Submitted Abstract

ID IMC22-FSAbstr- 627

First Author First Name Last Name	 Patrick Möhl
Submitting Author First Name Last Name	 Patrick Möhl
Correspondence	p.moehl@unibas.ch
Co-Authors **>> E-Mails will be not listed**	Hiltbrunner, Erika
Organisations	University of Basel, Department of Environmental Sciences, Switzerland
Country	Switzerland
Region	Western Europe
Title	Above- And Belowground Growth Phenology Of Alpine Grassland Is Internally Controlled And Does Not Extend Into A Longer Growing Season.
Keywords	Growth Phenology, Snowmelt, Root Growth, Senescence, Rhizotron
Type	List Of Focus Session
Focus Session ID	61

Abstract

Temperate, alpine grassland is adapted to a short growing season of a few months, constrained by cold temperature and snow cover. Ongoing climate warming has advanced snowmelt and confronts alpine plants with a longer season. This may prolong and enhance plant growth above- and belowground. Here, we assess whether growth phenology of alpine grassland is altered when the natural season length (3–4 months) is artificially extended by two (+2m) to four months (+4m). Monoliths of alpine grassland dominated by Carex curvula were prematurely exposed to summer conditions in climate chambers and compared to vegetation experiencing natural snowmelt in situ (control versus +2m and +4m group). Growth and senescence were tracked with mini-rhizotron images (root length) and vegetation photographs (greenness) as well as with leaf elongation and withdrawal of Carex. Rhizotron images, captured through transparent tubes embedded in the soil, were segmented into roots and soil using machine learning. Greenness was calculated as the fraction of the green channel of the photographs. In each group, leaf elongation and aboveground greening started with the onset of growing conditions, and so did root growth, but delayed by 1–2 weeks. Aboveground tissues reached a maximum after 5–6 (community greenness) to 6–8 weeks (Carex leaf elongation). In the following, Carex was withdrawing the green part of its leaves and community greenness faded below 50% within 4–5 weeks, although greenness increased again towards autumn in +2m and +4m. Root growth peaked when aboveground greenness reached its maximum and was to 80% completed within 8–11 weeks after season start. Thus, despite more than doubling the growing season length, the additional summer days did not translate into any prolonged growth, neither above- or belowground. Our data suggest that growth and senescence of this grassland are controlled by internal signals that are tuned to the naturally occurring growing season length, with aboveground growth preceding belowground growth. A longer growing season under future climate change may therefore not prolong growth activity in this community but could foster species with a less strict phenology than Carex curvula.