Submitted Abstract

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Abstract

Mountain grasslands are exposed to multiple global changes, which can cause significant phenological shifts. While the individual effects of elevated CO2, climate warming and drought events on grassland phenology have been studied to some degree, understanding of the interactive effects of these global change drivers is still limited. In a multifactor global change experiment on a managed montane grassland typical for many parts of the Alps, with 3 periodic cuts (end of May, July, and September), we tested the individual and combined effects of elevated CO2 (eCO2; +300 ppm), warming (eT; +3°C) and severe summer drought on canopy- and species-level phenology. We classified the data into 4 growing periods based on the cuts and derived the canopy-level phenological transition dates from Green Chromatic Coordinates (GCC) time series calculated from phenocam images. On weekly basis field phenological observations were conducted to monitor species-specific phenological shifts under different treatment conditions using BBCH codes. Our preliminary findings show that warming, both individually and when combined with elevated CO2, led to early green-up, while summer drought, both under ambient conditions and when combined with warming and elevated CO2, advanced senescence. Across all global change treatments non-leguminous forbs expressed earlier green-up and earlier senescence in comparison to grasses and legumes, though effects were also strongly driven by species identity. Overall, our first findings suggest distinct non-additive effects of interacting global change drivers on the phenology of mountain grassland.