

Integrate a representation of DOC production in terrestrial ecosystems within the soil column, and export DOC to the MOSART river network via lateral transport.



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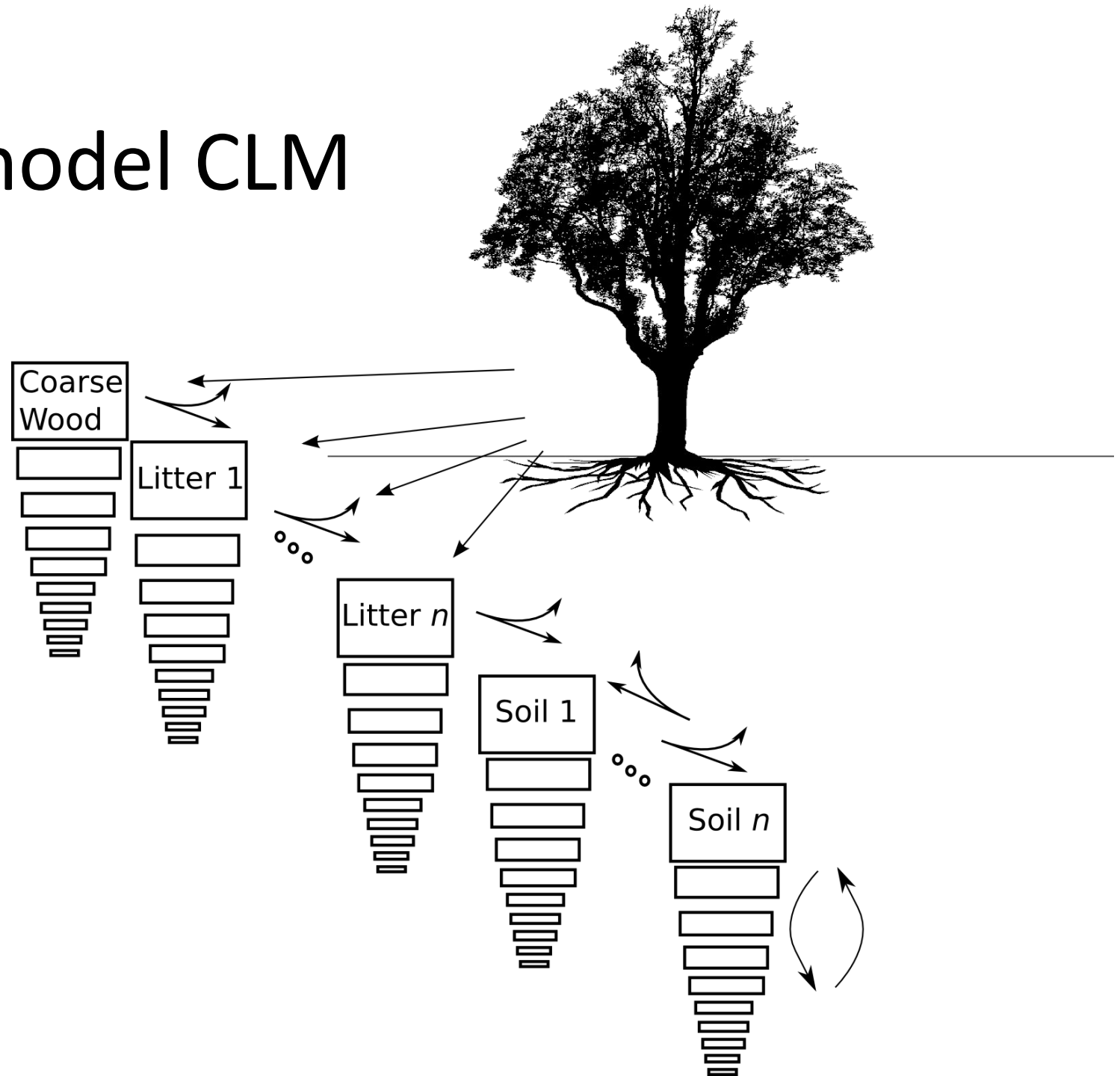


