Deconstruction of a science paper's data-evidence basis

Brian Mapes, Jan 22, 2018

MPO 624

Spring 2018

My Paper

- Title, citation
  - A Study of Links Between the Arctic and The Midlatitude Jet-stream Using Granger and Pearl Causality
    - » Savini Samarasinghe[1], Marie C. McGraw[2], Elizabeth A. Barnes[2] and Imme Ebert-Uphoff[1*]

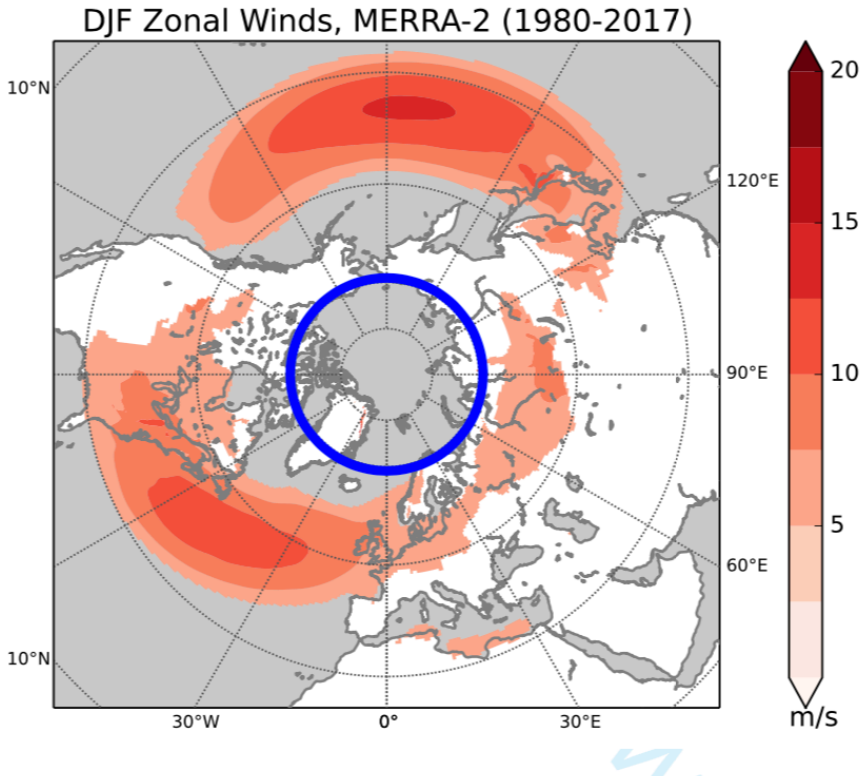
- Size of evidence set:
  - 4 figures (plus 2 in supplement), 0 tables
  - ? magic-number (in-text) results

Instructions

1. Copy each figure, table, or # into a slide of this powerpoint
2. Categorize it according to the list at EVIDENCE_TYPES.md on the course repo
3. If none of those categories quite fit, expand EVIDENCE_TYPES.md in your fork, and make a pull request! Try to follow the outline there, to keep our ideas compact and coherent. I may suggest edits before final PR acceptance.
4. Finally, paste the Abstract on a last slide here. Annotate it with little figure thumbnails connected to each claim or account of nature, to show how those are rooted in the figures (and thus in data).

