Using Causal Precursors to Predict Moroccan Crop Yield

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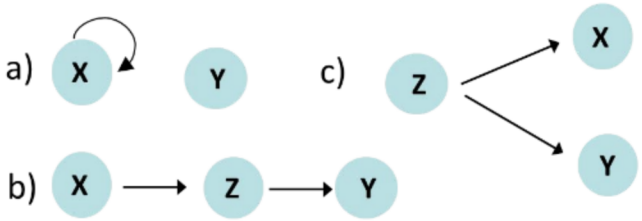
Motivation: Causal Discovery Techniques

Correlation ≠ Causation

Spurious correlations due to
a) Autocorrelation
b) Indirect linkss
c) Common drivers



Causal discovery algorithm

- Identifies spurious correlations amongst a set of time-series
- Step-wise tests for *conditional* independence
- No "black box" approach
- Causal drivers should be best predictors

Runge et al. (2012a, 2012b, 2014, 2017)
Kretschmer et al. (2016, 2017)

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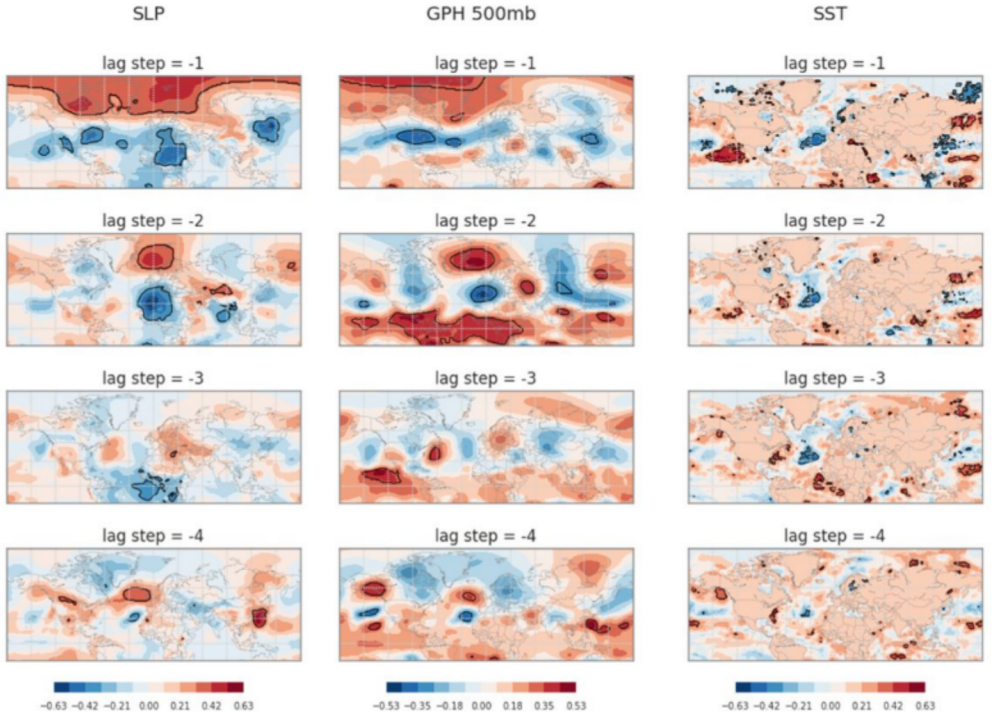
Response-Variable: Morocco Yield (1980-2015)

Identify Precursors (239 regions)