UiO : **University of Oslo**

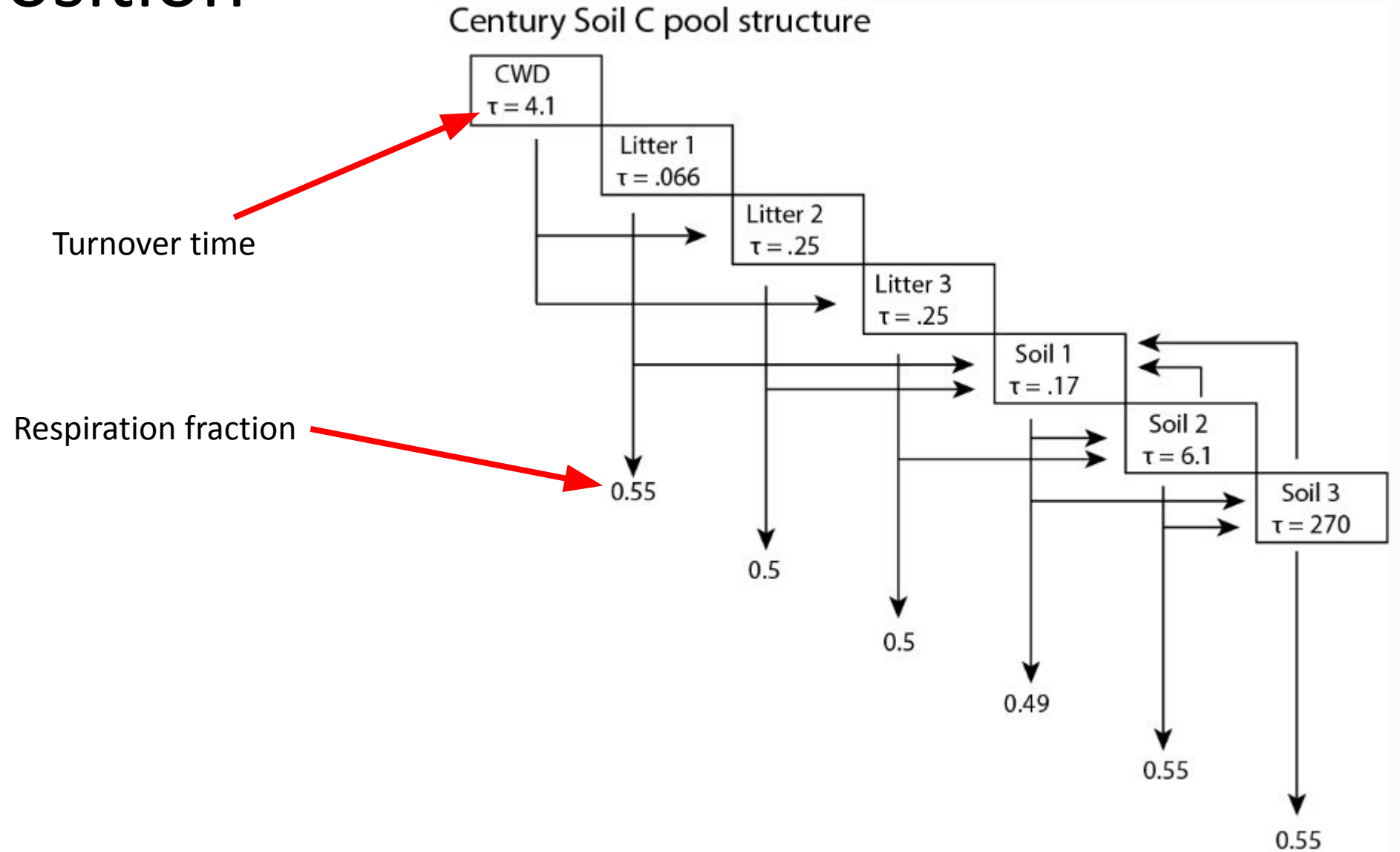
Dissolved organic matter (DOM)

- DOM is defined as the organic matter fraction in solution that passes through a 0.45 μm filter.
- DOM is often quantified by its carbon content and referred to as DOC.
- Yearly lateral flux of carbon from soils to running waters may amount to about a 5th of net ecosystem carbon exchange ($\sim 400 \text{ TgC/yr}$) (Bowring et al 2019; McGuire et al 2009).