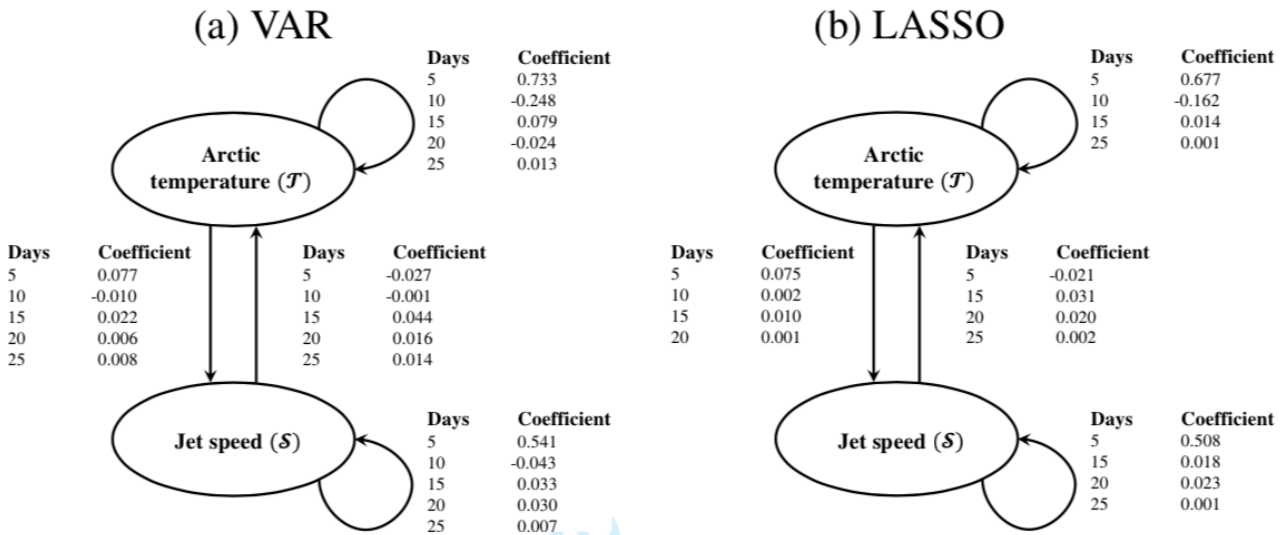
5. Put your .pptx in your fork of the class repo, sync with your Web fork, and make a Pull Request!

Figure 1



- "summary display of raw data"
  - a DJF mean is a statistic, a form of summary
- It also functions as a base map and guide

Figs 2,3



- This figure is a claim of relationship(s)
  - Causality interpretation is claimed

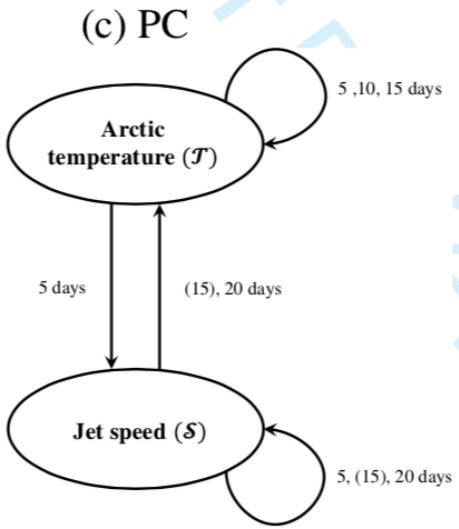


Figure 2: Arctic temperature ($\mathcal{T}$) and jet speed ($\mathcal{S}$) relationships as described by (a) VAR ($p = 5$), (b) LASSO ($\lambda = 0.0179, p = 5$) and (c) PC (11 time slices, $\alpha = 0.05$) models. Parentheses in PC results denote weak relationships.

