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Wide-ranged, highly disjunct, locally rare and severely endangered:

the challenging risk assessment and a global conservation strategy of *Erica sicula* Guss. sensu lato (Ericaceae)

Abstract

A global update on the knowledge related to the distribution, the ecology and the conservation status of the taxa belonging to the group of *Erica sicula* is provided. Despite its broad overall range area, this species, which probably represents one of the most ancestral members of the genus *Erica*, shows a strongly disjunct and fragmented distribution pattern and is subject to multiple threats facing continuous regression at the local scale. Data obtained from literature and herbarium specimens, in fact, testify that two of the three historic populations of subsp. *sicula* have disappeared from north-western Sicily. Equally alarming is the situation of subsp. *libanotica*; in Lebanon it only occurs in ten locations and is severely threatened by the growing impact of quarrying, urbanization, road and dam construction, whilst in Cyprus Island it is prone to the growing impact of goat overgrazing and fire. Further fieldwork is needed to better assess the demographic trend and the overall conservation status of *E. sicula* subsp. *libanotica* and subsp. *bocquetii* in southern Anatolia (Turkey) and of *E. sicula* subsp. *cyrenaica* in northern Libya. Moreover, genetic analyses should clarify the systematic value of the different taxa described in the Mediterranean Basin and help targeting future projects of in-situ and ex-situ conservation on the most unique and genetically rich populations.

Basic data + Material & methods

The geographic distances between the populations of the different taxa framed into this group are remarkable (900 km between SW Anatolia and N Libya, 1050 km between W Sicily and N Libya, 1600 km between W Sicily and SW Anatolia, 300 km between SW Anatolia and N Cyprus, 1050 km between SW Anatolia and Lebanon, 900 km between N Cyprus and Lebanon). To trace the past and present distribution and clarify the ecological requirements of the different heathers of the *Pentapera* group, we carefully analysed the information given in the vast scientific and horticultural literature concerning these taxa. We also consulted the national database of Turkish master and doctoral theses (looking for occurrence data concerning the Antalya district, and we created an inventory of the specimens kept in the European, Cypriot, Lebanese, Libyan and Turkish herbaria. As far as possible, the geographic coordinates were assigned to allow mapping both the literature records and the dry specimens. The risk assessment of *E. sicula* subsp. *libanotica* was performed both at the subspecies and the regional level, i.e., considering Lebanon, continental Turkey (Anatolia) and the Island of Cyprus as three separate units. The overall EOO of *Erica sicula sensu lato* (i.e., including all the related subspecies) exceeds 715'000 km², whilst the AOO is 144'000 km².



