1. **Brief introduction**

The model is generally composed of three parts: input files, the model itself, and the results, as shown below:

A screenshot of a computer

Description automatically generated

Model output

Model

Input files

Your directory



The input consists of two files: input.txt and climateday.clim. The input.txt file contains the model input parameters, including site information, vegetation parameters, and management settings (or disturbances). However, note that the management settings have been integrated into the code, so those in input.txt are not functional. The climateday.clim file contains the climate inputs for the model, which include monthly average daily maximum temperature (Tmax in °C), monthly average daily minimum temperature (Tmin in °C), monthly average photosynthetically active radiation (PAR in µmol m⁻² s⁻¹), monthly total precipitation (PPT in cm), monthly average ozone concentration (O3 in ppb), monthly average CO2 concentration (CO2 in ppm), and monthly total nitrogen deposition (NH4 and NO3 in gN m⁻²)

1. **To run the model:**
2. Open the `pnet\_linux` folder.
3. Locate the executable file `pnet\_cn\_daily.exe`.
4. Double-click the file to run it.
5. Navigate to the `Result` folder, then to the `Site` folder, where you will find the annual output file (`Output\_annual.csv`) and the monthly output file (`Output\_monthly.csv`).
6. **Model calibration**

You may need to adjust the input parameters in the input.txt file to calibrate the model. The meaning of each parameter is detailed in the source file pnet\_model.h, from lines 125 to 180. For your convenience, I have listed most of them below:

|  |  |
| --- | --- |
| Parameter | Description |
| WHC | Water hold capacity |
| Humus decomposition constant | soil decomposition constant |
| N immobolization factor A | N immoblization rate parameter |
| N immobolization factor B | linear coefficients for fraction of mineralized N reimmobilized as a function of SOM C:N |
| AmaxA | the intercept in a linear relation max net Photosynthesis as a function of N. |
| AmaxB | the slope in the function. Max rate units are umol CO2 m-2 leaf s-1 |
| BaseFolRespFrac | respiration as a fraction of max photosynthesis |
| AmaxFrac | Daily Amax as a fraction of the early morning instantaneous rate |
| SLWmax | specific leaf weight (top of canopy) g/m-2 |
| SLWdel | change in SLW with increasing foliar mass above  (g/m-2 g-1) |
| GDDFolStart | growing degree days at which foliar production begins |
| GDDFolEnd | growing degree days at which foliar production ends |
| GDDWoodStart | Growing degree days at which wood production begins |
| GDDWoodEnd | Growing degree days at which wood production ends |
| Max leaf mass | maximum foliar weight |
| k | canopy light attenuation constant exp -kT |
| FolNCon | foliar N concentration |
| RootAllocB | Relationship between foliar and root allocation. Slope |
| GRespFrac | Growth respiration, fraction of allocation |
| WoodMRFrc | Wood Maintenance respiration as a fraction of gross photowynthesis |
| RootMRespFrc | Ratio of fine root maintenance respiration to biomass production |
| MinWoodFolRatio | Min ratio of carbon allocation to wood and foliage |
| WUEConst | Constant in equation for water use efficiency as a function of VPD, g CO2/kg water |
| FLPctN | min % N concentration in foliar litter |
| RLPctN | min N % cincentration in root litter |
| WoodTurnover | fractional mortality of live wood per year, live wood to dead wood |
| RootTurnoverA | constant term of 2-deg polynomial describing fine root turnover |
| WoodLitLossRat | fraction of dead wood to litter in yr-1 |
| WoodLitCLoss | fraction of litter decayed as CO2 |

1. Model compiler

If you need to compile your own PnET model, I also include all source files in `pnet\_linux`. Note to turn off SDL check and precompiled header when you build solution.

1. Input files

In this model, there are several different input files representing different climate scenarios including BAU, CO2 fertilization, climate, N deposition, O3, and preindustrial scenarios, which named as BAU.txt, CO2.txt, climate.txt, N deposition.txt, O3, and preindustrial.txt.