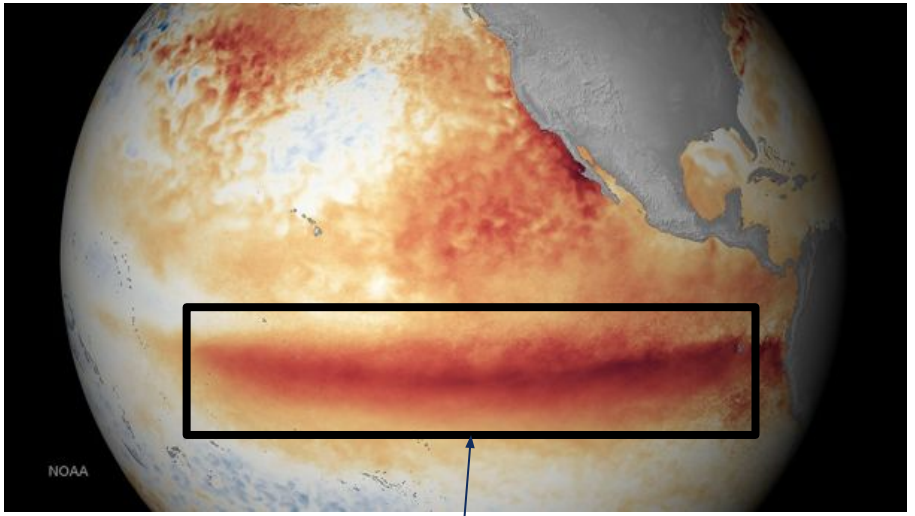
Lab activity - Day 2
Forecasting El Niño/ Southern Oscillation

What is El Niño?

- Cycle of warm and cold temperatures in the equatorial Pacific Ocean
- Dominant pattern that influences seasonal temperature

- How is El Niño measured? *Niño3.4 Index*
  - Rolling 3-month average of sea surface temperatures in the equatorial Pacific



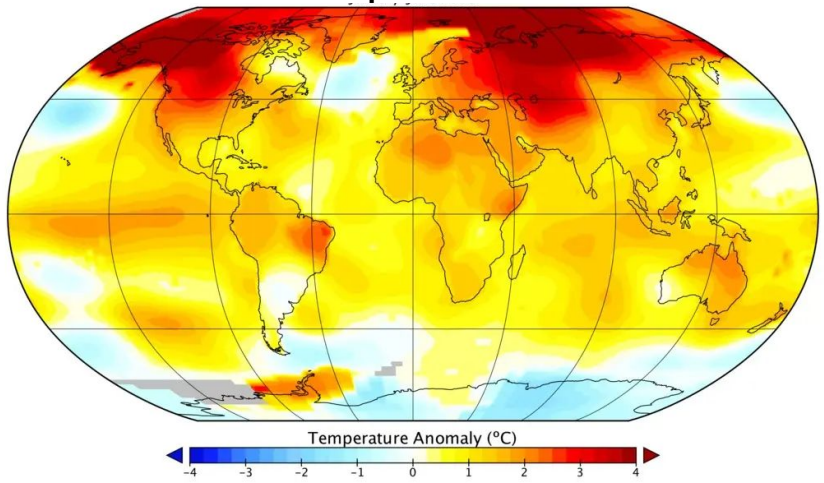
Source: National Oceanic and Atmospheric Administration

Equatorial Pacific Ocean with abnormally warm temperature: El Niño event

Topic discussed during the tutorial

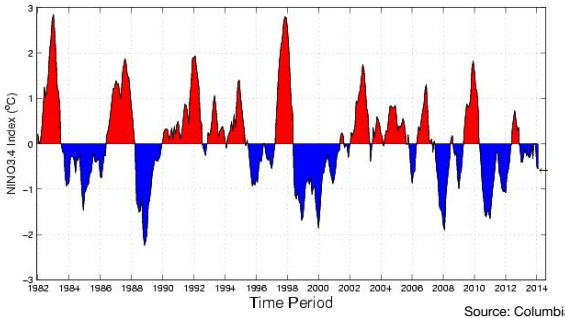
- **Data:** How does data size affect the performance of ML model?
- **Validation:** how to validate model in a good way?
- **Lead time:** How far ahead can machine learning make skillful predictions?
- **Extendability:** Can we use our neural network architecture to forecast *temperatures on land*?