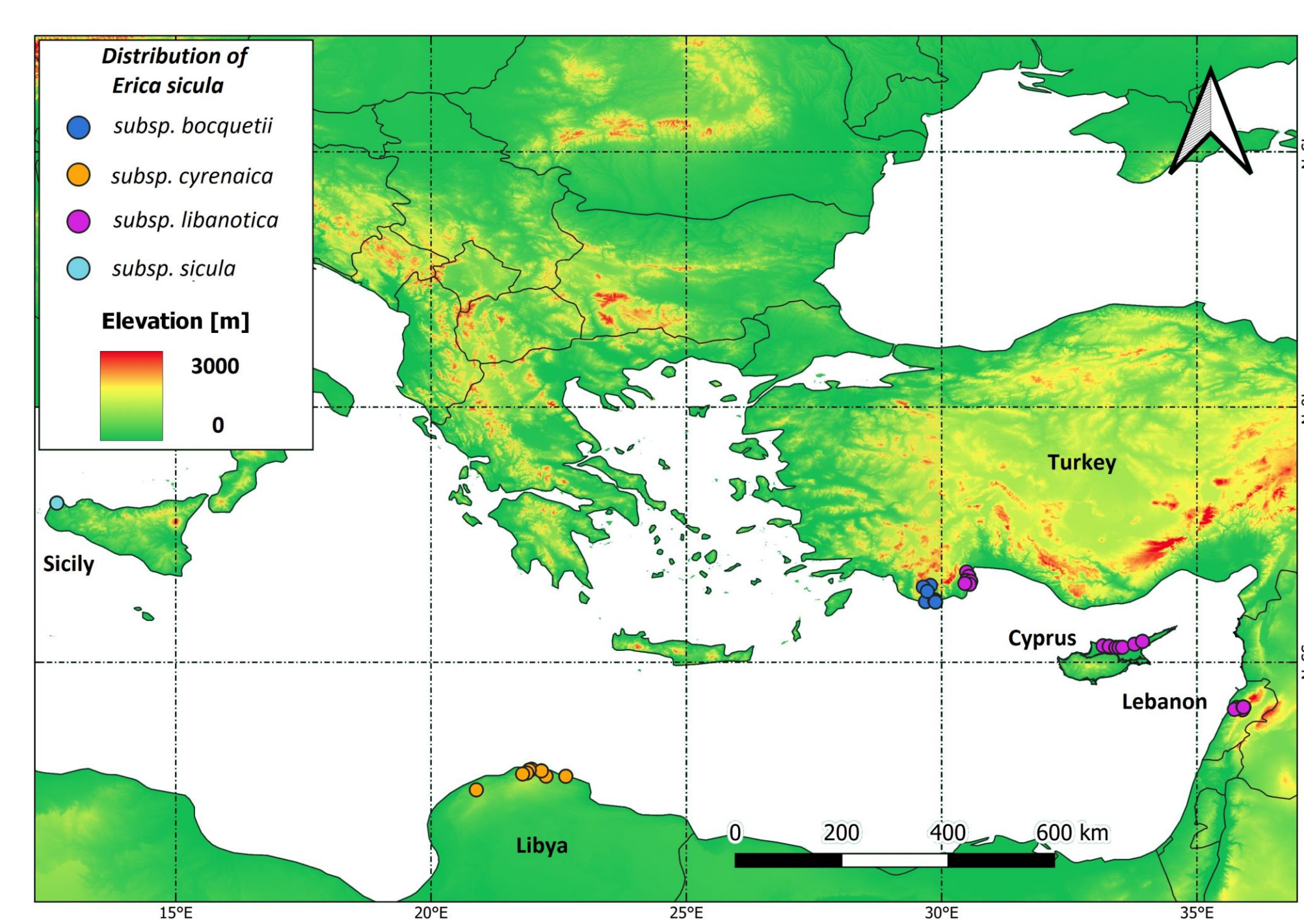
Habitat of *Erica sicula* subsp. *sicula* (photo: L. De Simone)



