

Microclimate monitoring around lichen habitat in Barton Peninsular, King George Island, Antarctica

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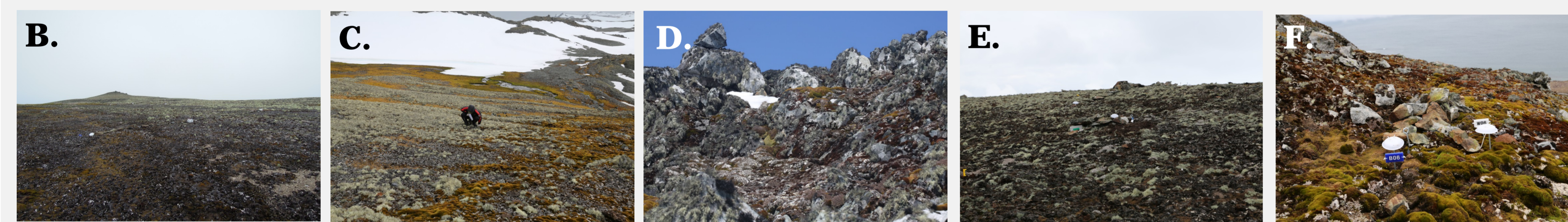
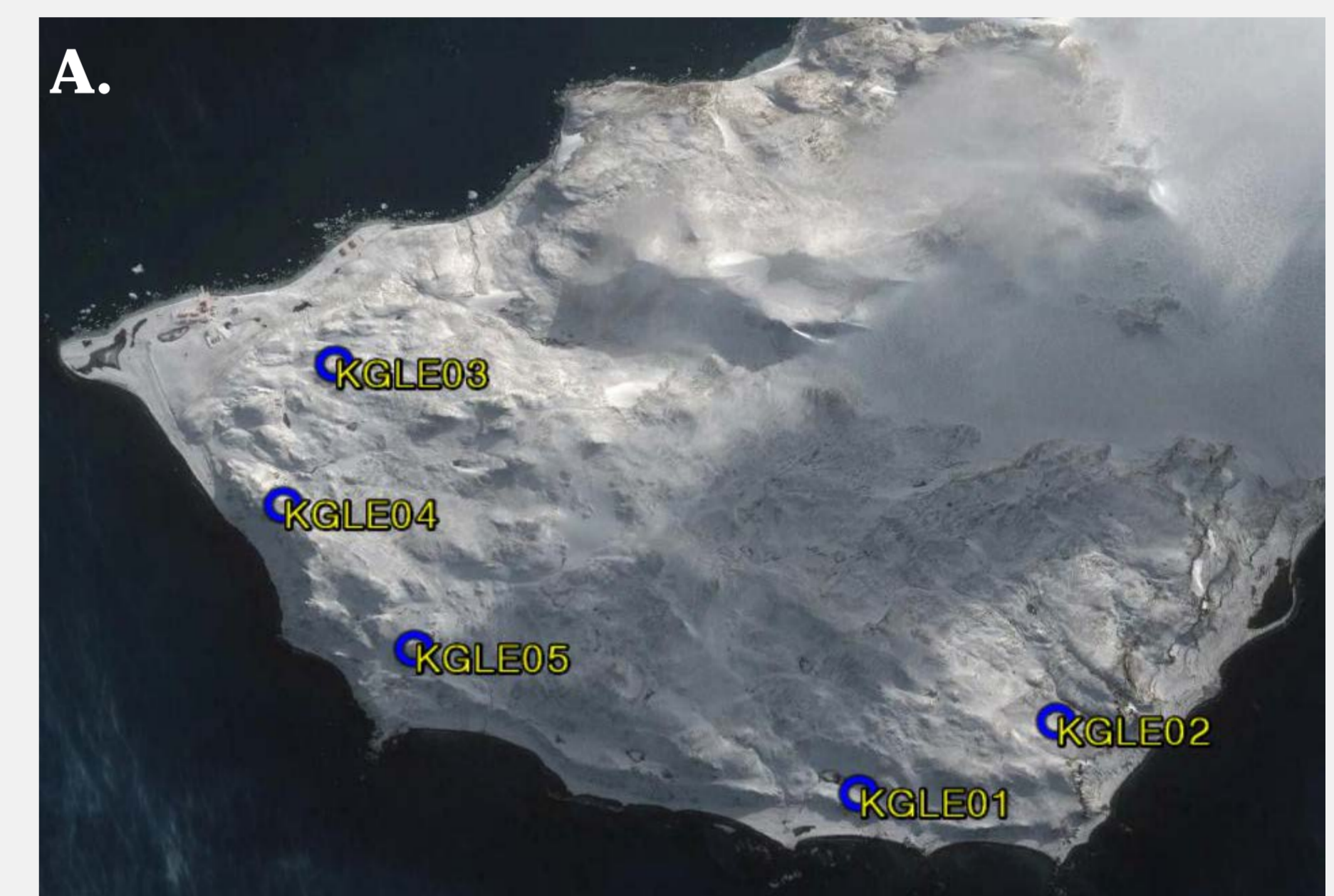
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Lichens are widely distributed on earth including extreme environments such as tropic, desert, high alpine and polar areas. Lichens are major flora in the terrestrial ecosystem of the Antarctic and account for more than 70% of floral diversity in Antarctic terrestrial ecosystem. Their distribution patterns are very complex and look dependent on the microclimatic conditions, which in turn are dependent on the geomorphological features. We selected five long-term ecological research (LTER) sites to study environmental factors that affect floral distribution, responses of lichens, mosses, and microorganisms to environmental changes. Major flora in these sites was *Sanionia*, *Polytrichastrum*, *Cladonia*, *Ochrolechia*, *Psoroma*, *Sphaerophorus*, and *Stereocaulon*. We monitored temperature, relative humidity, photosynthetically active radiation (PAR), temperature and water content of substrate from February 2013 to January 2014 to understand diversity of microclimate and effect on lichen distribution.

