repeat of 1997/98 according to the CESM-DP-LE.
Conclusions

• La Nina conditions for next winter more likely than not
  – 80% based on the magnitude of the observed thermocline discharge.
  – 60% chance based on initialized forecasts.
  – 50% likelihood based on historical observations.
  – Could have been predicted 18 to 24 months in advance.