Cleaning of the Code (Carbone & general)

- JARVIS Photosynthesis

- Treatment of NO_BIO : Should we keep the Normalisation of Veget_max ?
  Or can we have frac_no_bio as a “PFT” ?

- DYNAMIC versus CONSTANT mortality ?
  Should we keep only one mortality (Trunk)

- FIRE_DISABLE (no fire) related to the “old fire module only”:
  Suggestion: keep FIRE with DGVM only and no fire in “static” simulation ?

- WATCHAOUT ?

- ????

Potential issue with Bare soil fraction !

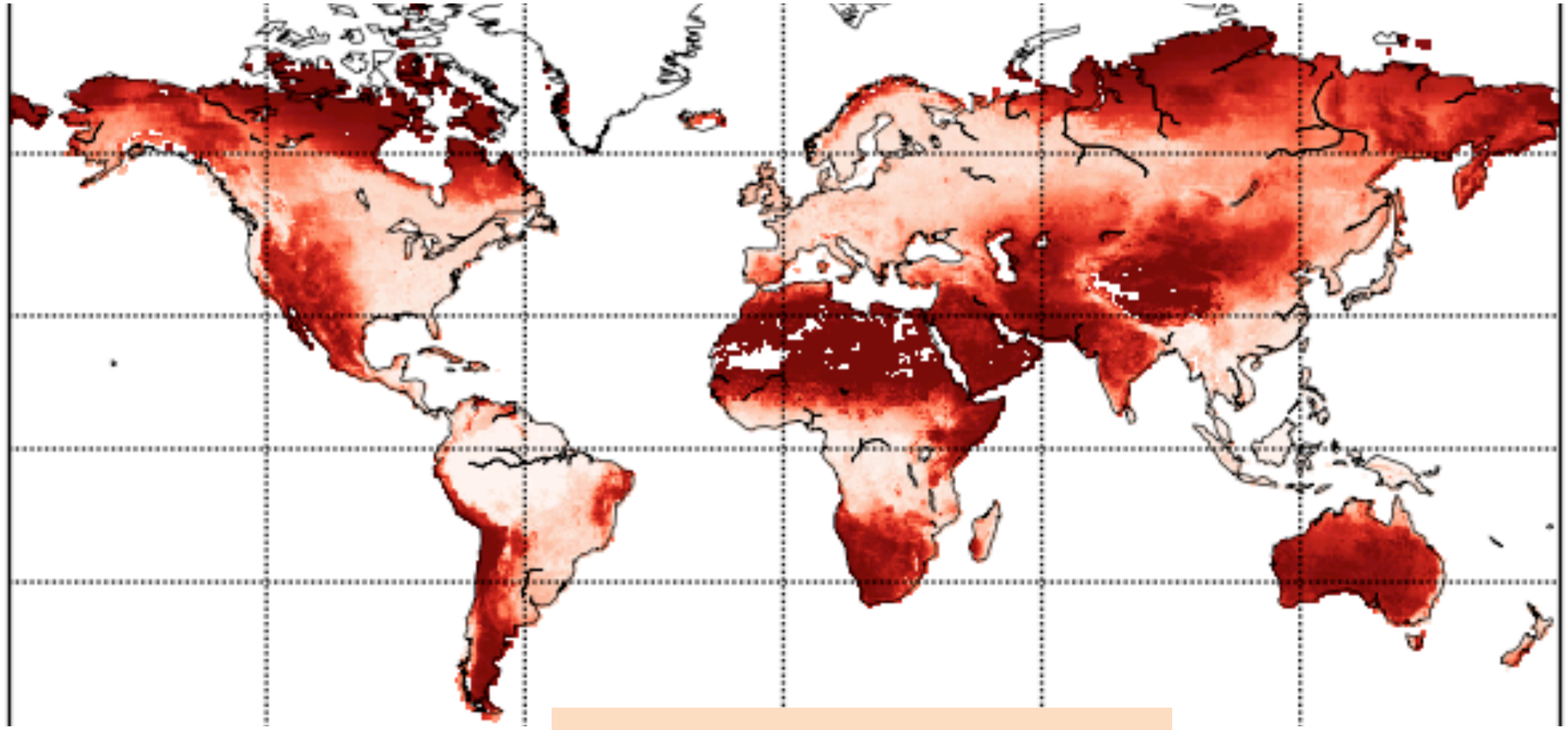
- Bare soil in ORCHIDEE comes from :
  - PFT 1 (max_veget_frac_1)
  - PLUS other PFTs with : BS = Exp (- LAI / 2.)

