

Project acronym: ARCTOSTRES

Project title: Resistance to extreme climatic variations of arcto-alpine bumblebees: Biogeography, phylogeny, physiology of hyperthermic stress

Project leader: Pierre Rasmont, University of Mons, Belgium

Discipline: Earth Sciences & Environment

Station(s): KHA (Russia)

After our previous studies in N. Sweden (Abisko, Tarfala), then in N. Alaska (Toolik) and Yukon (Kluane), we want to go further in assessing the physiological hyperthermic resistance of species that are exposed to a high continental gradient. Therefore, Siberian areas are of special interest as they show increased continentality in comparison to locations already studied. Taking into account our present hypothesis that the decline of these species is mainly driven by heat-wave risks, we want to test if high continentality selected better resistance to extreme temperatures. In this context, we want to apply the same hyperthermic stress bioassays to N. Siberian boreal and arctic species. Our experimental design requires field tests with living specimens. The comparison of results across the circum-polar area requires a careful assessment of their phylogenetic and taxonomic relationships. Thanks to our sampling we can also compare the genetic diversity of bumblebee populations between the different Arctic regions already sampled to identify the potential refuge zones around the Arctic Circle. We expect therefore to reuse the same specimens for genetic and chemo-taxonomic analysis. We call here for a financial support to collect these samples in N.W. Siberia boreal-arctic stations KHANYMEI RESEARCH STATION & NUMTO PARK STATION, which host a high species diversity for concerned taxa. Our analyses require about 20 males of each bumblebee species. We already have in hand material from main arcto-alpine species from Pyrenees, Alps, Apennines, Scandinavia, Finland, Alaska, Yukon. We still need to complete our sampling for most Siberian arcto-boreal species. Taxonomic assessment. We will use an integrative approach based on (i) nuclear and mitochondrial DNA analyses, (ii) analyses of secretions of cephalic labial glands, (iii) morphology. Chemical characters: The cephalic labial gland secretions are used as chemo-taxonomic character in our integrative approach. Genetic characters: We use three genetic markers: COI, ArgK, and PEPCCK. To assess the genetic diversity we use the microsatellites methods. - Consequences of climatic changes: Extreme climatic risk linked to heat waves will be assessed by hyperthermic stress bioassay.