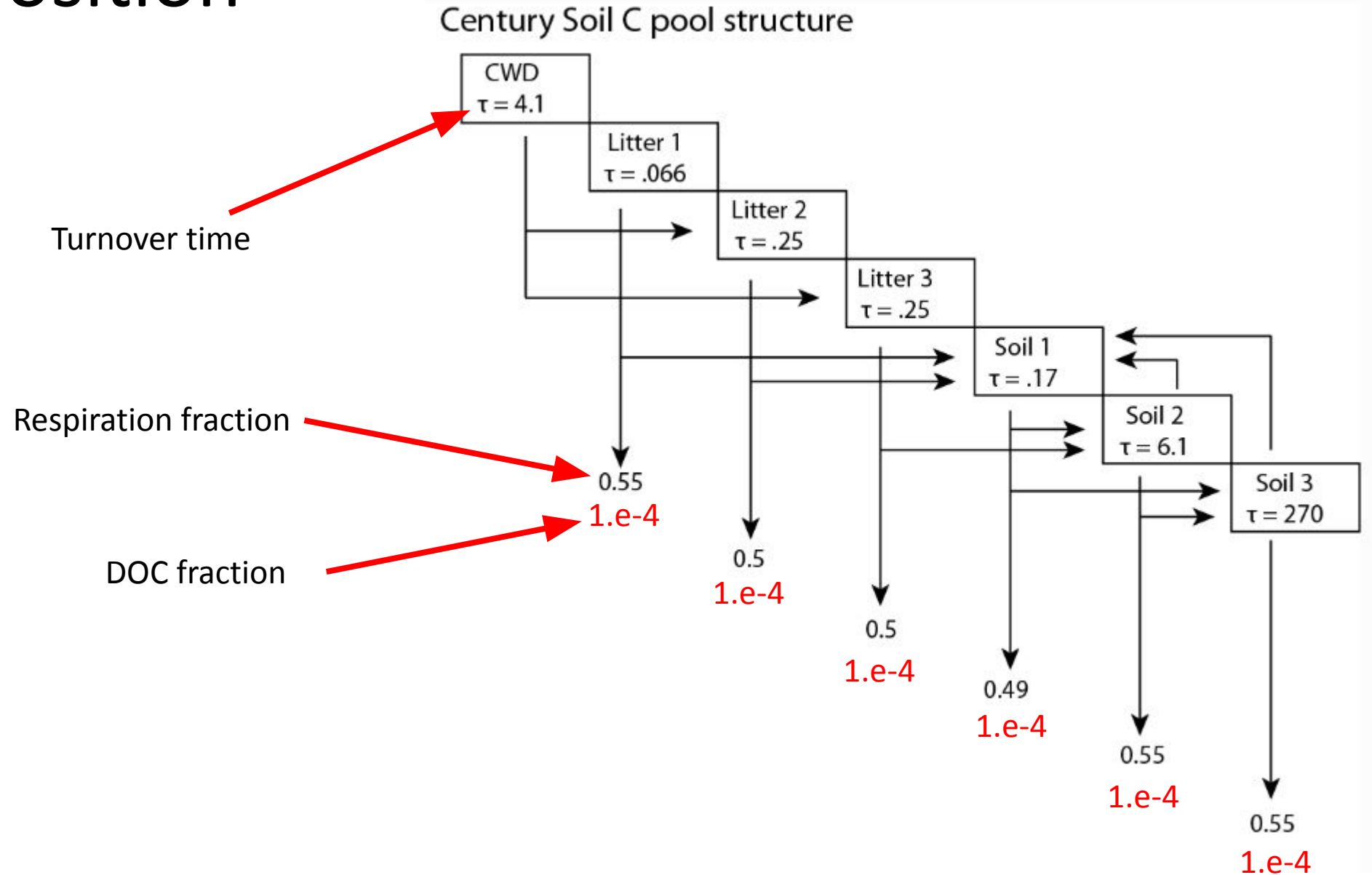
Decomposition model CLM



Decomposition cascade



Decomposition cascade



Carbon balance of the decomposing pool

$$\frac{\partial C_i}{\partial t} = R_i + \sum_{j \neq i} (i - r_j) T_{ji} k_j C_j - k_i C_i$$