Figs 2,3

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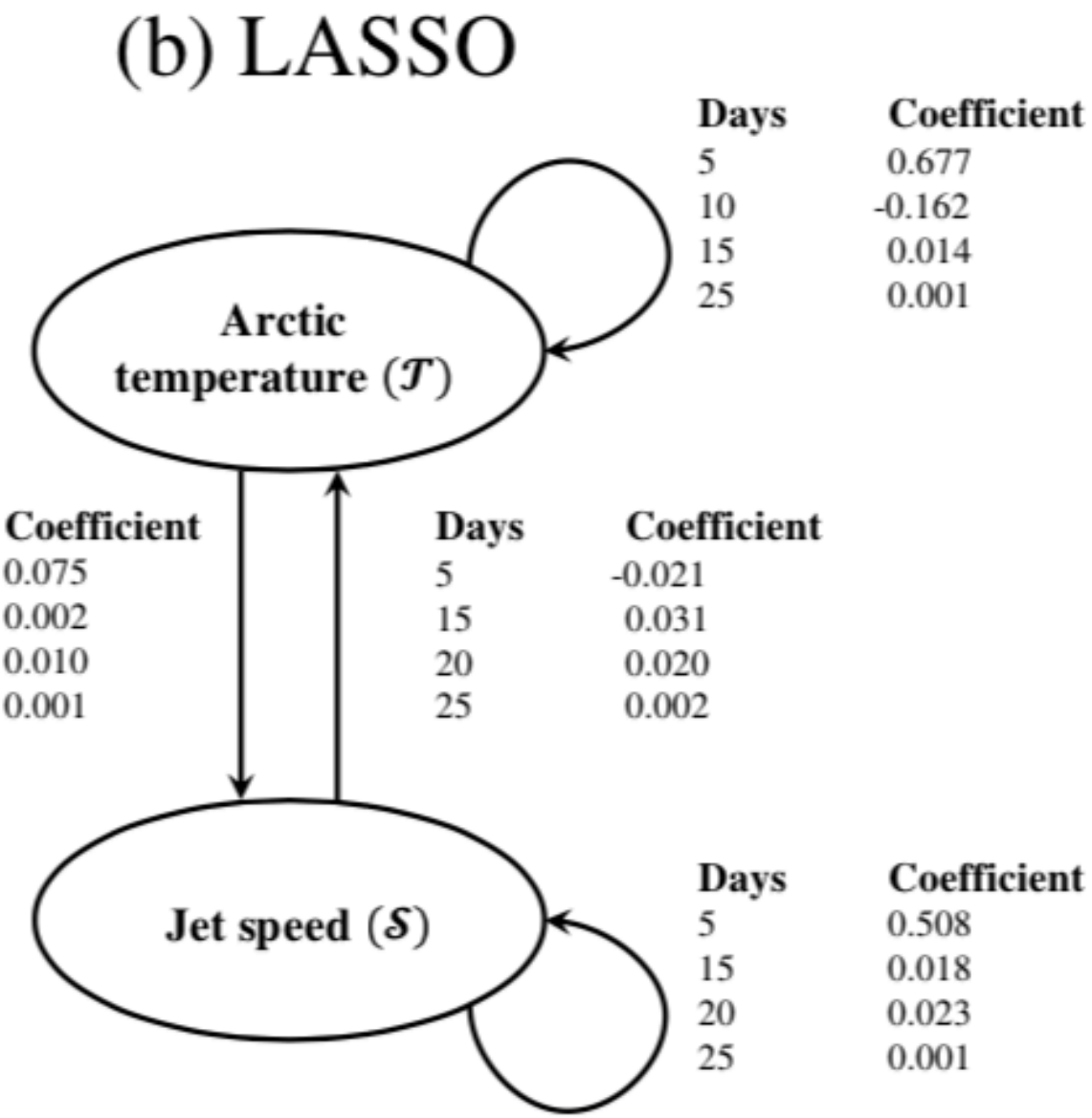


