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Extremes for high dimensional chaotic systems

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Extremes are related to high impact and serious hazard events and hence their study and prediction have been and continue to be highly relevant for all kind of applications in geoscience and beyond. Extreme value theory is promising to be able to predict them reliably and robustly. In the last fifteen years the classical extreme value theory for stochastic processes has been extended to dynamical systems and has been related to properties of physical measure (statistical properties of the system), return and hitting times. We will review what one can say for highly dimensional perfectly chaotic systems. We will concentrate on relations between the index of the extreme distribution and invariants of the underlying dynamical system which are stable, in the sense that they will continuously depend on changing parameters in the dynamics. Furthermore, we explore whether there exists a response theory for extremes, that is, whether the change of extremes can be quantitatively expressed in terms of changing parameters.