Predictor Data: surface temperature



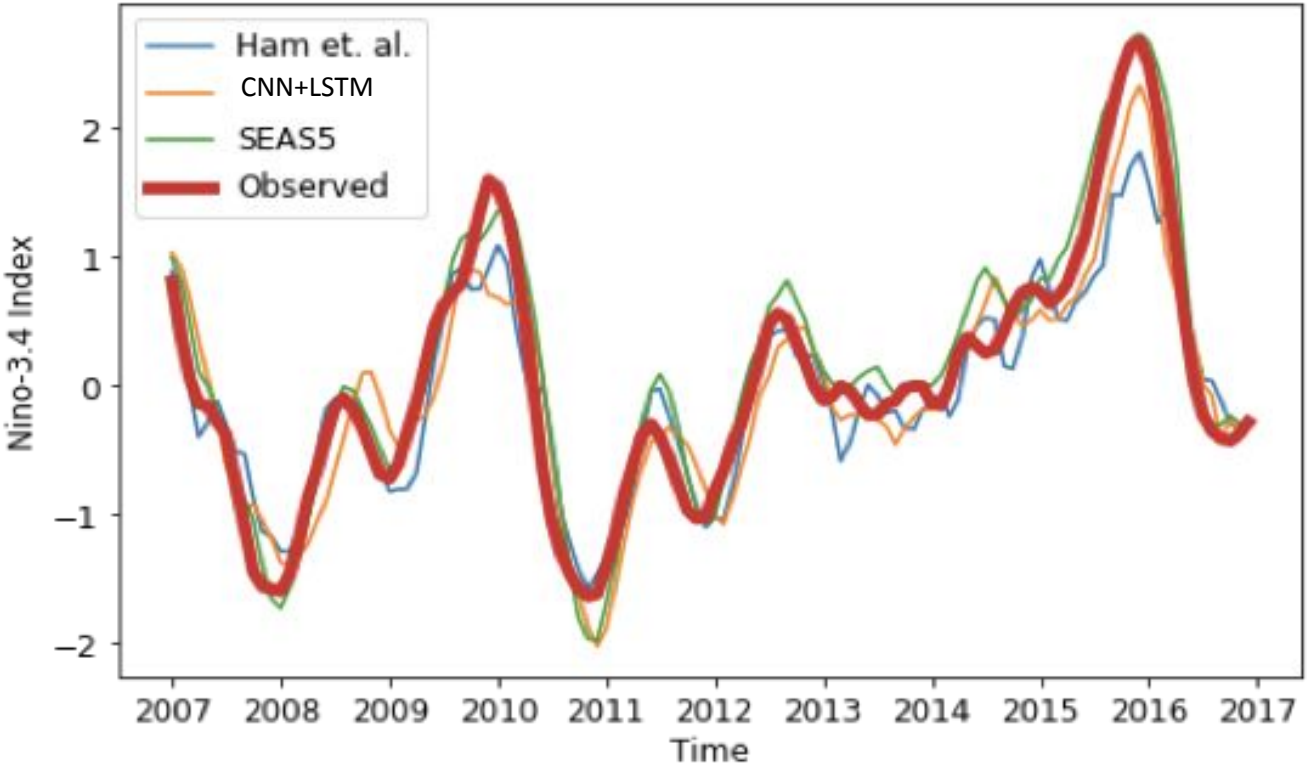
Source: NASA

Target Data:



Source: Columbia University

What might the forecasts look like? (4 month lead time)



SEAS5: seasonal forecasting model from ECMWF:
CNN+LSTM: a deep learning architecture designed to learn from spatial and time series data