Fig 4

- This figure is a schematic
  - summarizes meaning of other figures

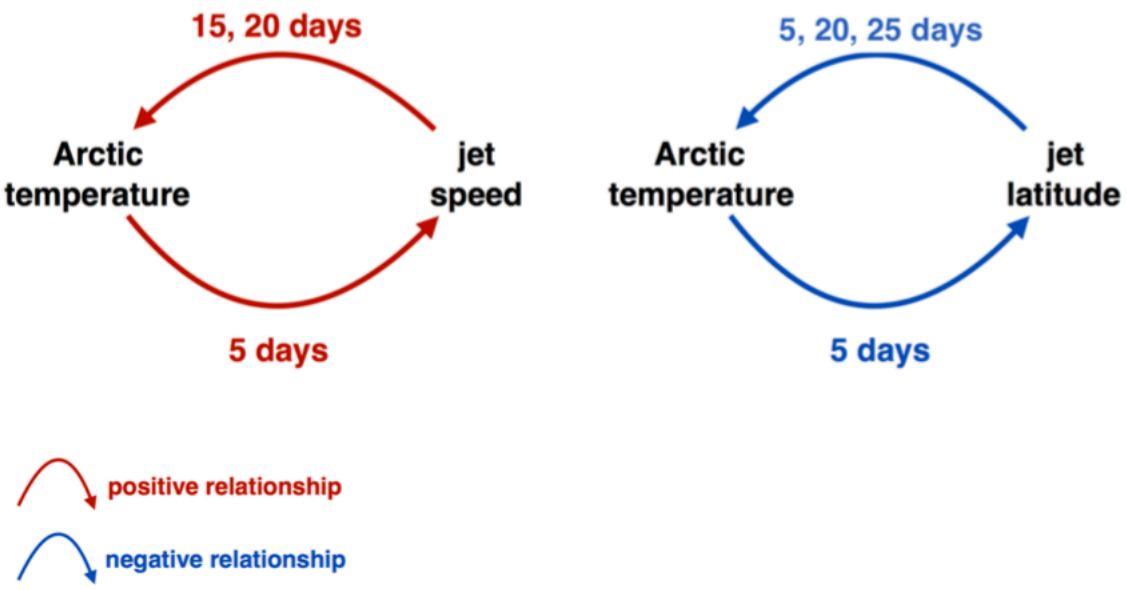
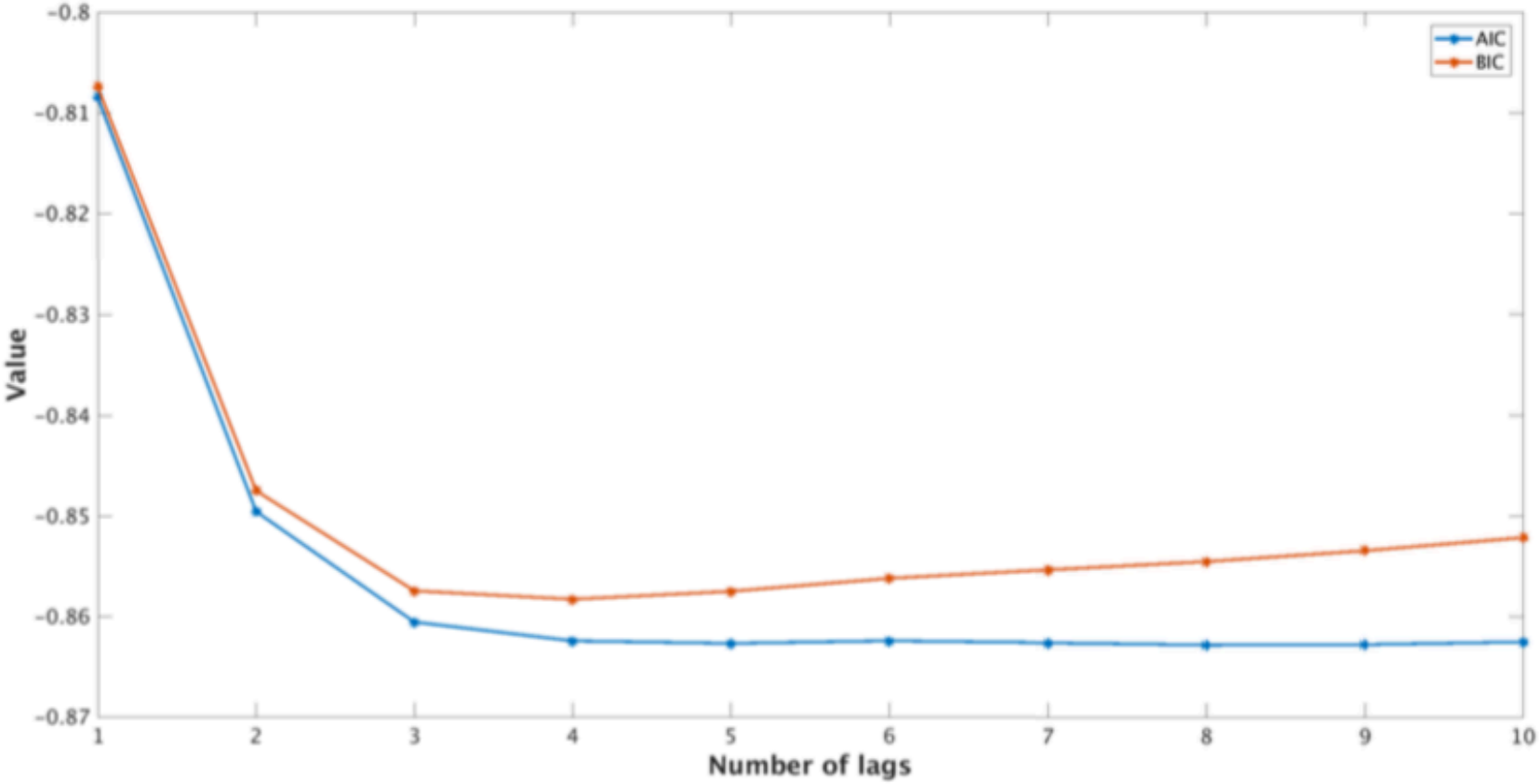


