

### Sp4. Oral

#### **Changes of flowering phenology in high mountain meadows: a long term study from Sierra Nevada**

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The high-mountain meadows (borreguiles) of Sierra Nevada (SE-Spain) are a high diverse ecosystem, which harbors a large number of endemic and threatened plant species. This ecosystem (included in the Annex-I of Habitats Directive) is very sensitive to changes in water availability and temperature, making it an interesting community to study the impacts of climate change in high mountains. The aims of this work were to determine long-term changes in: composition, abundance, and phenology of flowering of this ecosystem in Sierra Nevada. To achieve this, we sampled permanent plots (1 m<sup>2</sup>) in two periods: 1988-1990 and 2009-2013. The sampling was performed every 15 days during the free-snow season. Presence/absence data and abundance-coverage were recorded. We counted the number of individuals belonging to three phenophases: vegetative, flowering and fruiting. We classified each species into phenological groups: early, middle or late species. We analyzed changes in composition species and abundance between the two periods. For 19 species we assessed changes in phenological attributes (onset, end-date; duration and date of flowering peak) at community level and between phenological groups. Species composition and abundance did not show significant changes at community level between the two periods. Regarding phenology, we found a significant delay for all phenological attributes at community level. The flowering end-date showed the largest delay (+12.58 days). Analysis by phenological group showed that early species have significant delays for onset, end-date and date of flowering peak. On the other hand, late species did not show significant changes on their phenological attributes.