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Can NWP help to improve seasonal predictions of extreme events? A summer 2003 case study

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Seasonal forecasting with a coupled model using analysed states of the atmosphere and ocean has been an operational activity at ECMWF for many years. The forecasting system for seasonal time scales is constructed in a somewhat seamless way with ECMWF's numerical weather prediction system by using a frozen version of exactly the same atmospheric and land-surface components of the model for both time ranges. Climate prediction a few months ahead can thus benefit largely from the continuous efforts to improve the model physics primarily for routine weather forecasts. On the other hand, diagnostics of the impact of changes to the model physics on longer coupled climate simulations provides an important feedback for further improving the model physics. As an example, we present here results from ensembles of seasonal re-forecast experiments of the record-breaking warm summer 2003 over Europe. While the current operational seasonal forecasting system, as most coupled and uncoupled GCMs, fails to indicate any relevant risk of an extreme heat wave in JJA 2003, latest developments in parameterising atmospheric deep convection and land-surface exchanges have a significant positive impact on the predictability of extreme European summer temperatures on time scales of a few months.