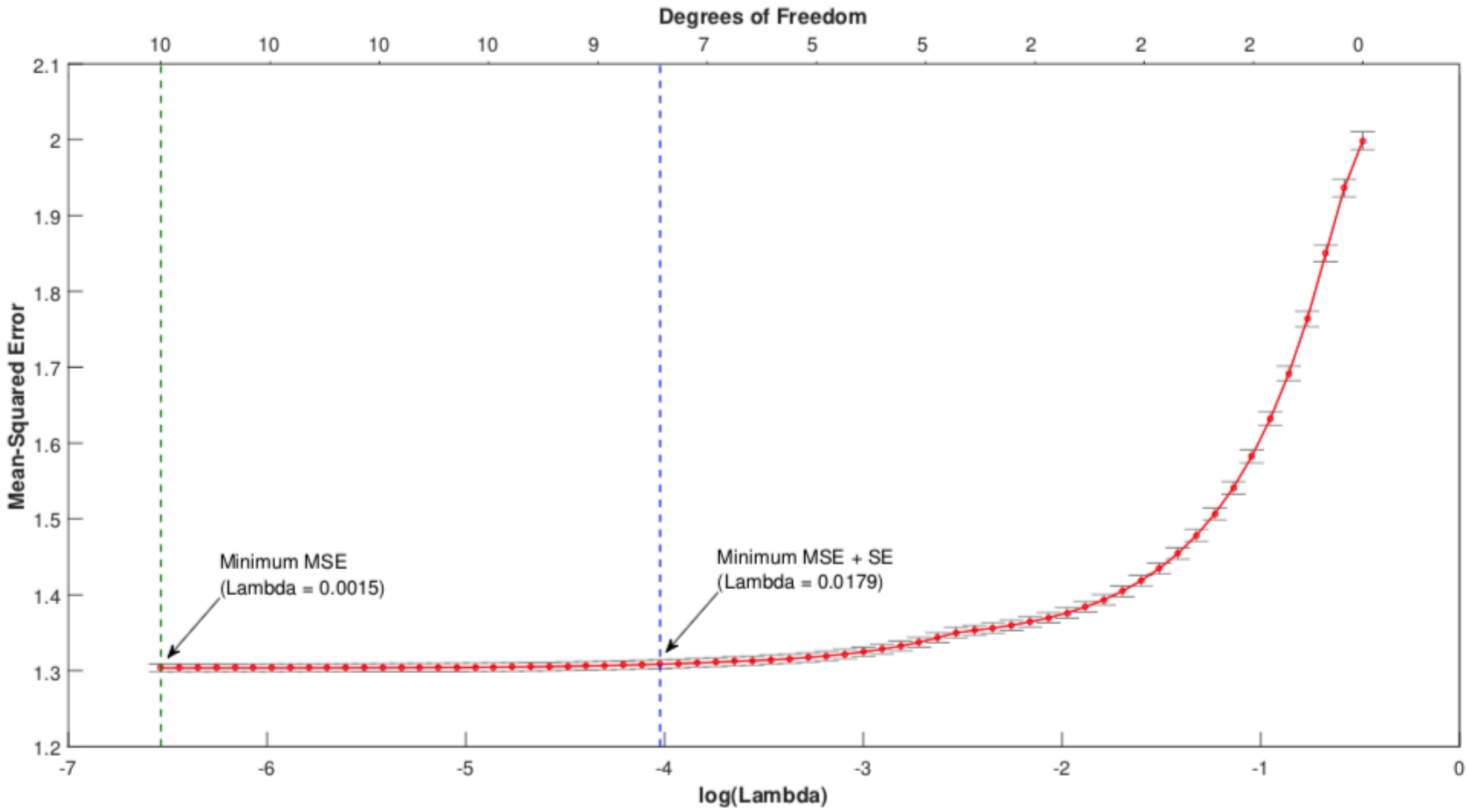
Figure 4: Minimalist graphs showing the dominant feedback loops and their time lags identified by all three methods when applicable. Note that the two positive relationships between arctic temperature and jet speed result in a positive (i.e. reinforcing) feedback loop. Similarly, the two negative relationships between arctic temperature and jet latitude together also result in a positive feedback loop.