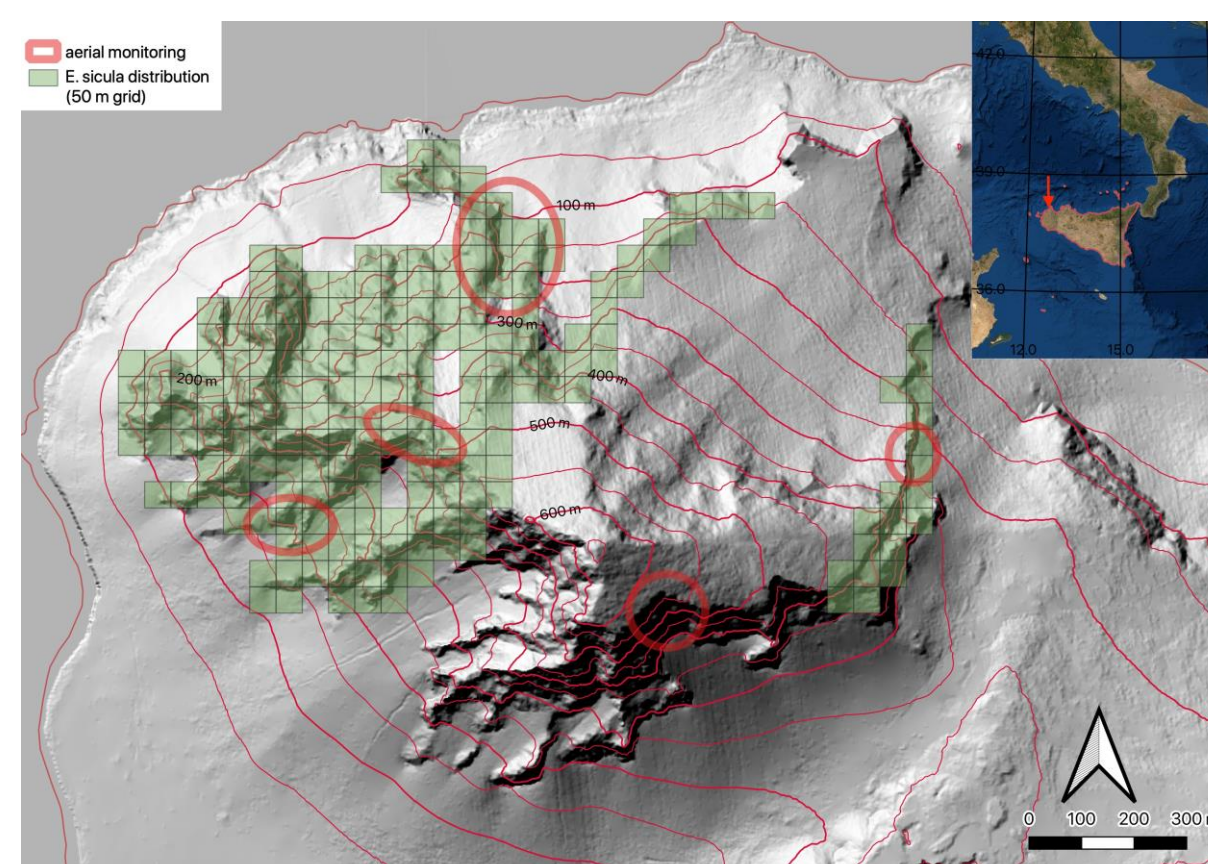
Erica sicula subsp. *sicula* at Monte Cofano, Sicily (photo: D. Salemi)