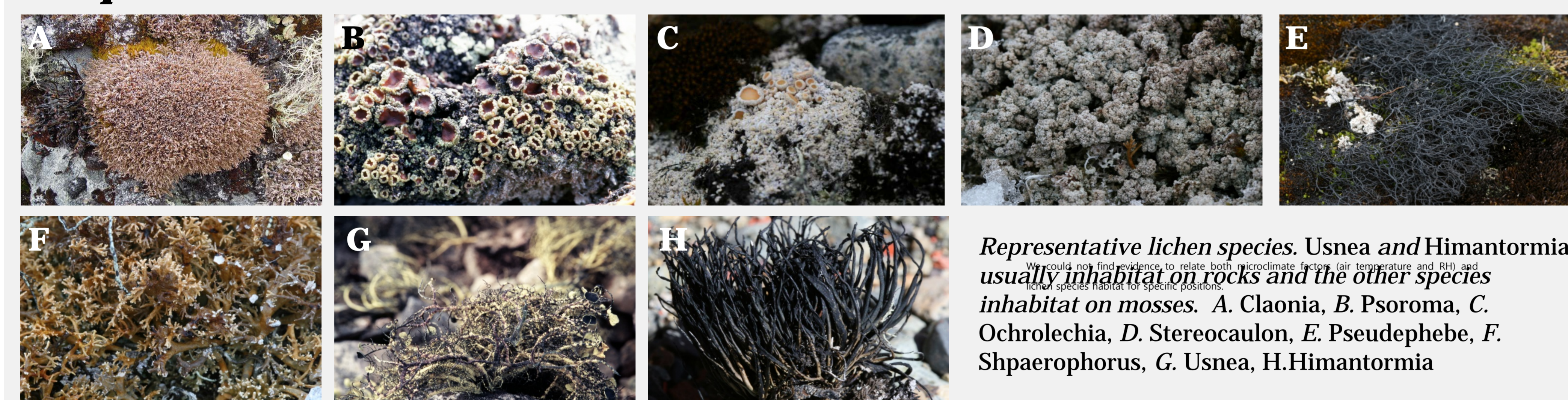
Sites

Site	Latitude	Longitude	Elevation (m)	Mean annual temp.(°C)	Mean annual RH(%)	Mean annual PAR (μE)	Dominant lichen	Site description
KGLE01	62°14'24.84"S	58°44'32.66"W	25	-1.40	94.25	165.09	<i>Cladonia</i> , <i>Psoroma</i> , <i>Ochrolechia</i> , <i>Sphaerophorus</i> , <i>Stereocaulon</i> , <i>Usnea</i>	Slop gradually near by lake
KLGE02	62°14'15.97"S	58°43'44.10"W	88	-1.14	97.40	156.57	<i>Cladonia</i> , <i>Psoroma</i> , <i>Ochrolechia</i> , <i>Sphaerophorus</i> , <i>Stereocaulon</i> , <i>Usnea</i>	Slope near by wetland
KGLE03	62°13'29.91"S	58°46'40.99"W	101	-1.64	94.96	158.22	<i>Cladonia</i>	Slope with rocks covered with moss and lichen
KGLE04	62°13'47.55"S	58°46'54.25"W	107	-2.20	96.90	162.71	<i>Cladonia</i> , <i>Psoroma</i> , <i>Ochrolechia</i> , <i>Stereocaulon</i> , <i>Usnea</i> , <i>Himantormia</i>	Slop gradually near by Giant Patrol habitat
KGLE05	62°14'5.87"S	58°46'22.22"W	81	-1.78	97.66	65.51	<i>Cladonia</i> , <i>Stereocaulon</i> , <i>Pseudophebe</i> , <i>Usnea</i>	Hill on the Penguin habitat



