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False Spring over Europe: risk and uncertainties

Raul Zurita-Milla¹, Rens Vermeltfoort², Serkan Girgin¹, and Emma Izquierdo-Verdiguier³

¹Faculty ITC, University of Twente, Enschede, the Netherlands (r.zurita-milla@utwente.nl)

²Faculty of Geosciences, Utrecht University, Utrecht, the Netherlands

³Institute of Geomatics, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria.

Understanding the impact of the climate crisis on our planet, and hence, on human and natural life, is a pressing but challenging scientific endeavor. Phenological studies help to build such an understanding by analyzing changes in the timing of biological events. Such changes are, in turn, linked to changes in the likelihood of experiencing false springs. Here we examine the risk and uncertainty of false springs over Europe using the extended spring indices models and the E-OBS weather dataset (1950-onwards). False spring uncertainty is evaluated using the full ensemble of 100 daily weather realizations that accompany the E-OBS dataset. Smart computing is used to handle this relatively large amount of gridded data. Our results show that changes in false spring risk are heterogeneous in space, with increasing risks mostly found in the mid-latitudes and decreasing risks mostly found at high and low latitudes. From 1950 until 1979, there was a substantial increase in false spring risk, whereas the change in false spring risk from 1980 onwards is negligible. Our results also show that false spring uncertainty is highest in western Europe. These results highlight the importance of considering temperature uncertainty in phenological modeling, especially when examining the risk of false springs.