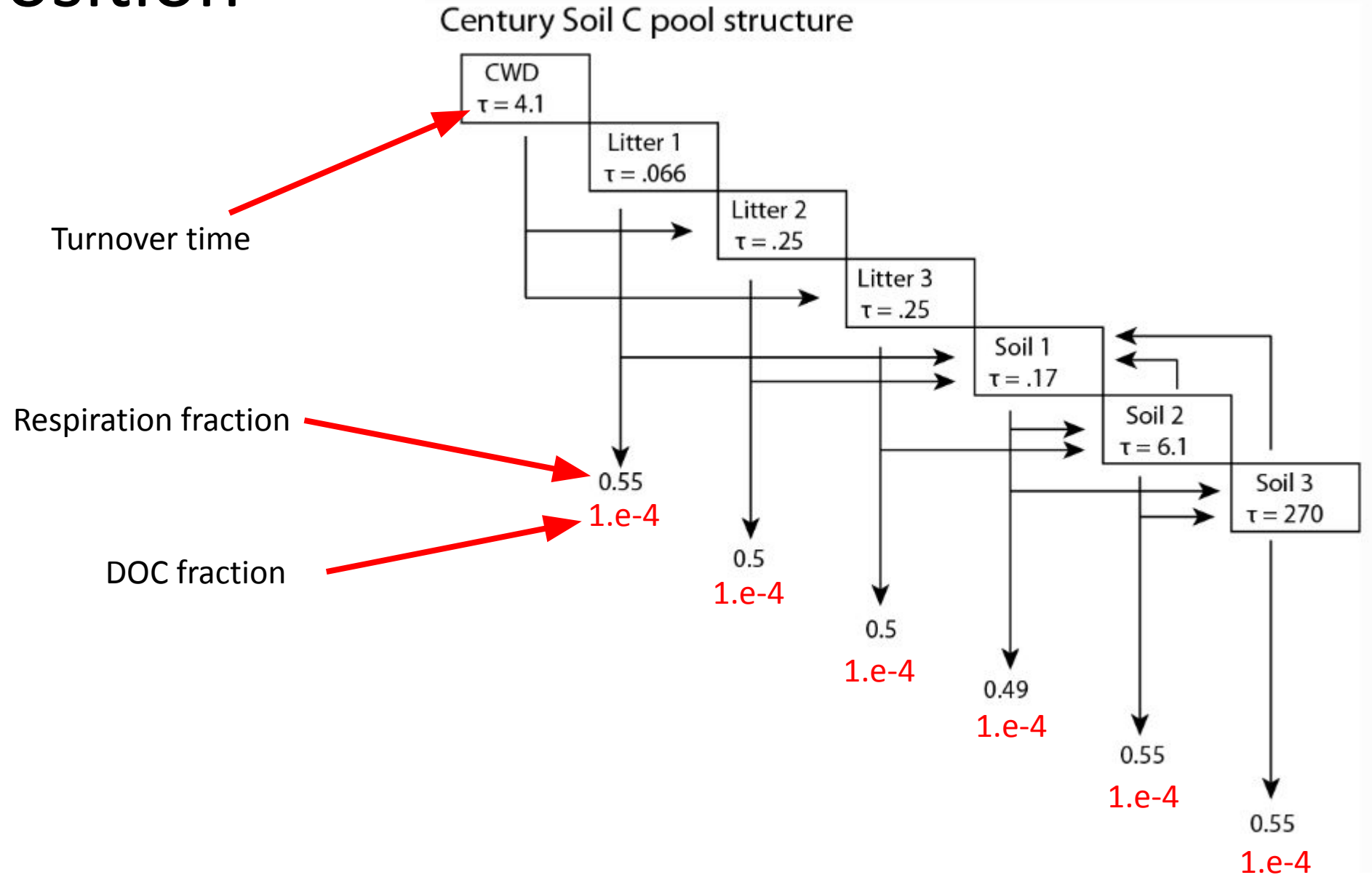
- C_i is the carbon content of pool i
- R_i is the carbon input from plant tissues directly to pool i
- K_i is the decay constant of pool i
- T_{ji} is the fraction of carbon redirected from pool j to pool i
- R_j is the respiration fraction

