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Simulating droughts and associated building damages in France

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Droughts can cause substantial building damages by the shrinking and swelling of soils, and lead to costs as high as for floods in some regions. The large cost for society is contrasted by a general lack of concepts to assess the risk associated with drought-induced soil subsidence. Here, we present a pioneering study developing a methodology for the quantification and forecasting of this hazard. We use a meteorologically based model system to simulate damages from soil subsidence in France. Our results show that the model is capable of reproducing observed annual drought-induced building damages, thus suggesting a strong meteorological influence. Furthermore, our results reveal a doubling of damage costs in the recent years compared to 1961-1990, mainly as a consequence of increasing temperatures in combination with nonlinear responses to increasing soil moisture depletion. We will discuss the implications for damage forecasts and the development of effective preventive measures, especially in the context of global climate change.