Project acronym: SAXLIFE

Project title: SAXifraga oppositifolia: at the edge of the vascular plant´s LIFE

Project leader: Jorge Gago, University of Balearic Islands, Spain

Discipline: Earth Sciences & Environment: Ecosystems & Biodiversity

Station(s): Villum Research Station (VRS) (Greenland/Denmark)

Plant´s fitness depends on the investments allocated to photosynthetical capacity (Amax) and stress tolerance (ST) traits in a trade-off relationship to ensure a final positive carbon balance. Saxifraga oppositifolia L., is the species that lives in the northern location and in the coldest place on Earth reported. This ecological performance agrees with our own data comparing species from all the world: Saxifraga oppositifolia was one of the most tolerant species to our ST tests but with the lowest photosynthetical capacity within the vascular plants. Thus, confirming the trade-off by locating in one of its extreme sides. Additionally, this long-lived, perennial herb has two cytotypes: diploid (2n = 26) (mostly with cushion-like forms) and autotetraploid (2n = 52) (always showing a trailing-form), being tetraploids usually associated to benign niches because of their putative higher competence capacity. Polyploidy, the whole genome duplication, is an important process driving plant evolution, that can alter this trade-off and thus opening the way to new ecological niches. There are just two regions reported that can be found mixed populations of both ploidy levels: Svalbard and Greenland. We planned to characterize photosynthetical capacity, water potential, leaf ultra-anatomy, C13 and N15 stable isotopes combined with primary and secondary metabolism along an environmental gradient driving by water availability in Ny-Alesund (Svalbard) and in Villum Nord Station (Greenland). This methodologies will help us to elucidate the main mechanisms driving the important stress tolerance showed by this species to cold and dry environments, but still ensuring positive net carbon balances, and as well to understand if its polyploidy affect this tradeoff relationship and could be an advantage in response to the warming that is suffering the Arctic. Also, we would like to re-visit the transects performed by Crawford and colleagues in 1992 and 1994 in Brøgger peninsule (Ny-Alesund), 30 years later, to evaluate if

the ecological performance of this species has been affected by climatic change there. We will monitor and compare this species at the edge of their northern distribution, but also in a temporal manner in Ny-Alesund.