Carbon balance of the decomposing pool

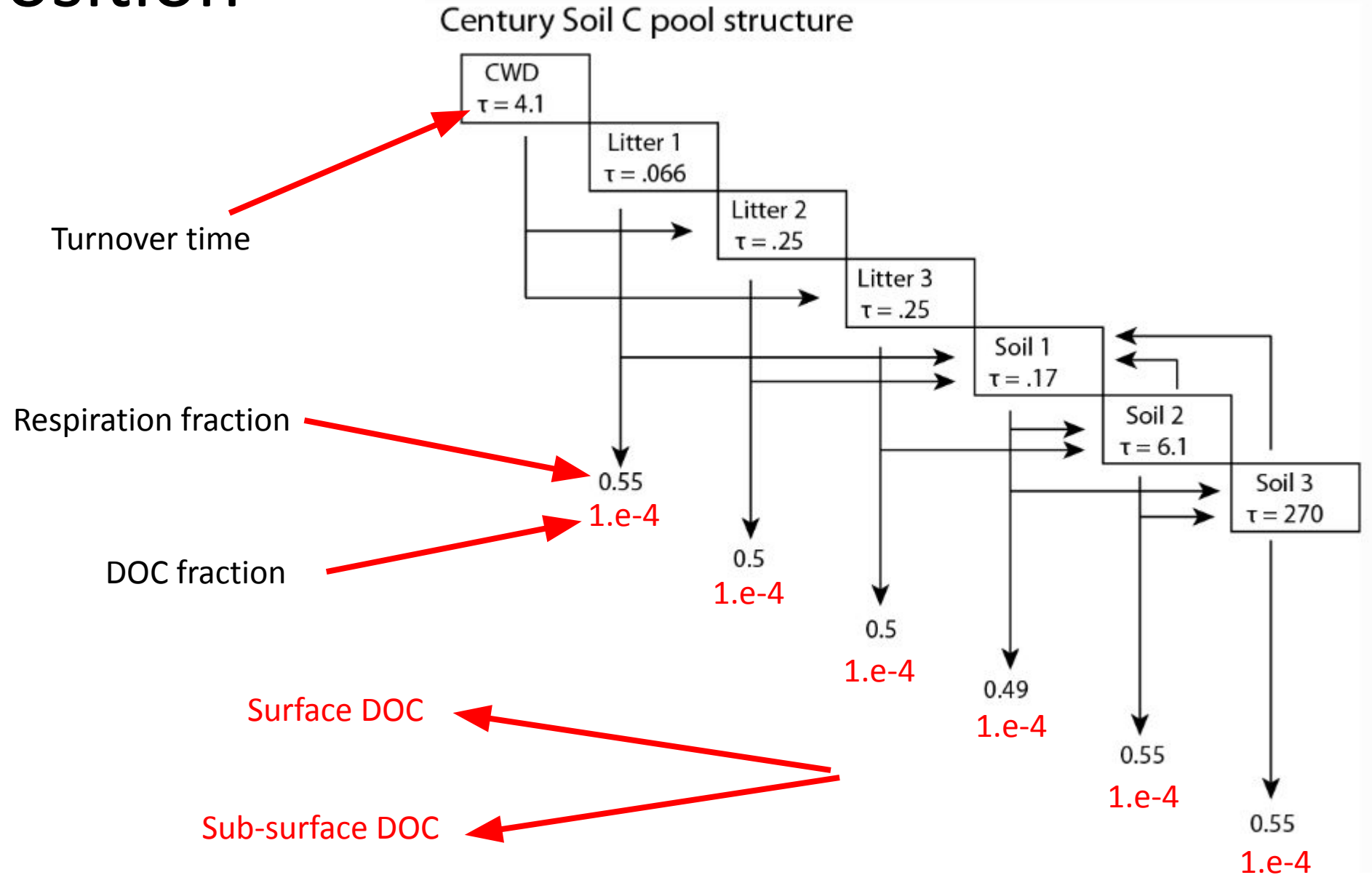
$$\frac{\partial C_i}{\partial t} = R_i + \sum_{j \neq i} (i - r_j - rdoc) T_{ji} k_j C_j - k_i C_i$$

