

Noise in the climate system – ubiquitous, constitutive and concealing

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The concept and role of noise in climate sciences is reviewed and discussed.

The variability we call „Noise“ is ubiquitous in the climate system. It prevails on all scales and is caused by myriads of nonlinear mechanisms. Whether this noise is really random or if we are unable to disentangle the deterministic dynamics behind the seemingly erratic behaviour, is really irrelevant. To conceptualize the noise as random is a –most useful- mathematical construct.

Noise has two major roles in climate science, namely a constructive and a destructive role. The former role is to change the dynamics of the climate system – the mean circulation would be different if there were no storms; the storms were different if there were not convective cells, just to mention two examples. The destructive role is to hinder the identification of externally forced signals (and the utility of forecasts), and the attribution of anomalies to specific causes.

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