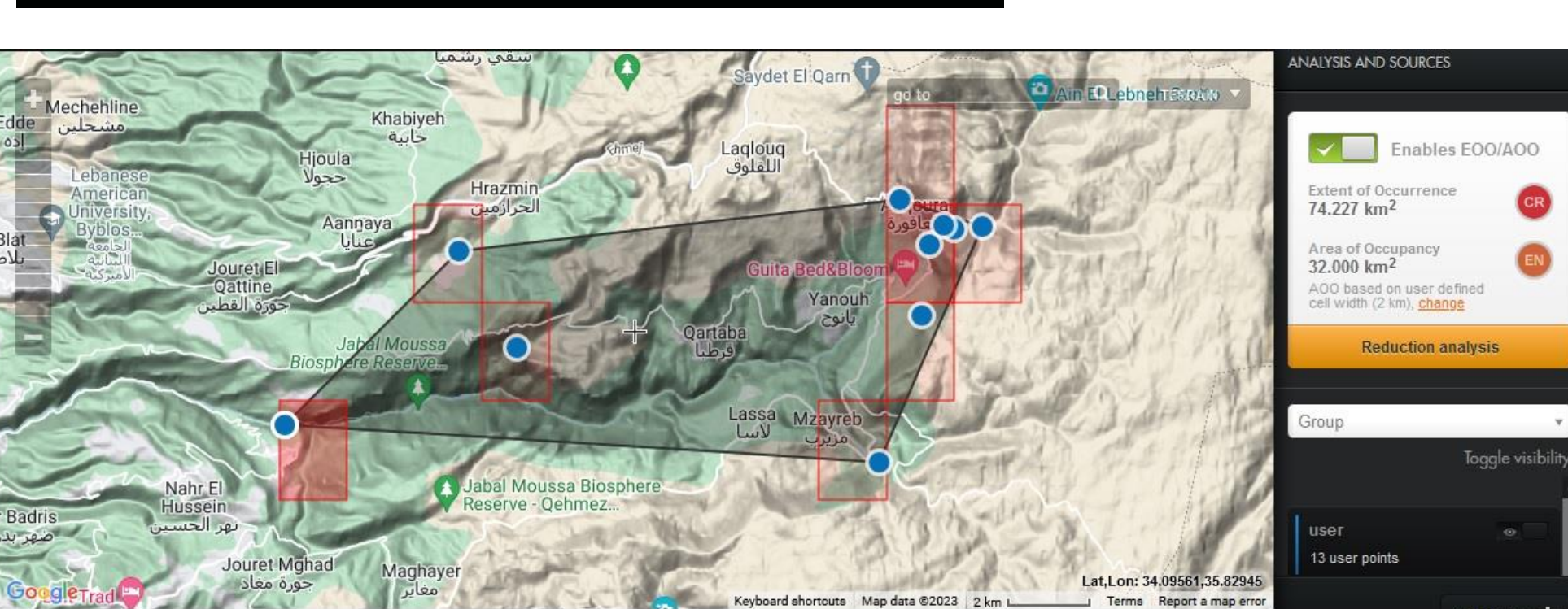
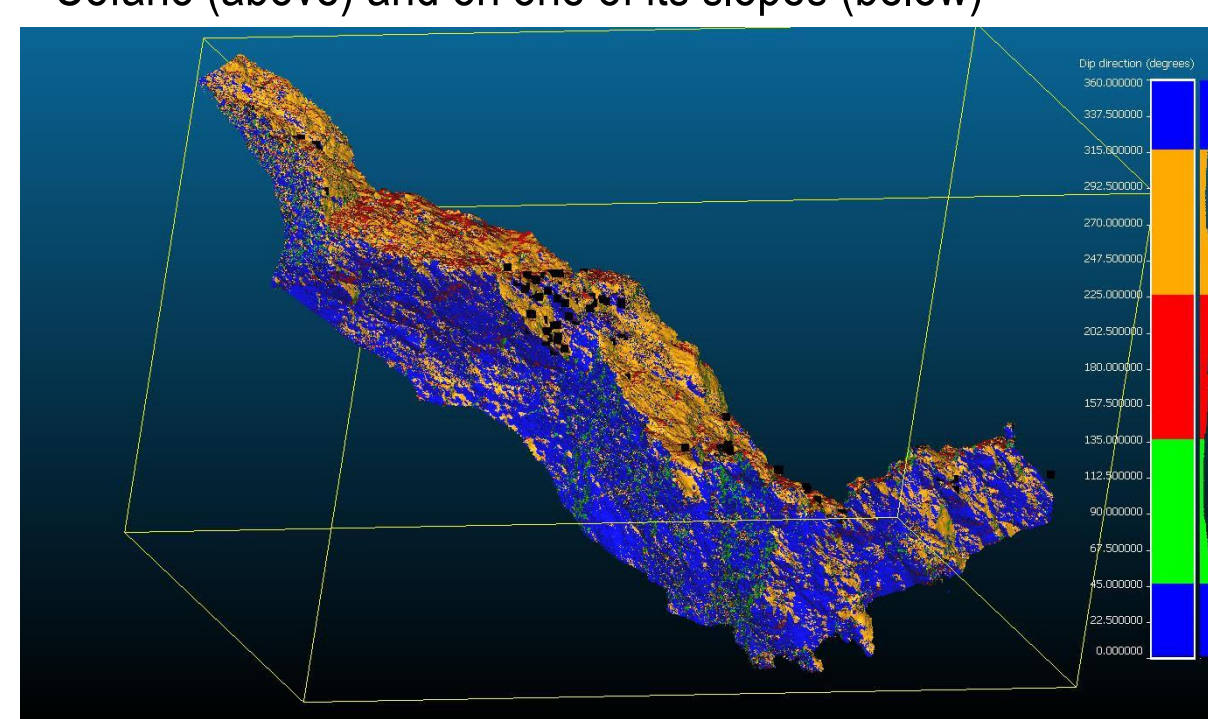
Erica sicula subsp. *libanotica* at Buffavento, Cyprus (photo: S. Cambria)