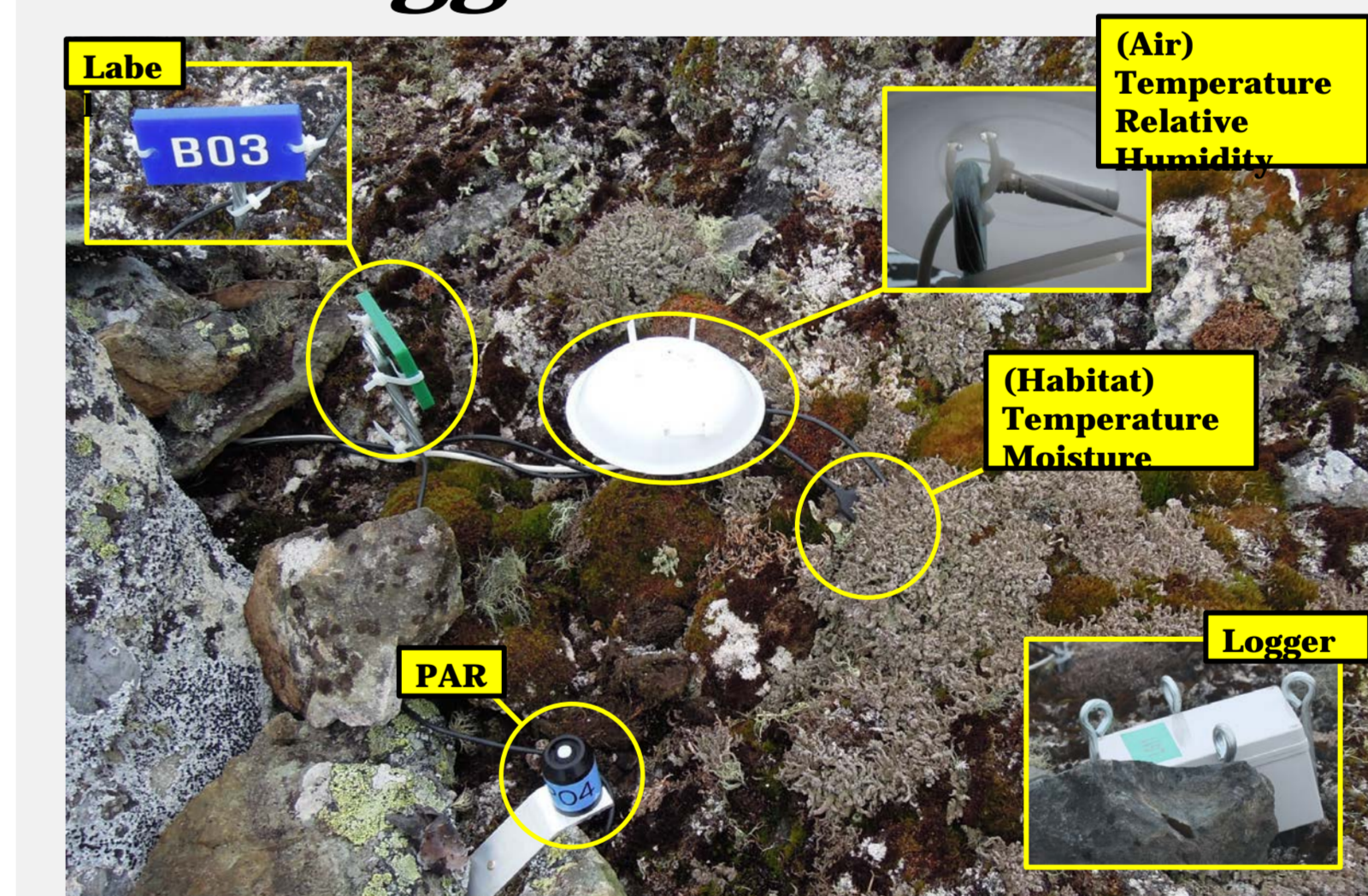
The flora of these areas consists of moss and moss dependent lichens. Five KGLE sites have similar floral patterns. KGLE01 and KGLE02 sites are zoned lichen distribution depending on the slope. A. Location of the study area in Barton Peninsular, King George Island, B-G. King George Island Long Term Ecological site B. KGLE01, C. KGLE02, D. KGLE03, E. KGLE04, F. KGLE05

