



Event Attribution of Climate Changes with Dynamically driven-Stochastic Weather Generators

Sheng Chen, Davide Faranda, and Mathieu Vrac

Laboratoire des Sciences du Climat et de l'Environnement (LSCE-IPSL, CNRS), Centre d'Etudes de Saclay, Orme des Merisiers, 91190 Gif-sur-Yvette, France (sheng.chen@lsce.ipsl.fr)

This study combines Stochastic Weather Generators (SWG) and dynamical system theory to perform event attribution analyses. We present a statistical framework to construct daily SWGs of temperature and precipitation conditioned on the atmospheric circulation. The dynamics of the large-scale mid-latitude flow is projected onto state-dependent dynamical indicators such as the so-called local dimensions and the local persistence. This information is used by the statistical model to obtain Dynamically driven-Stochastic Weather Generators (DSWG). Those have been used to perform the event attribution of climate changes conditioned by specific dynamics information. The attribution of extreme events requires the definition of a factual (*resp.* counterfactual) world with (*resp.* without) anthropogenic emission. The advantage of using a daily SWG is that the relative change between the factual and counterfactual worlds is such that the fraction of attributable risk (FAR) or the changes in the intensity (ΔI) can be expressed as an instantaneous daily value conditioned on the chosen predictors. As a first study, we focus on the attribution of temperature and precipitation events in the urban areas of Paris, Madrid, and Stockholm and we discuss how the atmospheric dynamics can affect the interpretation of extreme events attribution.