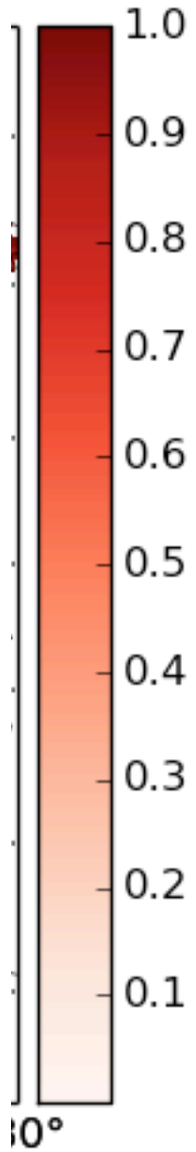
- Formulation established for Radiative Transfert, with spherical random-position leaves and sun at the Zenith !
  → Probably leads to too large BS fraction
  LAI = 1 → BS = 60%
  LAI = 2 → BS = 37 %
  LAI = 3 → BS = 22 %

- We should probably change the “clumping” factor (2) by a smaller number ?

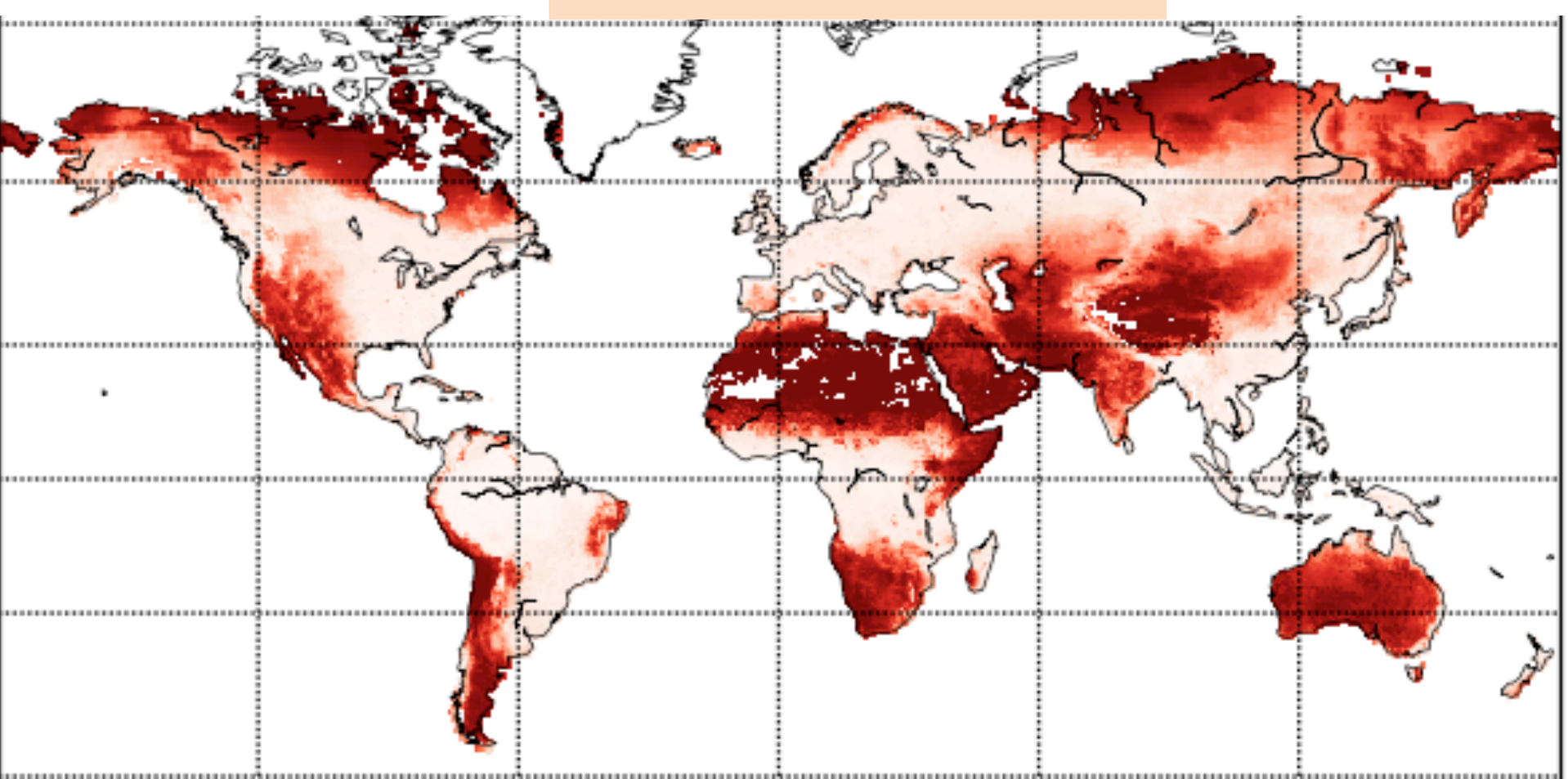
BS fraction in JUNE

EXP (-LAI / 2)

