

EGU24-8450, updated on 11 Oct 2024

<https://doi.org/10.5194/egusphere-egu24-8450>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## Many shades in three dimensions and parallel universes of causality analysis

**Milan Palus**

Czech Academy of Sciences, Institute of Computer Science, Prague 8, Czechia (mp@cs.cas.cz)

Many approaches to infer causal relations from time series in Earth sciences have been proposed and applied in order to identify diverse interactions, such as the influence of large-scale circulation modes on local temperature and precipitation, variability of Euroasian winters due to changing Arctic Sea ice cover, or interactions of solar activity and interplanetary medium conditions with the Earth's magnetosphere-ionosphere systems. The methods usually depend on "dimensions" in which the understanding of underlying phenomena is located: The phenomena or processes can be linear or nonlinear; deterministic, or random. The third abstract "dimension" is the actual dimensionality of the problem, given either by the dimension of the state space of the underlying mechanism or the number of involved variables. We will conduct a short flight inside these "dimensions," shedding light on some of the shades, comparing some of the causality inference methods using model and real data from the Earth sciences.

This study was supported by the Czech Academy of Sciences, Praemium Academiae awarded to M. Paluš and the Czech–Chinese Academies of Sciences Mobility Plus Project NSFC-23-08.