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Abstract

We used two simulation models to examine the importance of directional changes in climate to the dynamics of sand grasslands in Hungary. We used an individual plant-based model (ECOTONE) to evaluate the effects of climate change on aboveground biomass of three sand grasslands located along an aridity gradient. Increases in temperature led to an small increase in biomass whereas decreases in precipitation led to decreases in biomass. None of the climate scenarios resulted in shifts in dominance between *Stipa* and *Festuca* species. A small difference in climate between the two wetter, cooler sites resulted in a much larger difference in biomass. Because these differences are not observed in the field, other processes that may be affected by climate change, such as seedling establishment, may be important. We also used a daily time step soil water model (SOILWAT) to examine the effects of directional changes in climate on site water balance. We found that the same amount of precipitation is used more effectively by plants if it comes in fewer big events compared to many small events. Consequently, a dry year has severe effects on plant growth both due to small amounts as well as to the distribution of rainfall events since most events are small and less effective. Furthermore, if changes in climate shift to a decrease in precipitation, there may also be a shift in the distribution of rain events to small events that will have a disproportionate effect on the vegetation.