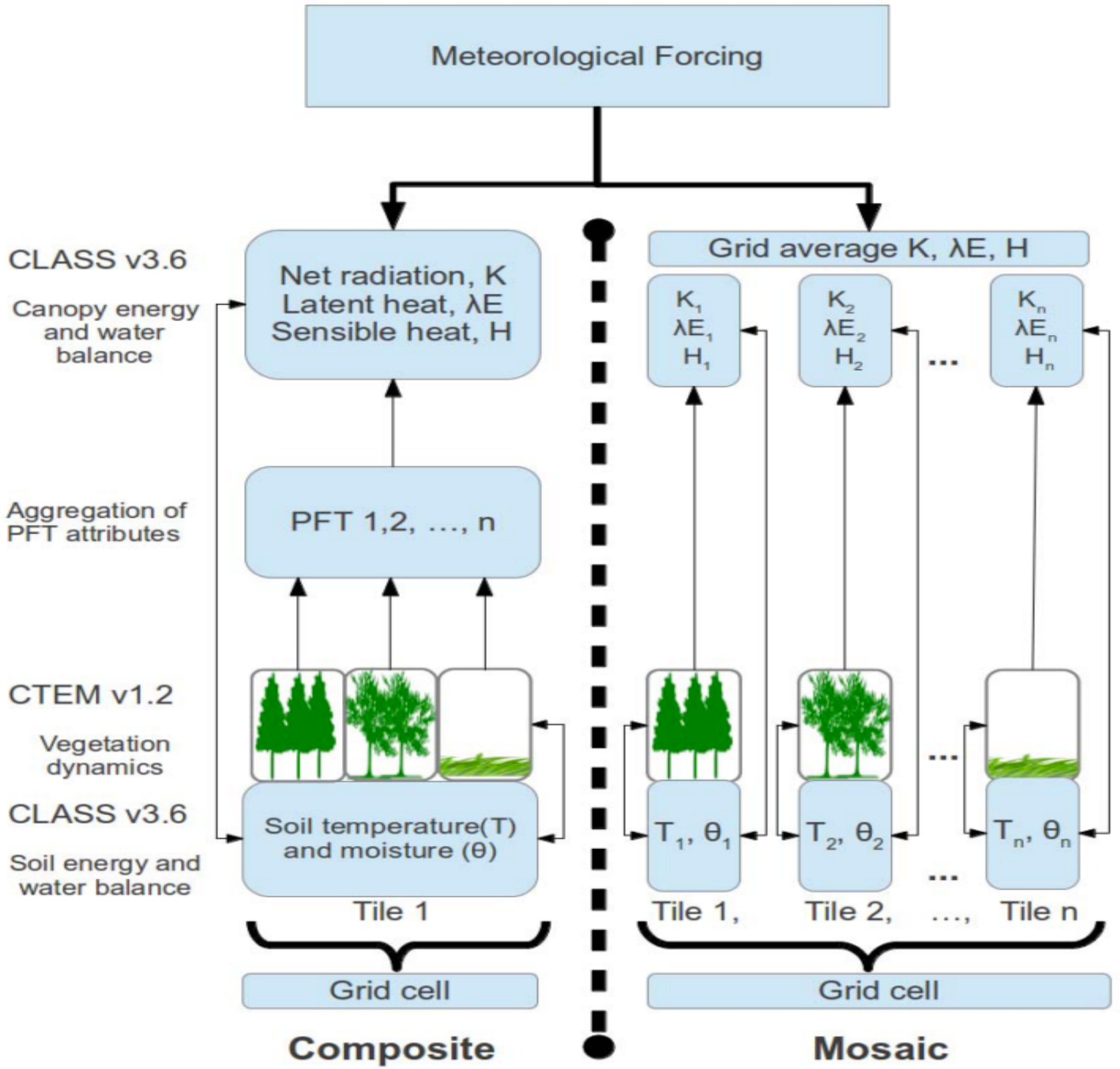




EXP (-LAI / 1)



Tiling issues: What is sub-grid cell variability?



(Melton & Arora, 2014)

Posing the question…

Differences of 5% between grid averaged heat fluxes when mosaic approach and composite approach are compared (Li & Arora, 2012; Melton & Arora, 2014)