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Decomposition cascade

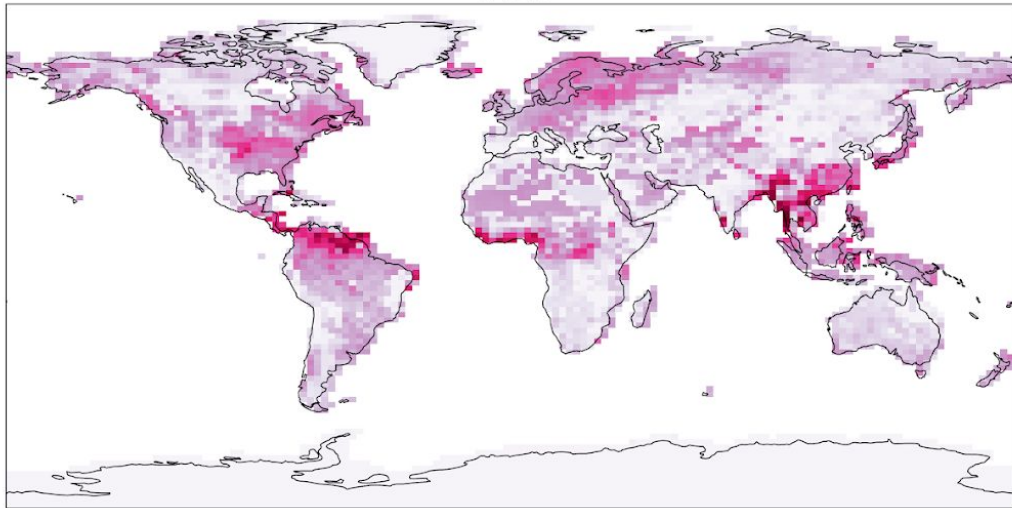


Decomposition cascade

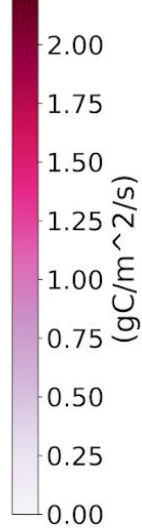


CTSM

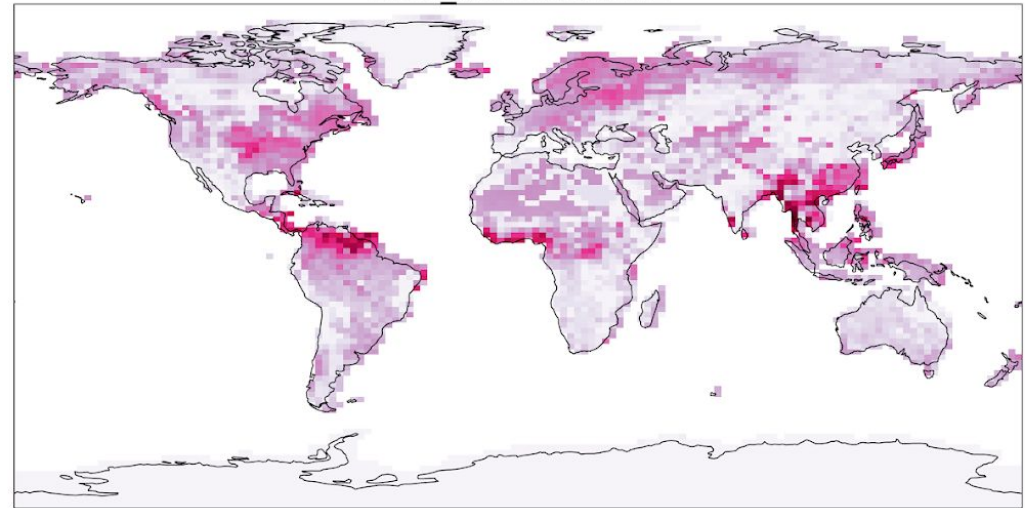
DOC



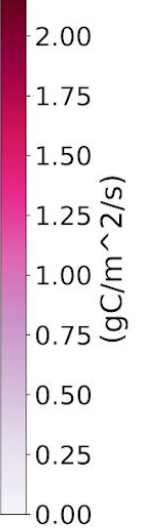
1e-8



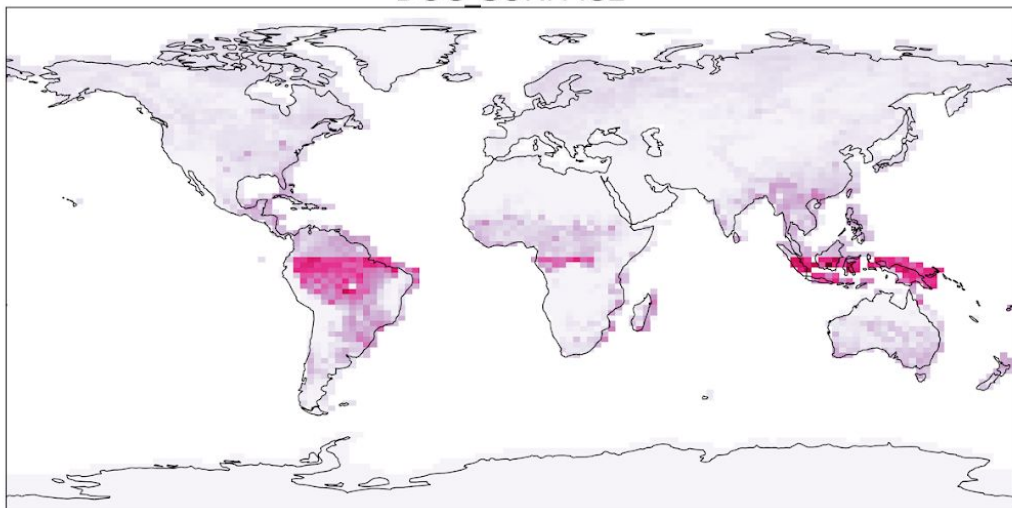
