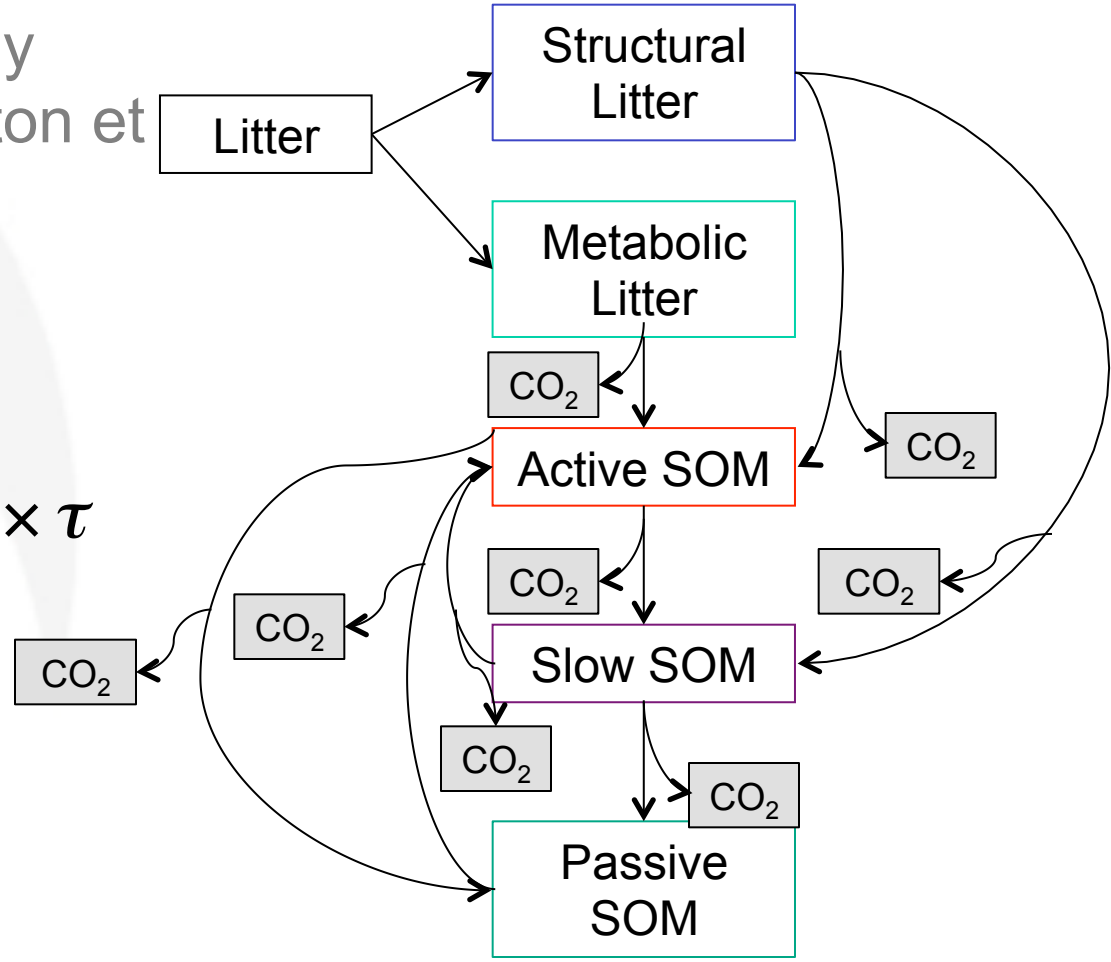
Multi tiling for the soil biogeochemistry in ORCHIDEE

THE SOIL BIOGEOCHEMISTRY IN ORCHIDEE 2.0

- Soil representation mainly based on CENTURY (Parton et al., 1987).

$$\frac{\partial SOC}{\partial t} = I - k \times SOC \times \theta \times \tau$$



THE SOIL BIOGEOCHEMISTRY IN ORCHIDEE 2.0

- Split between stomate_litter.f90 and stomate_soilcarbon.f90
- Run at ½ hourly time-step whereas stomate runs at daily time-step.
- Moisture and temperature function calculated in stomate_litter.f90

