EGU24-11997, updated on 19 Jan 2025
https://doi.org/10.5194/egusphere-egu24-11997
EGU General Assembly 2024

Extreme events in a templex

Gisela Daniela Charó[1,2,3], Davide Faranda[3,4,5], Michael Ghil[5,6,7], and Denisse Sciamarella[2,8]
[1]Universidad de Buenos Aires, Centro de investigaciones del mar y la atmósfera, Buenos Aires, Argentina (gcharo@fi.uba.ar)
[2]CNRS-IRD -CONICET-UBA, Instituto Franco-Argentino para el Estudio del Clima y sus Impactos (IRL 3351 IFAECI), C1428EGA, Buenos Aires, France
[3]Laboratoire des Sciences du Climat et de l'Environnement, UMR 8212 CEA-CNRS-UVSQ, IPSL & Université Paris Saclay, 91191 Gif-sur-Yvette, France
[4]London Mathematical Laboratory, 8 Margravine Gardens, London W6 8RH, UK.
[5]Laboratoire de Météorologie Dynamique, IPSL, École Normale Supérieure, PSL Research University, Sorbonne Université, École Polytechnique, IP Paris, CNRS, 75005 Paris, France
[6]Department of Atmospheric & Oceanic Sciences, University of California, Los Angeles, California 90095-1565, USA.
[7]Departments of Mathematics and of Finance, Imperial College London, London SW7 2AZ, United Kingdom
[8]Centre National de la Recherche Scientifique, 75794 Paris CEDEX 16, France

Theoretical and numerical studies have shown that transient atmospheric motions leading to weather extremes can be classified through the instantaneous dimension and stability of a state of a dynamical system [Faranda et al., Sci. Rep., 2017]. The asymptotic values of these quantities can be computed theoretically only for specific systems, while their numerical counterpart for climate observables provides information on the rarity, predictability, and persistence of specific states. In this work, we present a first attempt to relate the presence of extreme events with the elements that make up a templex of the system under study, both in the deterministic [Charó et al., Chaos, 2022] and stochastic frameworks [Charó et al., Chaos, 2023]. The templex provides the key characteristics of the topological structure underlying a dynamical system. This work will present results for the classical, deterministic Lorenz [JAS, 1963] attractor and for the Lorenz Random Attractor, dubbed LORA [Ghil & Sciamarella, NPG, 2023].