Causal Discovery Step

Causal Precursors

a) SLP in December

b) SLP in September

c) SSTs in September

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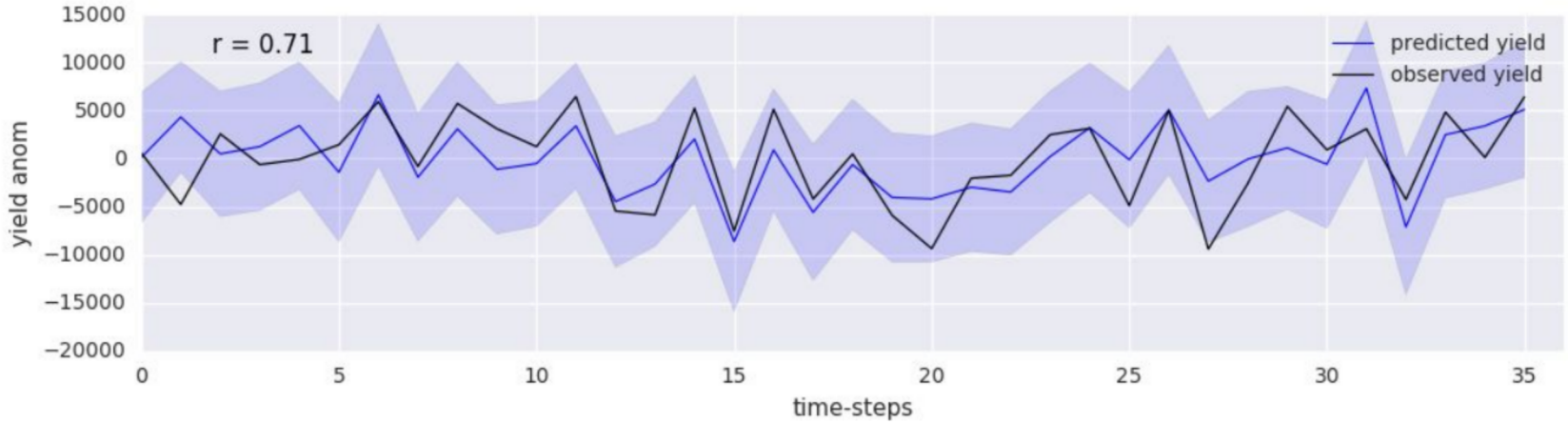
Preliminary Results

Out of sample predictions:



Thank You!

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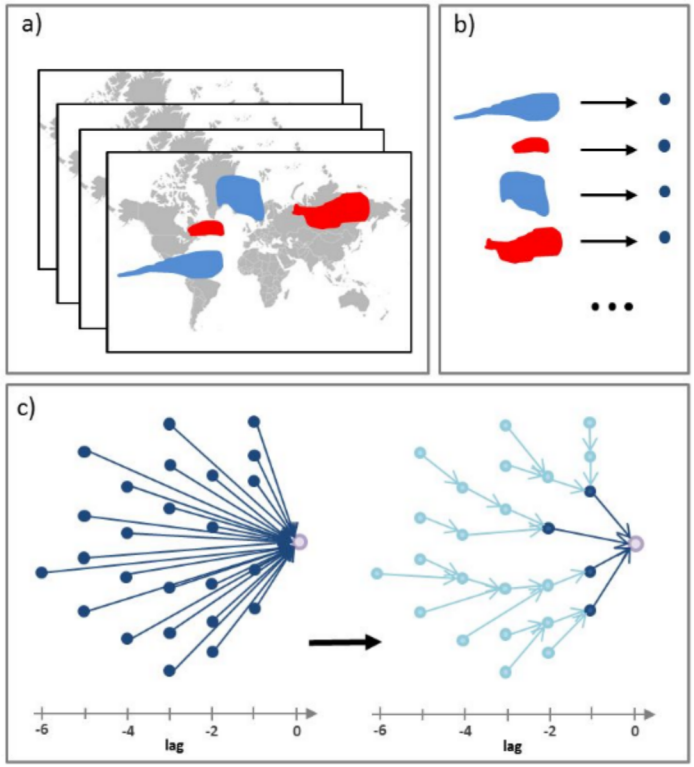
Response-Guided Causal Precursor Detection (RG-CPD)



a) Detect regions in multi-variate data which correlate positively (red) or negatively (blue) with the response variable at different lags

b) Take area-weighted averages of all regions creating time-series of precursors.

c) A causality test removes all non-causal links due to common drivers, auto-correlation or indirect links.

Kretschmer et al., GRL (2017)

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