DOC SUBSURFACE



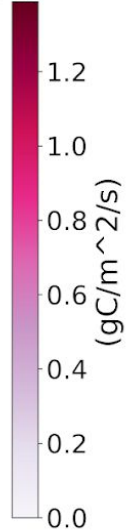
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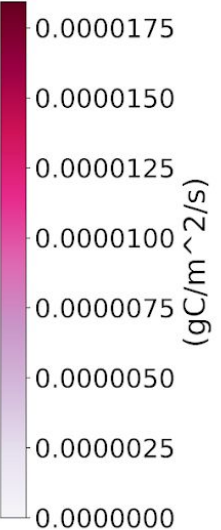
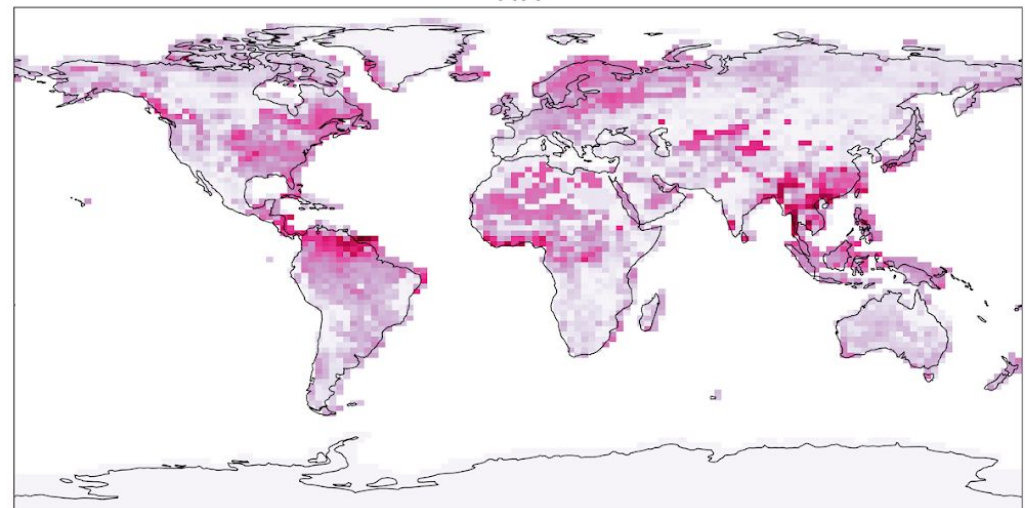
DOC SURFACE



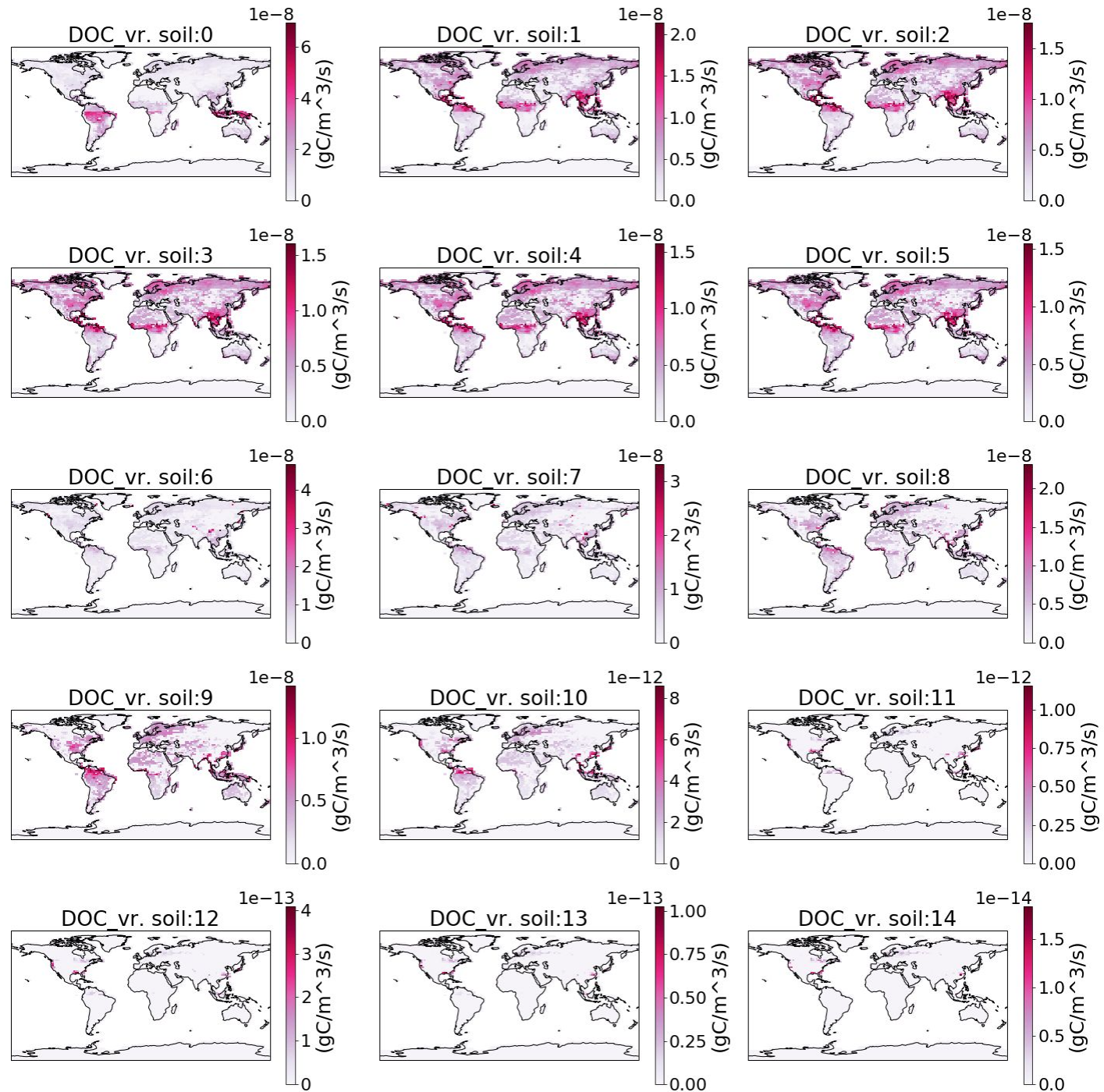
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HR