Differences of ~30-40% between grid averaged NPP LAI, Soil Carbon and vegetation biomass (Li & Arora, 2012; Melton & Arora, 2014)

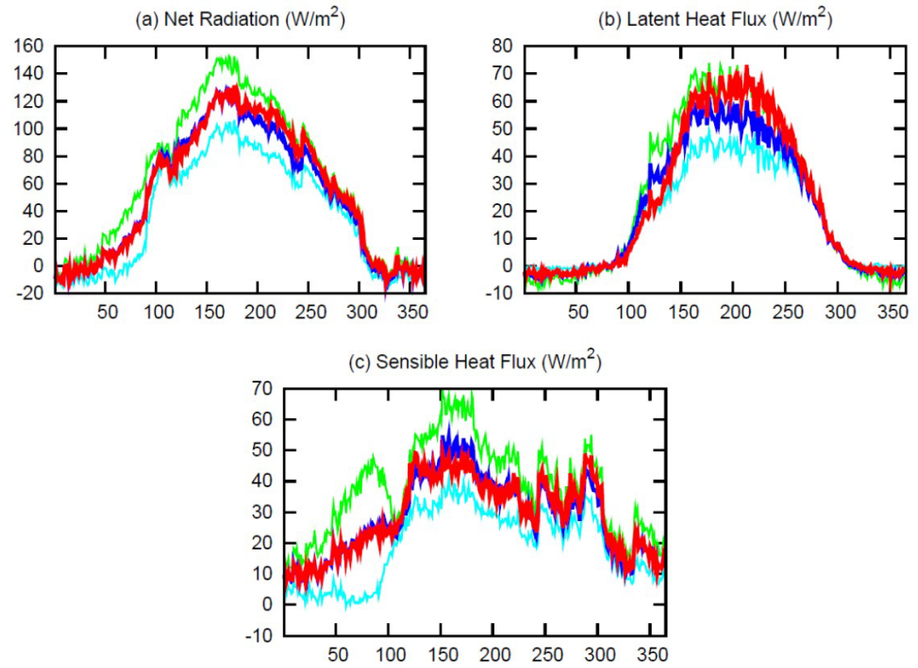
For high within cell heterogeneity, differences are greater in both instances

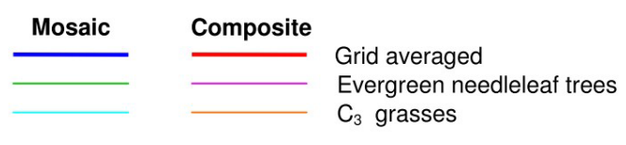
Mosaic or composite - which is correct?

