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Nonlinear phenomena in the complex Earth system

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Abstract– Global warming, extreme climate events, earthquakes and their accompanying natural disasters pose significant risks to humanity. Yet due to the nonlinear feedback, multiple interactions and complex structure of the Earth system, the understanding and in particular the predicting of such disruptive events represent formidable challenges for both scientific and policy communities. During the past years, the emergence and evolution of Earth system science has attracted much attention and produced new concepts and frameworks. Especially, novel statistical physics and complex networks-based techniques have been developed and implemented to substantially advance our knowledge for a better understanding of the Earth system. I will present a brief review on the recent scientific progress in the development and application of how combined statistical physics and complex systems science approaches can be applied to complex Earth systems.