

Parameterization in ORCHIDEE

Where ?

- Parameters are set mostly in the `src_parameters` directory
- This directory contains several files
 - `constantes.f90`
 - `constantes_mtc.f90`
 - `constantes_soil.f90`
 - `constantes_soil_var.f90`
 - `constantes_var.f90`
 - `control.f90`
 - `pft_parameters.f90`
 - `pft_parameters_var.f90`
 - `vertical_soil.f90`
 - `vertical_soil_var.f90`

constantes_var.f90

- Declaration and initialization of scalar parameters that do not vary (PARAMETER keyword)
 - array index, constants like gravitation, Earth diameter ...
- Declaration and first initialization of scalar parameters that might be modified by the user at execution time
 - Flags but also parameter values (numbers)

- `constantes.f90`
 - Possible modification of the scalar parameters (mainly numbers) initialized in `constantes.f90`
 - call of the `getin_p` function:
 - `getin_p('name_var_in_run.def', name_var_in_code)`
 - If the parameter is set in the `run.def`, its value will be modified in the code following the call to the `getin_p`, if not present in the `run.def`, its default value will be used
 - At the end of the initialization phase, the '`used_run.def`' file will contain all the parameter values for which `getin_p` was call (default or modified value)
- `control.f90`
 - like `constants.f90` but only for flag parameters

constantes_soil_var.f90 & constantes_soil.f90

- Same philosophy than constantes_var.f90 and constantes.f90
- Only dedicated to soil-related parameters
- There are mainly scalars but not only

PFT parameters

- They are parameters which vary with PFT
- Vectors from 1 to the number of PFT
- Set within 3 files:
 - constantes_mtc.f90
 - pft_parameters_var.f90
 - pft_parameters.f90

constantes_mtc.f90

- Declaration and initialization of the PFT parameters for the standard configuration (13 PFT's = nvmc)
- Standard PFT's are called 'metaclass'
- All these parameters have a '_mtc' suffix
- They are all declared with the PARAMETER keyword

pft_parameters_var.f90

- Declaration of the PFT parameters for the configuration used by the user (number of PFT used = nvm)
- They are the same parameters than those declared in constantes_mtc.f90 but without the ‘_mtc’ suffix
- They are not declared with the PARAMETER keyword
 - their value should be modified if needed by the user
- They are set with the ALLOCATABLE keyword
 - because their length (nvm) is only set at the execution time

From metaclass to PFT

- How do we link PFT that will be used in the simulation to the 13 Metaclasses ?
- The pft to mtc parameter
 - Conversion table
 - Size: nvm
 - The i^{th} element is an index which refers to the metaclass used for the i^{th} PFT
 - Default value
`pft_to_mtc=(1 2 3 4 5 6 7 8 9 10 11 12 13)`

pft_parameters.f90

- Instructions done for all the PFT parameters initialized in pft_parameters_var.f90 file
 - Allocation
 - Default initialization
 - `my_param(:) = my_param_mtc(pft_to_mtc(:))`
 - Call to the `getin_p` function for possibly reading the parameter value in the `run.def`
 - Deallocation : call at the end of the simulation

Example: Adding a 14th PFT

- In the run.def

```
NVM=14
```

```
PFT_TO_MTC=1,2,3,4,5,6,7,8,9,10,11,12,13,13
```

```
VCMAX25__14=100
```

⇒ The 14th PFT will inherit of all the parameter values from the 13th PFT,

⇒ The parameter VCMAX25 is modified for the 14th PFT and set to 100.

Recommendations

- Do not use 'numbers' in your code, only variables and parameters
- If it is a scalar => constantes_var.f90 and constantes.f90
 - If Fixed value (ie Parameter) used the PARAMETER keyword
 - Else, it is declared as a variable and initialized in constantes.f90
- If it is a soil parameter => constantes_soil_var.f90 and constantes_soil.f90
- If it is a PFT parameter => constantes_mtc.f90, pft_parameters_var.f90 and pft_parameters.f90

Which parameters can I modify ?

- Most of the parameters can be modified by the user
 - see <http://forge.ipsl.jussieu.fr/orchidee/wiki/Documentation/OrchideeParameters>
 - or orchidee.default file in the config/PARAM directory)