Not yet verified on a large regional or global scale

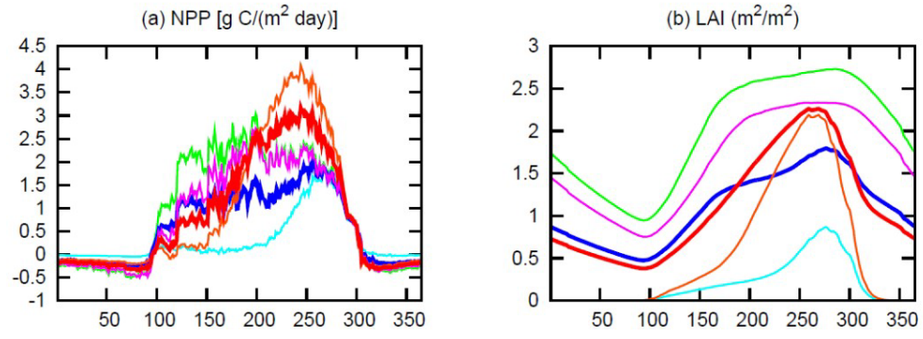
(Li & Arora, 2012)

Energy fluxes	Mosaic approach			Composite approach
	Grid averaged	Evergreen needleleaf trees	C_3 grasses	**Grid-averaged**
Net radiation (W m^{-2})	**51.0**	64.2	37.8	**53.1**
Net radiation over growing season (W m^{-2})	**86.7**	102.0	71.3	**90.0**
Latent heat flux (W m^{-2})	**21.2**	24.7	17.7	**23.3**
Sensible heat flux (W m^{-2})	**28.5**	37.9	19.0	**28.4**





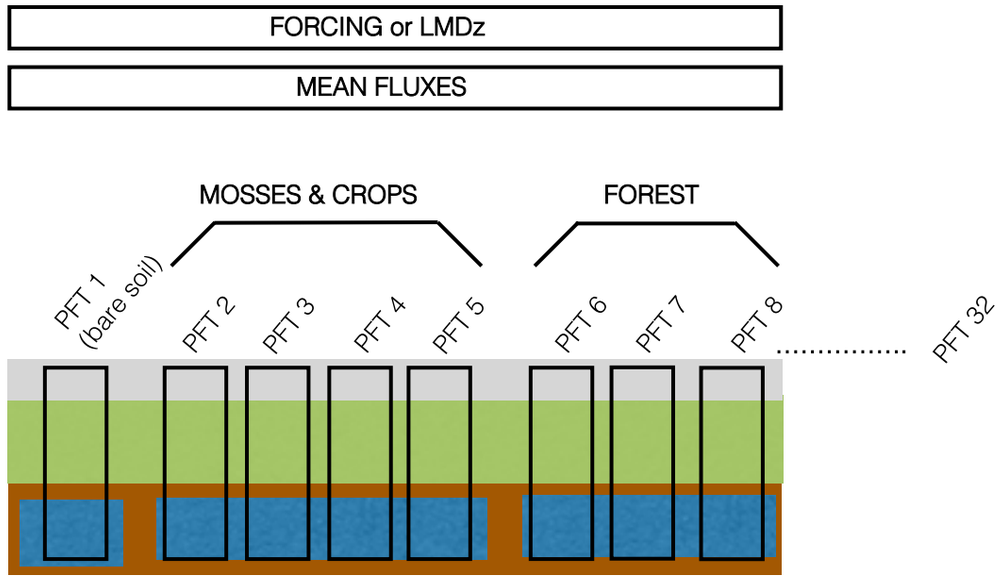
Carbon quantities	Mosaic approach			Composite approach		
	Grid-averaged	Evergreen needleleaf trees	C_3 grasses	**Grid-averaged**	Evergreen needleleaf trees	C_3 grasses
NPP (g C m^{-2} yr^{-1})	**234.1**	355.0	113.3	**316.8**	292.5	341.1
Max. LAI (m^2 m^{-2})	**1.8**	2.8	0.9	**2.3**	2.4	2.2
Soil carbon mass (Kg C m^{-2})	**6.1**	7.0	5.2	**8.9**	5.5	12.2
Vegetation biomass (Kg C m^{-2})	**2.5**	4.9	0.2	**2.1**	3.7	0.6



