Purpose of the Short Term Scientific Mission

The main purpose of the Short Term Scientific Mission (STSM) was to calibrate a *Pinus pinaster* niche model integrating molecular information at a European scale. As this objective required an accurate bioclimatic information source, the choice of an optimal bioclimatic database was also an integrating part of the work developed during the STSM.

Description of the work and main results

In a first step, a revision of all the possible bioclimatic databases available was undertaken. Given accessibility, spatial scale requirements and time limitations, WORLDCLIM (Hijmans, Cameron, Parra, Jones, & Jarvis, 2005) was considered to be the best bioclimatic information source. Nevertheless further analyses with several other bioclimatic datasets have been planned for a near future to evaluate the influence of their accuracy in niche models.

Secondly, the calibration of *Pinus pinaster* niche model was addressed. Twenty three bioclimatic variables were considered (19 directly downloaded from WORLDCLIM and four new created bioclimatic variables). The new created variables (Potential evapotranspiration in summer and spring and Moisture Index in summer and spring) aimed to better characterize water availability. Potential evapotranspiration estimates water loss as a ratio depending on average temperature and solar radiation while moisture index is defined as the difference between precipitation (water source) and potential evapotranspiration (water loss). Presence/absence records of the target species were obtained through a combination of two different datasets, EUFORGEN (http://www.euforgen.org/distribution_maps.html) and JRC - FOREST TREE SPECIES IN EUROPE (Köble & Seufert, 2001) covering the whole natural range of the species. Although JRC is a more accurate database (1 km grid), it does not separate between natural and not natural populations and it does not include Northern Africa territory which is also part of *Pinus pinaster* natural range. Thereby, EUFORGEN (http://www.euforgen.org/distribution_maps.html) is a good complement for JRC as it embraces the whole territory of the species distribution (Europe and the North of Africa) and it establishes presence of the species exclusively in its natural range. Niche model calibration was done by the means of five different correlative algorithms. The predictions from the five calibrated models were finally combined to generate composite predictions by creating an ensemble model using “biomod2” package from R (R Core Team, 2013).

Following the above described procedure, nine different ensemble niche models were calibrated: one for the whole species, and eight for the different genetic groups detected across the full distribution using molecular markers. These nine models will now be further analyzed in order to assess the importance of including molecular information in a species niche model.

Future collaborations

The STSM has enhanced collaboration between two different institutions (Instituto Universitario de Investigación y Gestión Forestal Sostenible and Swiss Federal Institute for Forest, Snow and Landscape Research WSL). This collaboration has been very fruitful for both sides, and will go further in a near future by investigating more deeply two issues: i) How to integrate molecular information in niche models, and does this information help improving the models; ii) what is the importance and what are the consequences of database accuracy in the construction of successful niche models.

Foreseen publications

The work developed during the STSM will be published as soon as the analysis of the results is completely finished, sometime in 2014.

Acknowledgements

I would like to personally thank the COST ACTION FP1202 for the great professional and personal experience they have enabled me to enjoy. I would also like to thank the WSL for endorsing me during the STMS period and Nicklaus Zimmerman as my responsible in the WSL for all the support provided.

References

Hijmans, R. J., Cameron, S. E., Parra, J. L., Jones, P. G., & Jarvis, A. (2005). Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology*, *25*(15), 1965–1978. doi:10.1002/joc.1276

Köble, R., & Seufert, G. (2001). Novel maps for forest tree species in Europe. In Data set available online at: http://afoludata.jrc.ec.europa.eu/index.php/dataset/detail/66 (Ed.), *Proceedings of the 8th European Symposium on the Physico-Chemical Behaviour of Air Pollutants: "A Changing Atmosphere!"* (pp. 17–20). Torino (It).

R Core Team. (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: http://www.R-project.org/.