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Partial land surface emulator forecasts ecosystem states at verified horizons

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While forecasting of climate and earth system processes has long been a task for numerical models, the rapid development of deep learning applications has recently brought forth competitive AI systems for weather prediction. Earth system models (ESMs), even though being an integral part of numerical weather prediction have not yet caught that same attention. ESMs forecast water, carbon and energy fluxes and in the coupling with an atmospheric model, provide boundary and initial conditions. We set up a comparison of different deep learning approaches for improving short-term forecasts of land surface and ecosystem states on a regional scale. Using simulations from the numerical model and combining them with observations, we will partially emulate an existing land surface scheme, conduct a probabilistic forecasts of core ecosystem processes and determine forecast horizons for all variables.