



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: Ecosystems & Biodiversity

Station(s): CEN Whapmagoostui-Kuujuarapik Research Station (Canada)

It is now well established that wild bees suffer a dramatic decrease (Carvalho et al., 2013). This strong bee decline is observed around the world (e.g. Biesmeijer et al., 2006). In this context, our team (University of Mons) is managing the database (4000000 data), the mapping and the Red List of about 2050 European wild bee species (Nieto et al. 2015). Our works confirm the strong decline of most bumblebee species (*Bombus* sp.) in Europe (Kerr et al., 2015; Rasmont et al., 2015). Recent studies where we are deeply involved suggested that climate change has already become a main trigger of bumblebee species regression (Martinet et al., 2015; Rasmont & Iserbyt 2012b, Kerr et al. 2015). This tendency is expected to be emphasized during this century (Rasmont et al. 2015). Our results suggested that the heat waves could play a major role in local extinction of bumblebees (Rasmont & Iserbyt 2012b, Martinet et al., 2015, Martinet et al., 2017 submitted). Taking into account our present hypothesis that the decline of these species is mainly driven by heat-wave risks, we want to test if boreal conditions linked to high continentality selected better resistance to extreme temperatures.

After four seasons of study in N. Sweden (Abisko, Tarfala), Western North America (Kluane Lake and Toolik field station), West-Siberia (Khanymey), we want to go further with our physiological hyperthermic resistance tests all around arctic Circle with East America (Whapmagoostui-Kuujuarapik Research Station) along the continental gradient. The conservation policy in arctic and boreal areas should be aware of circum-arctic connection that could support intense population exchanges in the future. Phylogenetic and taxonomic assessments are needed to allow the monitoring of population moves. Thanks to our sampling we can also compare the genetic diversity of bumblebee populations between the different Arctic subregions already sampled (Alaska, Yukon, Sweden, West Siberia) to identify diversity hotspots and potential Arctic refuge zones.