Samples



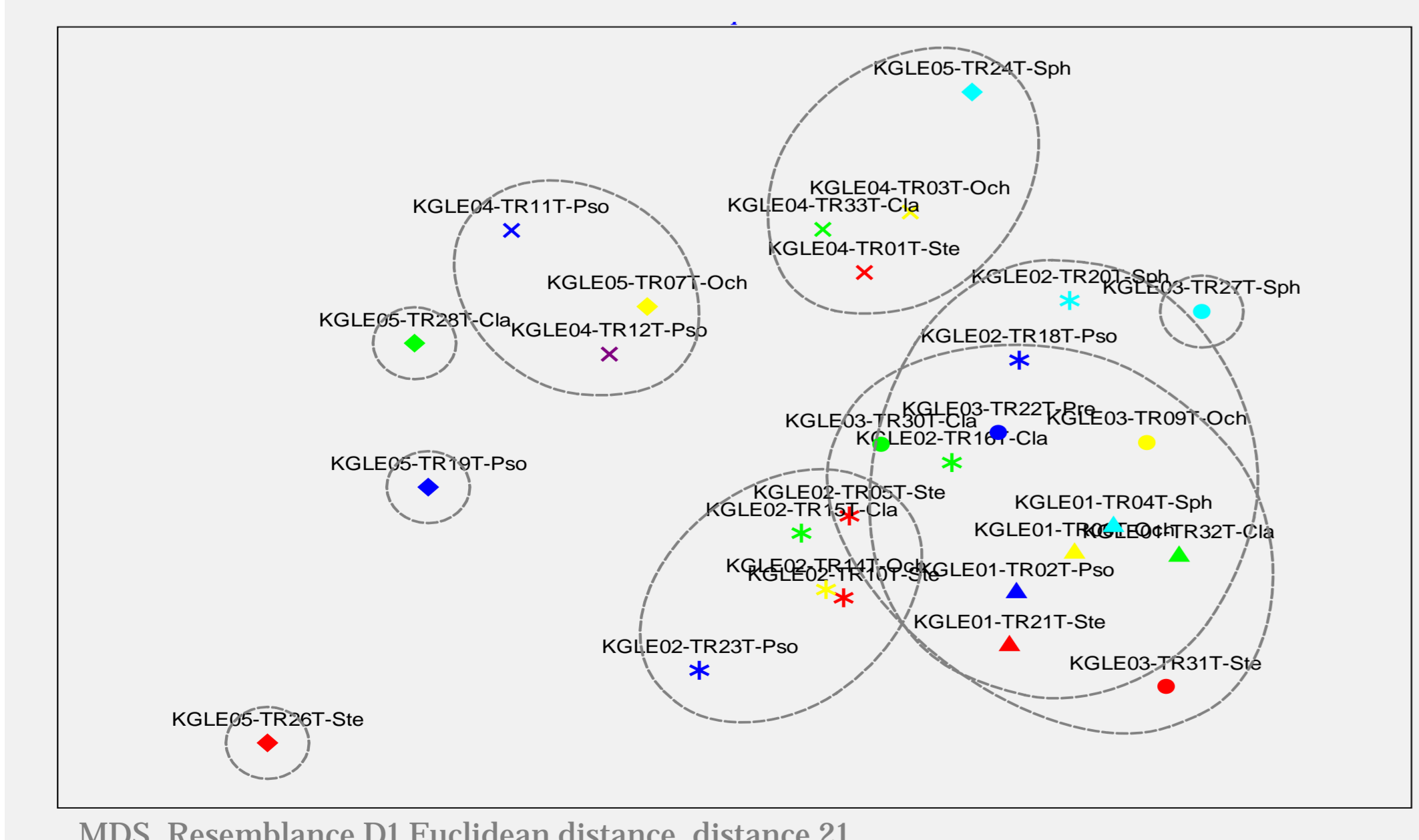
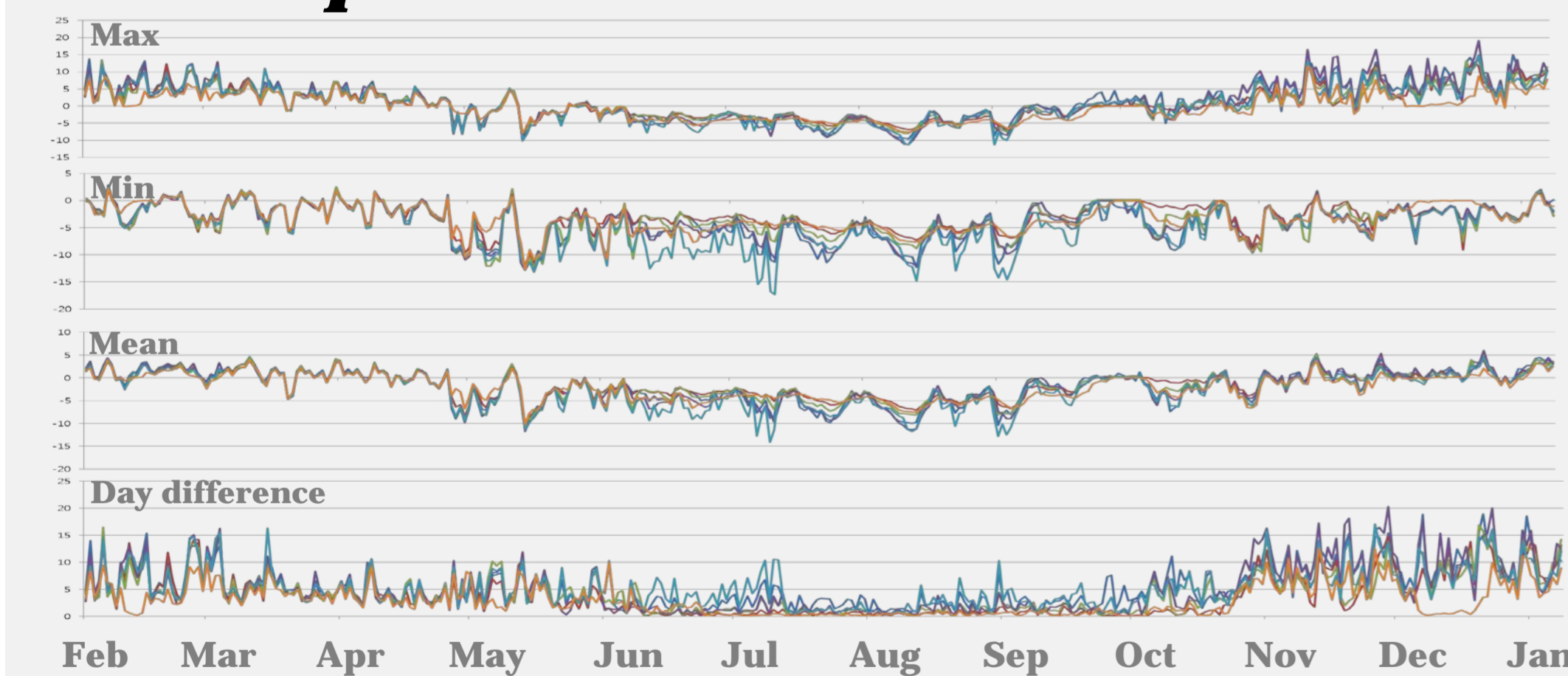
Representative lichen species. *Usnea* and *Himantormia* usually inhabit on rocks and the other species inhabit on mosses. A. *Cladonia*, B. *Psoroma*, C. *Ochrolechia*, D. *Stereocaulon*, E. *Pseudophebe*, F. *Sphaerophorus*, G. *Usnea*, H. *Himantormia*

