Dissertation Proposal **NOTES**

Proposed Title

Time Series Causality with Applications in Space Weather

Topic Overview

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Proposed Table of Contents

1. Introduction
   (a) Brief history of the causality studies
   (b) Causality studies occur in many different fields including philosophy, physics, artificial intelligence, statistics, signal analysis, graph theory, and econometrics. How are these fields split regarding techniques and terminology?
   (c) Try to group the field into "causality foundations", "statistical causality", "probabilistic causality", and "time series causality". The terms appear confusingly redundant, but it may be worthwhile to try to explain their use within the field.
   (d) Where does this work fit into the scheme described above? Answer: time series causality; i.e. dealing with the fact that correlation is not causation in existing data sets.
2. Time Series Causality (TSC) Background
   (a) Basic assumptions
   (b) Granger causality
   (c) Transfer entropy
   (d) Equivalence of Granger causality and transfer entropy (under assumptions of Gaussian noise)
   (e) Pairwise asymmetric inference
3. Proposed TSC Algorithm
   (a) ...
4. Applications of Proposed TSC Algorithm
   (a) ...