**FOREST MODELS – homework 8A**

**Development of a model to estimate site index for eucalyptus stands in Portugal**

Data file: “Ec\_SiteIndexModelling.xlsx”

1. The data file contains data from 1261 plots measured in eucalypt stands in Portugal. The objective is to use this data to develop a model to estimate site index for this species in Portugal. Start by reading the data (the description of the variables can be find after the questions) and estimate the site index for each plot using the GLOBULUS site index curves:

$$hdom\_{2}=\left(29.0669+0.2880 NdaysPrec\right)\left(\frac{hdom\_{1}}{29.0669+0.2880 NdaysPrec}\right)^{\left(\frac{t\_{1}}{t\_{2}}\right)^{0.4890}}$$

1. Study the relationship between site index and each one of the variables available (exploratory data analysis).
2. Use different algorithms in order to pre-select a series of candidate models
3. Compare the candidate models on the basis of their fitting and prediction ability (you may select one of the methods that were described in the classes) and select one model
4. Check the regression assumptions of the model selected and check if there is some tendency of the residuals with site index, soil type, litology or any other variable relevant for the explanation of site index.

**DESCRIPTION OF THE VARIABLES AVAILABLE IN THE Ec\_SiteIndexModelling.xlsx file**

| **Name** | **Description** |
| --- | --- |
| ID\_parc | Plot identification |
| t | Age (years) |
| hdom | Dominant height (m) |
| tm | Average temperature (2011-2040) |
| tmmax | Maximum tenperature (1971-2000) |
| tmmin | Minimum temperature (1971-2000) |
| tmJan | Average temperature in January (1971-2000) |
| tmAug | Average temperature in August (1971-2000) |
| dist\_sea | Distance to the sea (m) |
| altitude\_m | Altitude (m) |
| slope\_perc | Slope (%) |
| Daystm\_0 | Number of days with average temperature below 0 (1971-2000) |
| Daystmin\_0 | Number of days with minimum temperature below 0 (1971-2000) |
| Daysprec | Number of days with precipitation above 1 mm (1971-2000) |
| prec | Annual precipitation (1971-2000) |
| prJan | Precipitation in January (1971-2000) |
| prFeb | Precipitation in February (1971-2000) |
| prMar | Precipitation in March (1971-2000) |
| prApr | Precipitation in April (1971-2000) |
| prMay | Precipitation in May (1971-2000) |
| prJun | Precipitation in June (1971-2000) |
| prJul | Precipitation in July (1971-2000) |
| prAug | Precipitation in August (1971-2000) |
| prSep | Precipitation in September (1971-2000) |
| prOct | Precipitation in October (1971-2000) |
| prNov | Precipitation in November (1971-2000) |
| prDec | Precipitation in December (1971-2000) |
| precSpring | Precipitation in Spring (1971-2000) |
| precSummer | Precipitation in Summer (1971-2000) |
| precAutumn | Precipitation in Autumn (1971-2000) |
| precWinter | Precipitation in Winter (1971-2000) |
| humrel | Relative humidity |
| evap | Evaporation |
| wind | Wind |
| dryp | Dry period (number of months wih precipitation below 40 mm)  |
| Martonne | Martonne index |
| azimuth | Azimuth |
| soil | Soil type (FAO) |
| litology | Litology |