Data logger and sensors



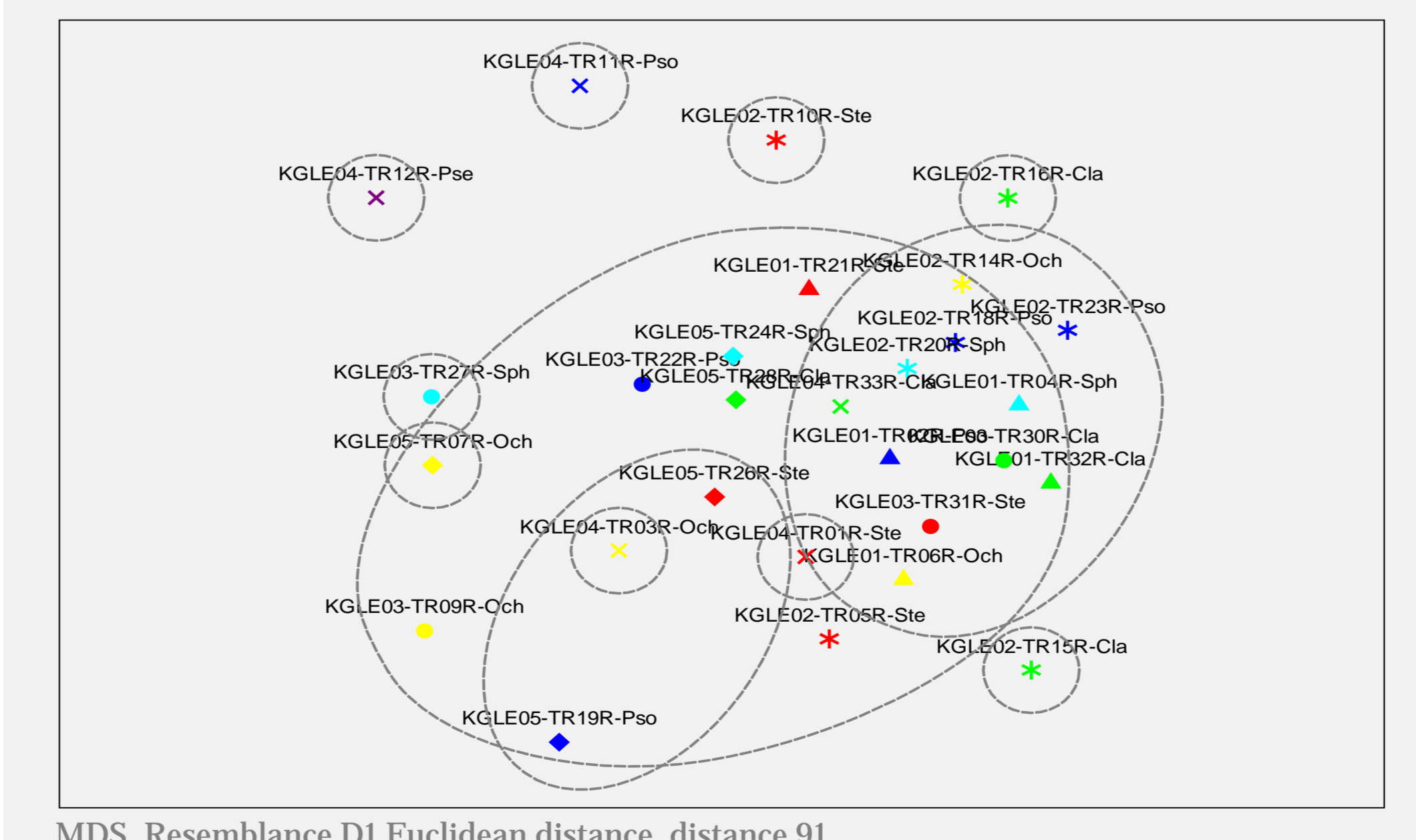
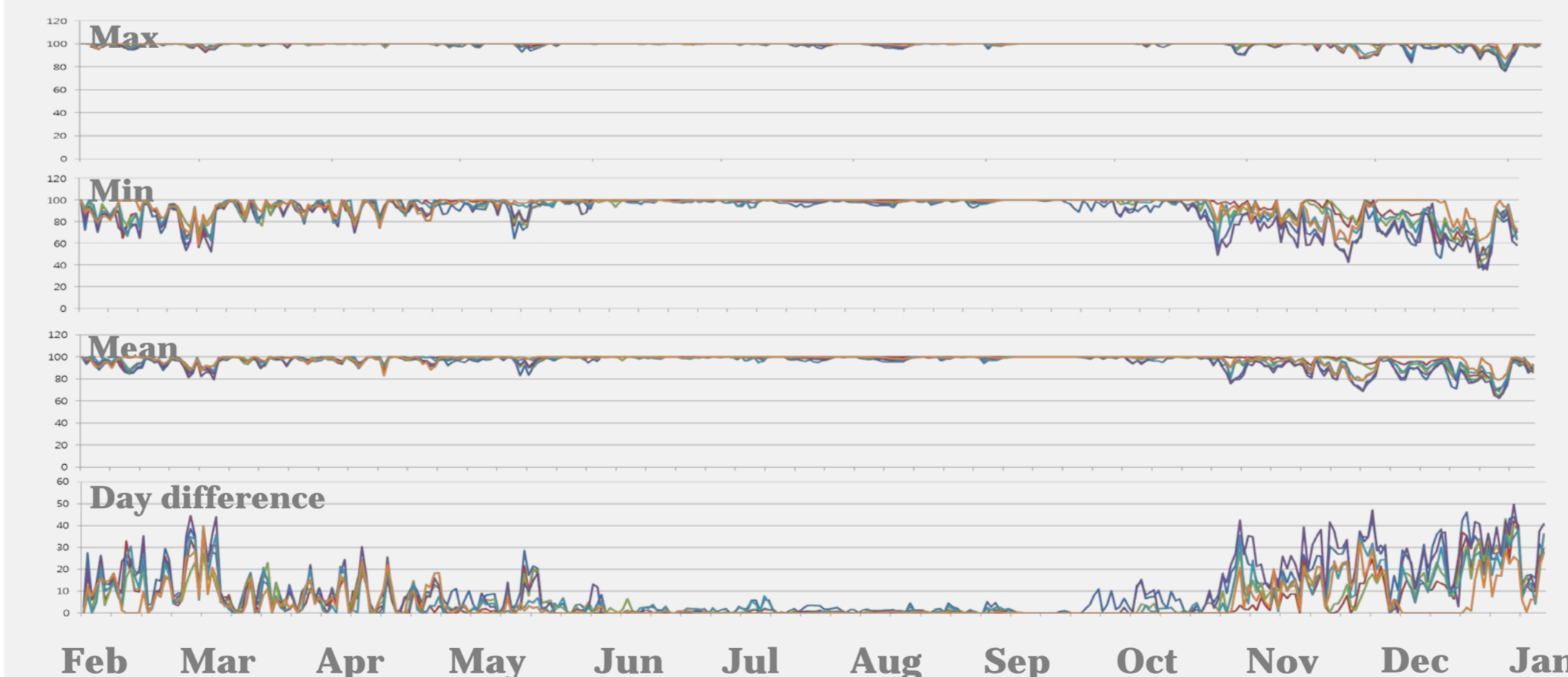
Data logger and sensors installed five KGLE sites. The data logger sets consist of PAR, air temperature, relative humidity, water contents and temperature of substrates.

