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Carbon sink strength in an Artic rich fen is driven by primary production and leaf area.

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Arctic peatlands harbor enormous stocks of carbon (C) owing to the imbalance between photosynthesis and respiration rates. The carbon stock has been exposed to a warming climate during the last century. The Arctic has warmed by three-quarters of °C during the recent decades, which is almost double the rate of global average. Although there is a wide range of studies on Arctic peatland C cycle, the factors behind the hot and cool moments of peatland C fluxes under warming climate are still a large source of uncertainty. We applied an intermediate complexity terrestrial ecosystem model (TEM) calibrated by a Bayesian model-data fusion framework at a weekly timestep with publicly available eddy covariance, earth observation, and in-situ datasets between 2014 and 2020. We found that the increasing C sink is forced by a steep trend in leaf area index, leaf lifespan, and GPP accompanied by a modest rise of ecosystem respiration (Reco). Relative to 2014, GPP and net primary production (NPP) almost doubled by 2017, transforming the peatland from a C source to a sink.