Figure S1



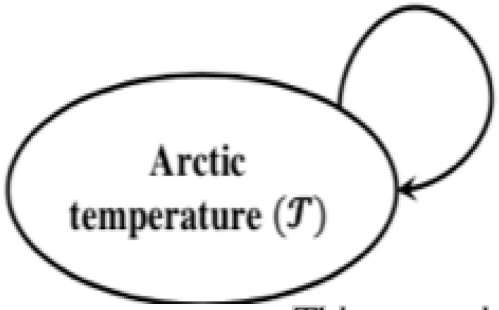
- This figure *claims similarity* of red and blue
- It also claims a feature: leveling out at “3-5”

Figure S2

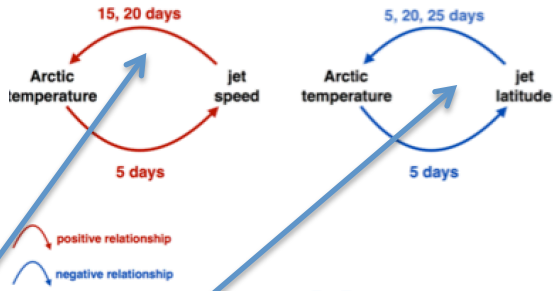


- This figure claims a feature (flatness between green and blue lines), justifying truncation (simplification) choices in a statistical modeling exercise.

The Abstract, and how figures support its claims



Days	Coefficient
5	0.677
10	-0.162
15	0.014
25	0.001



Abstract

This paper investigates causal links between Arctic temperatures and the jet-streams. We apply two different frameworks for this application based on the concepts of (1) *Granger causality* and (2) *Pearl causality*. Both methods show that Arctic temperature and jet speed and position all exhibit strong auto-correlation, but also that these variables are linked together by two robust positive feedback loops that operate on timescales of 5-25 days. The dynamical implications of these feedbacks are discussed. This study is only the beginning of a larger effort to apply and compare different causality methods in order to gain a deeper understanding of the causal connections between the Arctic and weather at lower latitudes.