Options for ORCHIDEE in the sub-grid

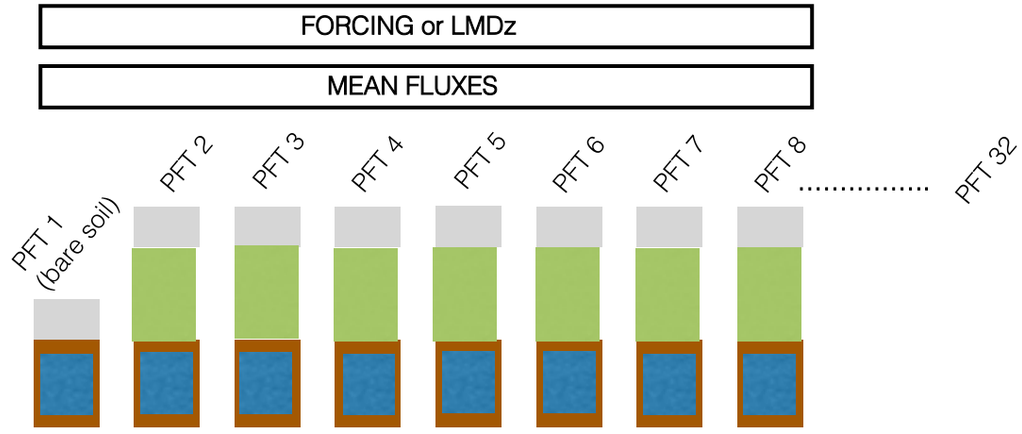
option 1 (current default)

- one global energy budget
- one snow budget
- three soil hydrology schemes



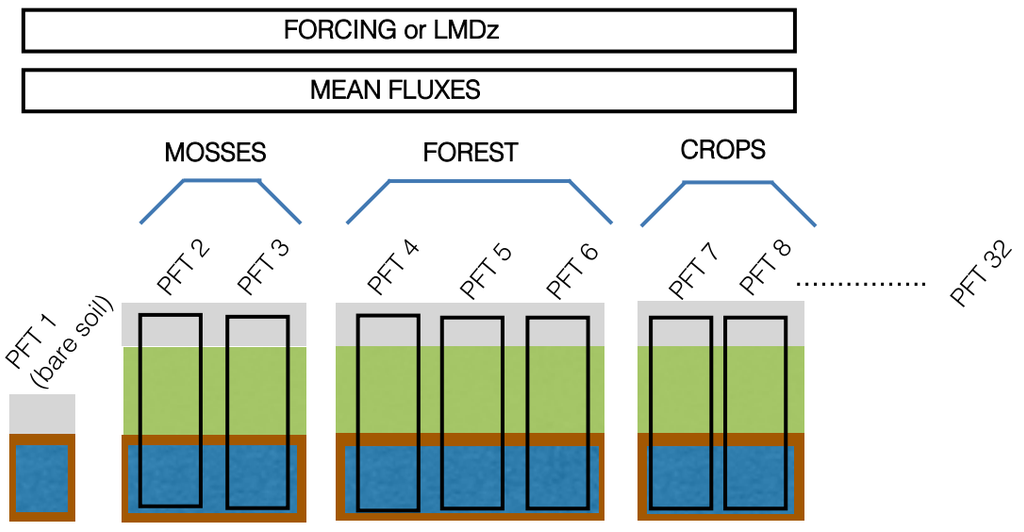
option 2 (maximum complexity)

- one global energy budget per PFT
- one snow budget per PFT
- one soil hydrology scheme per PFT



option 3 (intermediate complexity)

- one global energy budget per PFT grouping
- one snow budget per PFT grouping
- one soil hydrology scheme per PFT grouping



Potential questions ?

- Should we have other intermediate cases ?

- Do we want to separate Energy and Water “tiles” ?
  (Several energy budget for 1 soil Water column ? Or reverse ?

- Should we have different “grouping” for different regions ?

- How to implement the “grouping” in option 3 ?
  - one flag for the different options
  - how to define the grouping ?

- Later: possibility to have several Atmospheric columns

- Should it be similar for the soil Carbon/Nitrogen ?