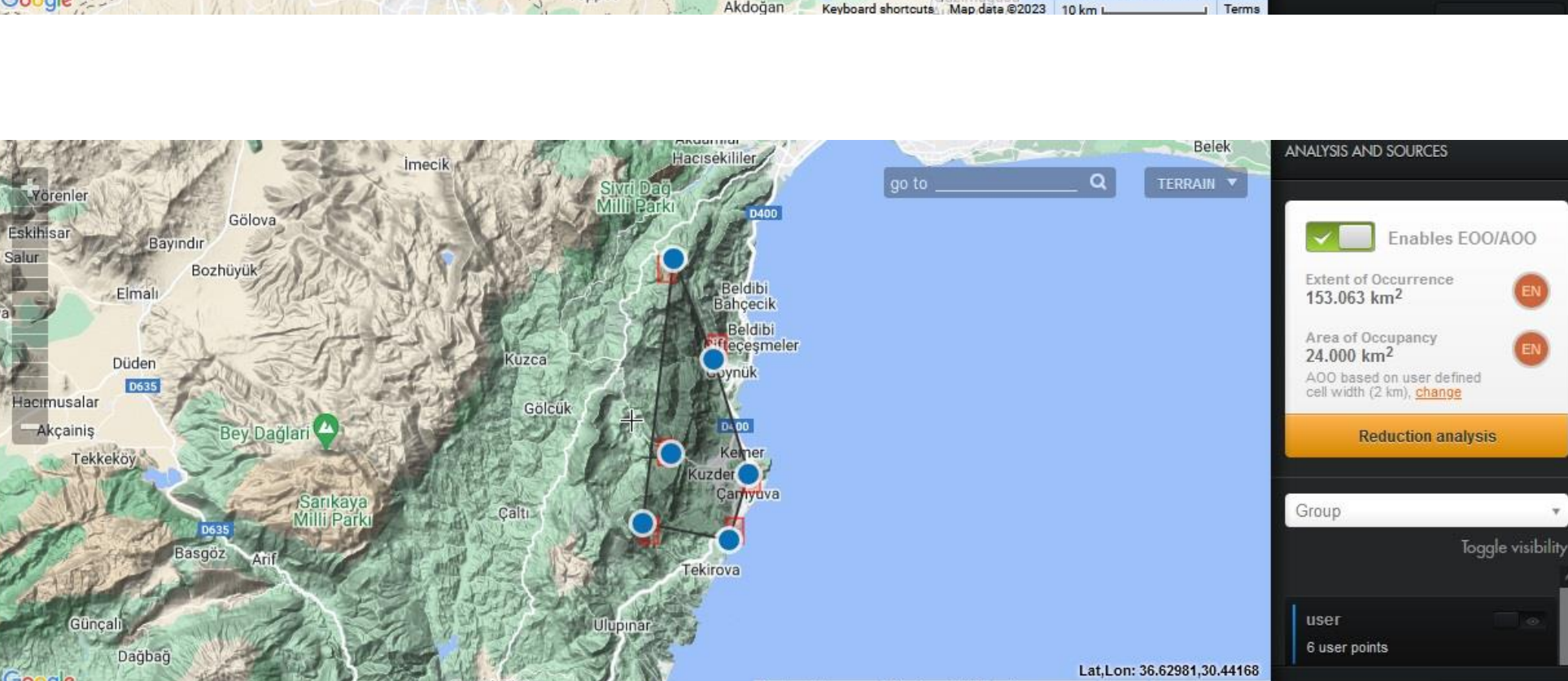
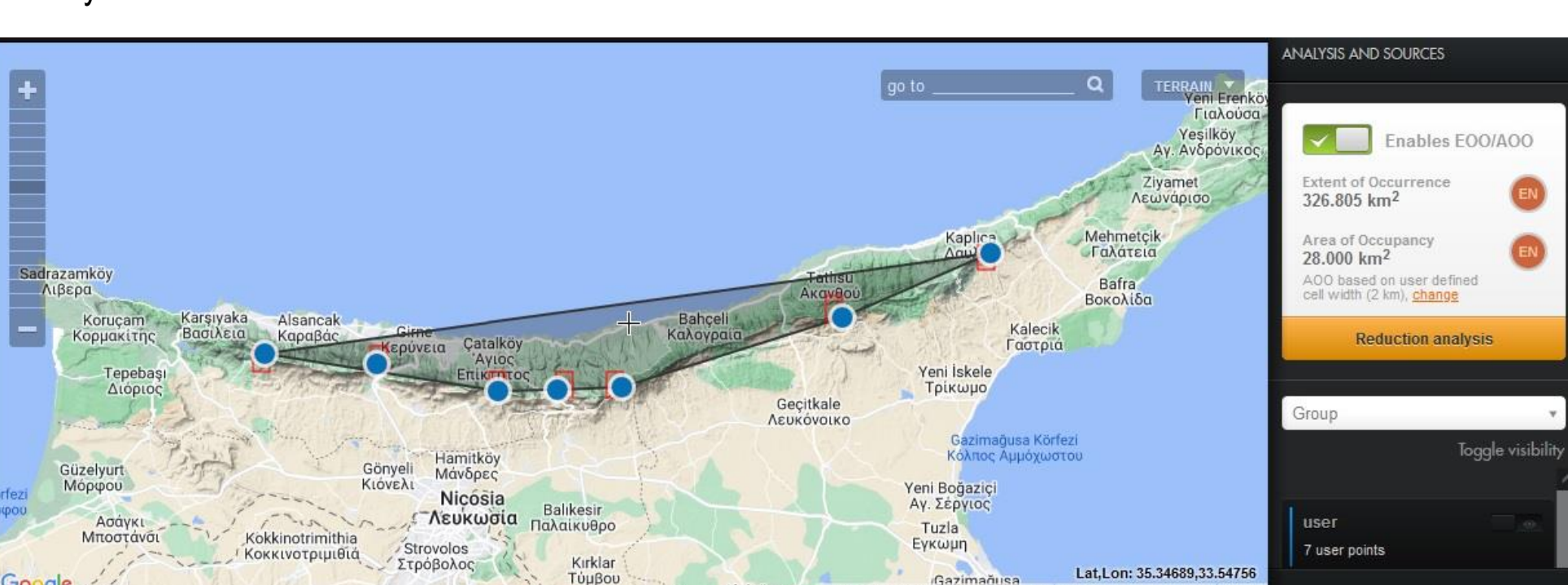
Overall distribution range of the taxa belonging to *Erica sicula sensu lato*