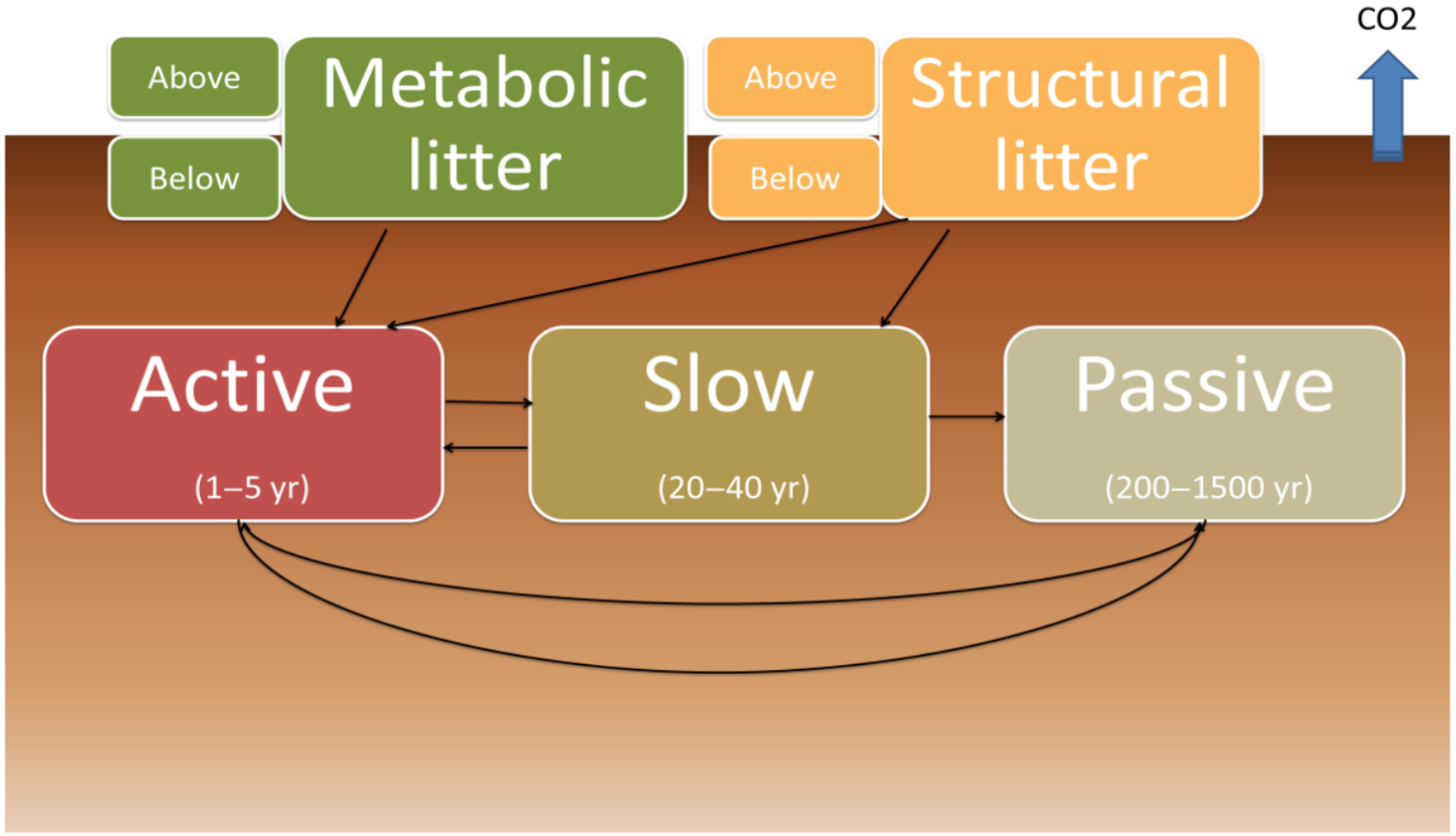
$$\tau = Q_{10}^{(T - Topt)/10}$$

$$\theta = Max(0.25, Min(1, M))$$

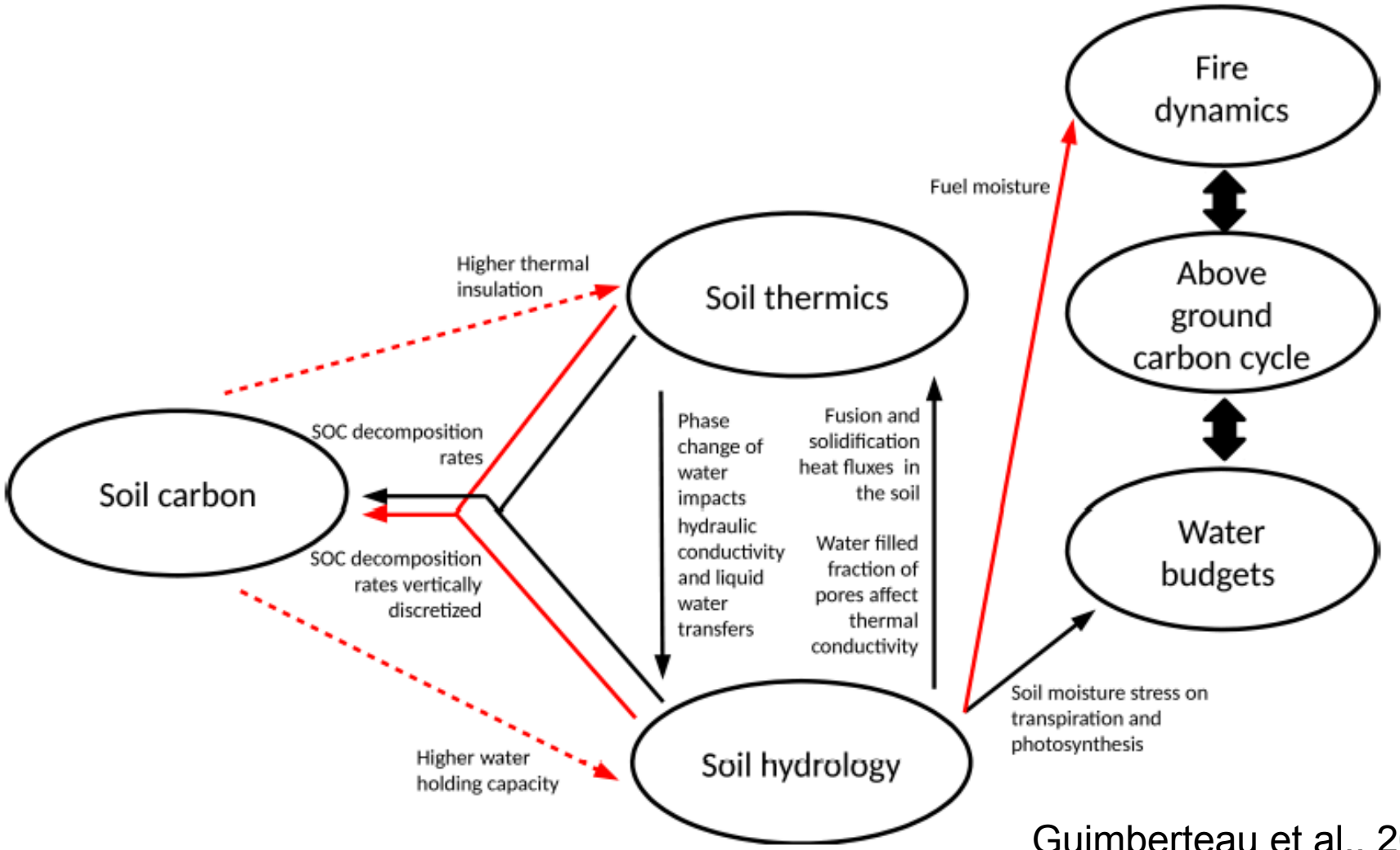
$$M = -1.1 * SM^2 + 2.4 * SM - 0.29$$

THE SOIL BIOGEOCHEMISTRY IN ORCHIDEE 2.0

No discretization with depth

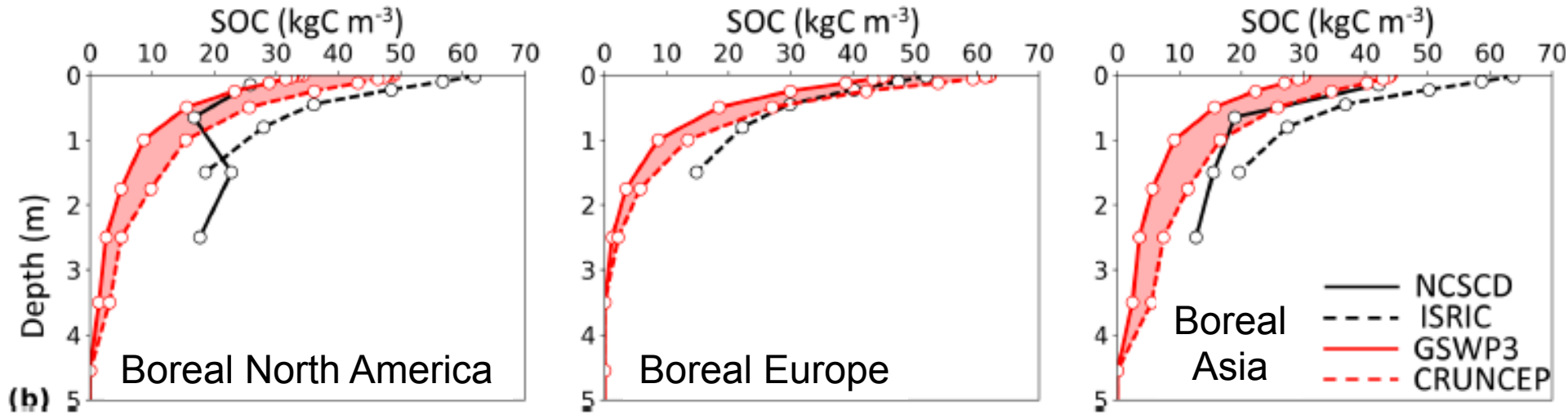


THE SOIL BIOGEOCHEMISTRY IN ORCHIDEE-MICT



Guimberteau et al., 2018

THE SOIL BIOGEOCHEMISTRY IN ORCHIDEE-MICT



Guimberteau et al., 2018

SOIL DISCRETIZATION SCHEME IN ORCHIDEE TRUNK

- Discretization scheme from MICT including cryoturbation/ bioturbation is now incorporated into the trunk
- Effect of soil freezing on decomposition
- MICT doesn't have explicit N.
- Soil N also discretized
- Mineral N pools is so far not discretized just the sum of the N mineralized at each layers
- No effect of soil C or N profile on N uptake by plants
- Test are ongoing with this version so far a problem of water stress has been identifed but the model runs at global scale with no crash.