

# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme

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Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

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## Are Modern Concepts of Complex Systems Science Useful for Earth Sciences?

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### Abstract

The application of methods of complex systems science has a rich tradition in Earth sciences and has enabled substantially new insights into various complex processes there. However, some approaches and findings have been controversially discussed over the last decades. One reason is that they are often basing on strong restrictions and their violation may lead to pitfalls and misinterpretations.

Here, we discuss three general concepts of complex systems science: synchronization, recurrence and complex networks and explain that they can be indeed useful for better understanding of basic phenomena as rainfall extremes in monsoonal climates or to detect paleoclimate-variability transitions which are related to human evolution.