Detailed distribution of *E. sicula* subsp. *sicula* on Monte Cofano (above) and on one of its slopes (below)



From up to down: distribution range, AOO and EOO of *E. sicula* subsp. *libanotica* in Lebanon, Cyprus and Turkey



Distribution range of the subspecies

Based on 2x2 km wide cells, the estimated EOO of *E. sicula* subsp. *sicula* is 4 km² and the AOO is 4 km². Considering the inclination in the surveyed slopes and using a digital terrestrial model with 2x2 m accuracy, the projected AOO is 52 ha, while the real EOO is 115 ha. As for *E. sicula* subsp. *libanotica* in Lebanon, its EOO = 74 km² and the AOO = 32 km². A recent survey provided detailed information about the 7 subpopulations living on Cyprus Island; its current EOO is around 327 km², whilst the AOO = 28 km². Based on the location of the populations of *E. sicula* subsp. *libanotica* in Antalya province, the EOO of the Turkish populations is about 153 km², while the AOO is 24 km². The EOO of *E. sicula* subsp. *bocquetii* is around 525 km², while the AOO is 28 km². Although we were unable to locate and map all the historical records of *E. sicula* subsp. *cyrenaica*, the estimated values for EOO (2'185 km²) and AOO (32 km²) appear to be realistic enough.



Specimen of *E. sicula* subsp. *libanotica* from Cyprus (photo: O. Şentürk)

Risk assessment

According to the IUCN (2012) classification, at the global scale (i.e., considering all its subspecies throughout its entire distribution range) *E. sicula* may be considered as Least Concern (LC). As for the national assessments, *E. sicula* subsp. *sicula*, endemic to W Sicily, has been listed by Domina et al. (2012) as Critically Endangered (CR) according to the criteria B1ab(i,ii,iv,v). Available data about distribution range, number of populations, and demographic trends led Stephan et al. (2017) to consider the Lebanese population of *E. sicula* subsp. *libanotica* as Endangered (EN) by applying the criteria B1ab(iii)+2ab(iii). Recent field investigations suggest to propose the same risk level for the Island of Cyprus following the criteria B1ab(i,ii,iv)+2ab(i,ii,iv). As for the Turkish populations, both *E. sicula* subsp. *bocquetii* and *E. sicula* subsp. *libanotica* shall be considered Endangered (EN) according to the criteria B1+2. Considering the recent shrinkage of its wide distribution range, *E. sicula* subsp. *cyrenaica* should be considered as Near Threatened (NT).

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