Air temperature



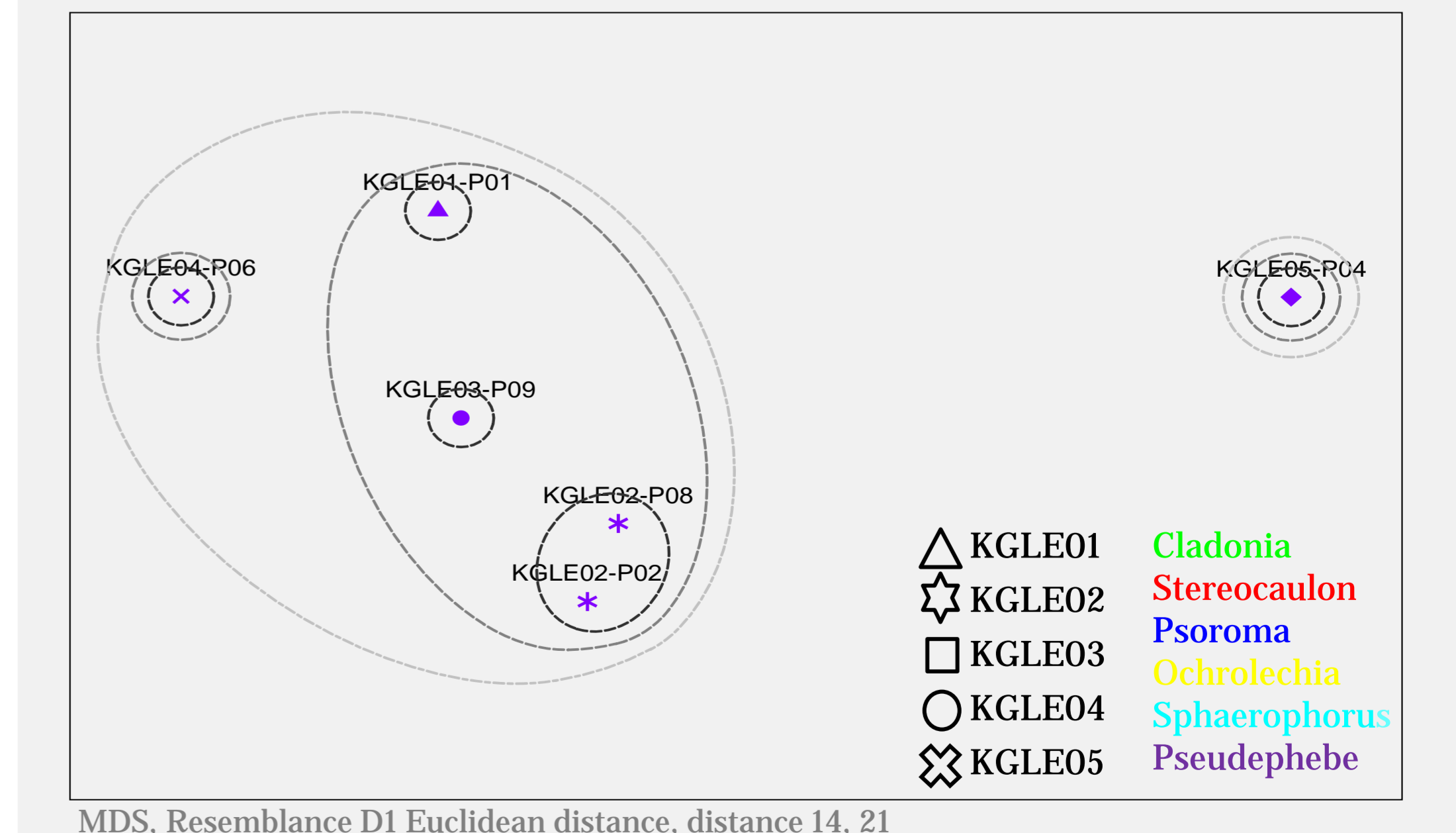
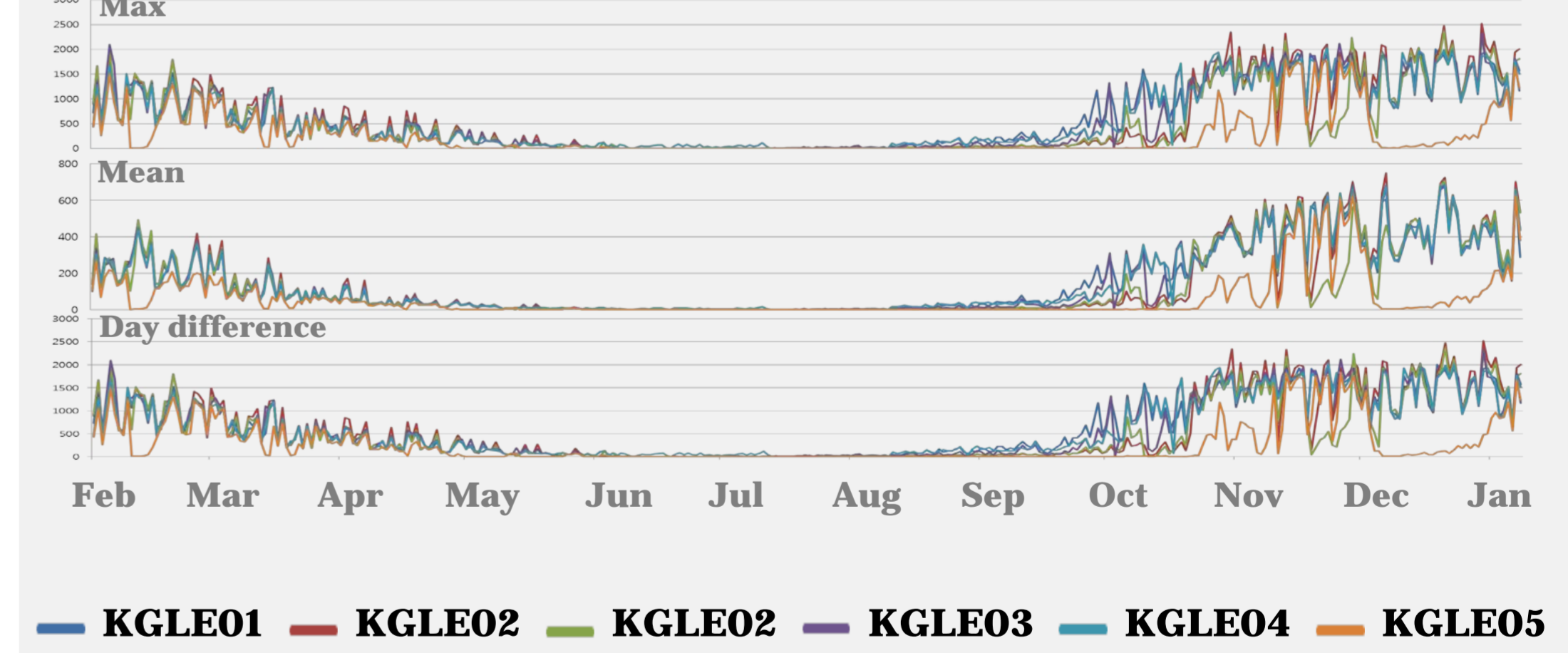
MDS, Resemblance D1 Euclidean distance, distance 21

RH



MDS, Resemblance D1 Euclidean distance, distance 91

PAR



MDS, Resemblance D1 Euclidean distance, distance 14, 21

- △ KGLE01 *Cladonia*
- ☆ KGLE02 *Stereocaulon*
- KGLE03 *Ochrolechia*
- ◇ KGLE04 *Sphaerophorus*
- ⊗ KGLE05 *Pseudophebe*

Maximum PAR value in each LTER site was highly variable ranging from 1823.7 to 2338.7 μE. Maximum and minimum temperature records were 20°C and -17°C and they were variable with 8°C and 4°C differences depending on sites. We compared weather conditions and different vegetation, but we could not find evidence to relate both microclimate factors (air temperature and RH) and lichen species habitat for specific positions.