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Simulated future changes in ENSO dynamics in the framework of the linear recharge oscillator model

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This study analysed the changes El Nino Southern Oscillation (ENSO) dynamics as they are simulated in 25 models of the CMIP5 simulations for the RCP8.5 scenario relative to the historical control simulation. The ENSO linear recharge oscillator (ReOsc) framework is used to focus on changes in the growth rate of T and h, the coupling between the two and the noise forcing driving the ENSO variability. We further focused on the feedbacks controlling the growth rate of T, namely the Bjerknes wind- SST, the atmospheric net heat flux and the residual oceanic feedback. We find significant changes in nearly all of these important elements of the ENSO dynamics, despite the fact that the ensemble shows very little changes in the overall ENSO variability. The growth rate of T weakens resulting from a combination of increased negative atmospheric net heat flux feedbacks, increased positive Bjerknes wind-SST feedback and increased residual oceanic feedbacks. Further notable changes are, an increase in the growth rate of h and a stronger coupling of T to h. Sensitivity analysis of the ReOsc model can explain why these strong dynamical changes lead to effectively no changes in the overall ENSO variability, but are likely to affect the predictability of ENSO.