

February/March 2022 - [Seminar series at Meteorological Institute](#) of **Hamburg** University;  
15 February 2022; 14:15, online

Hans von Storch

*Noise - nuisance and constitutive -*

“Noise”, i.e., unprovoked variability in the climate system, is a ubiquitous component of the system’s dynamics. As such, when looking after the effect of something deterministic, be it the effect of a change in a model configuration, or the co-variability of different phenomena, is obscured by the presence of variations unrelated to the sought-after “signal”. Luckily, these variations in systems like climate, atmosphere, and ocean may be conceptualized as being stochastic, i.e., under the rule of a mathematical construct. Thus, statistical analysis is often a suitable tool to deal with this “nuisance”.

On the other hand, noise is not a mere nuisance but a constitutive element – i.e., the system would behave differently if there would be no noise. This is well described by Hasselmann’s “stochastic climate model”, which has been highlighted as one of the Nobel prize-winning achievements – the process, which generates long-term variations in an inert system forced by short-term variations - “smoke without fire”!

The concept of is a prerequisite of dynamical modelling climate, atmosphere, and ocean – namely that in the spirit of Hasselmann’s PIP concept the effect of most processes on the resolved dynamics can be summarized as stochastic slaves conditioned by the resolved state.

von Storch, H., J.-S. von Storch, and P. Müller, 2001: [Noise in the Climate System - Ubiquitous, Constitutive and Concealing](#). In B. Engquist and W. Schmid (eds.) [Mathematics Unlimited - 2001 and Beyond](#). Part II. Springer Verlag, 1179-1194