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## High-Dimensional Granger Causality for Climatic Attribution

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We use the framework of Granger-causality testing in high-dimensional vector autoregressive models (VARs) to disentangle and interpret the complex causal chains linking radiative forcings and global as well as hemispheric temperatures. By allowing for high dimensionality in the model we can enrich the information set with all relevant natural and anthropogenic forcing variables to obtain reliable causal relations. These variables have mostly been investigated in an aggregated form or in separate models in the previous literature. An additional advantage of our framework is that it allows to ignore the order of integration of the variables and to directly estimate the VAR in levels, therefore avoiding accumulating biases coming from unit-root and cointegration tests. This is of particular appeal for climate time series which are often argued to contain specific stochastic trends as well as yielding long memory. We are thus able to display the causal networks linking radiative forcings to global and hemispheric temperatures but also to causally connect radiative forcings among themselves, therefore allowing for a careful reconstruction of a timeline of causal effects among forcings. The robustness of our proposed procedure makes it an important tool for policy evaluation in tackling global climate change.