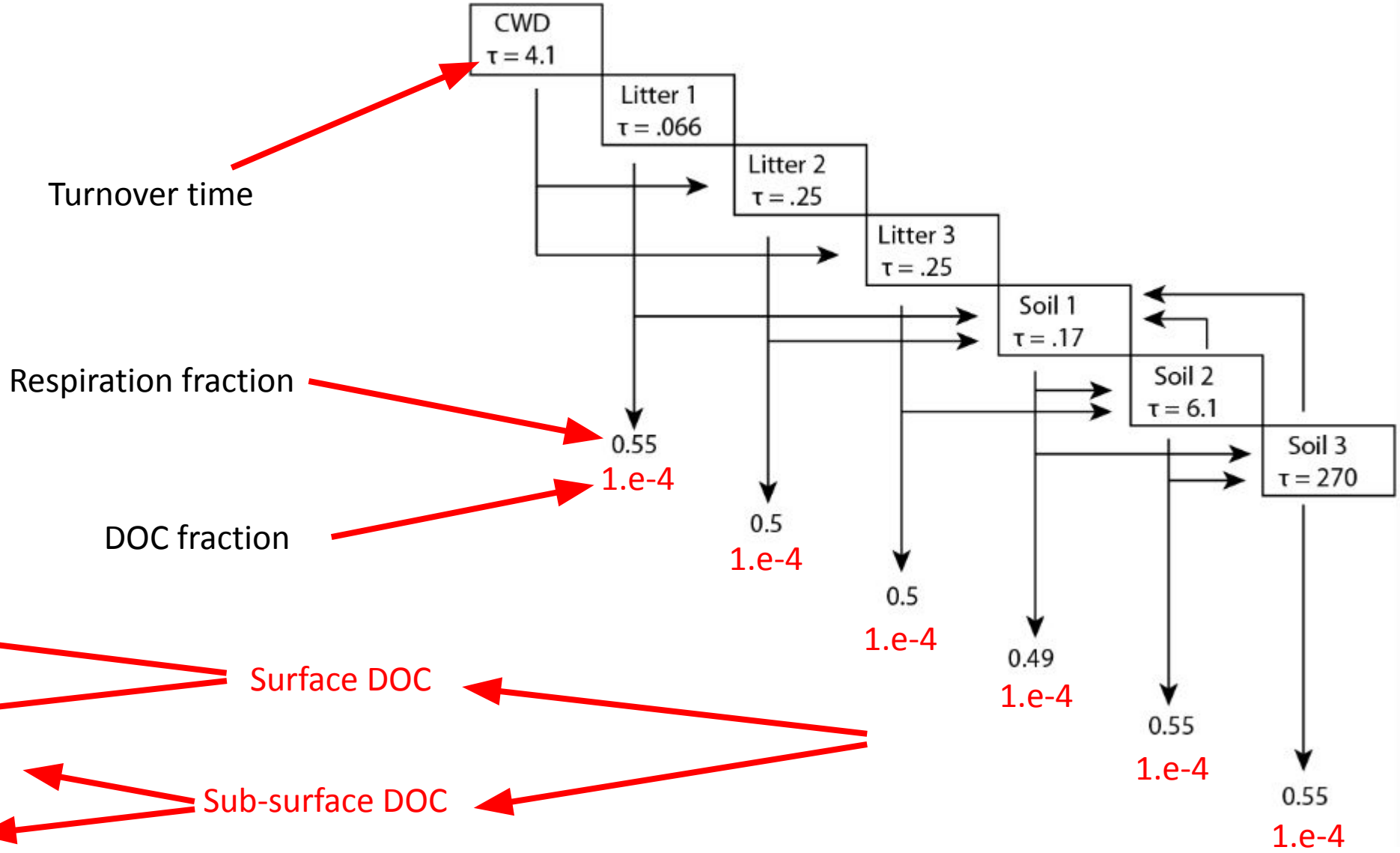


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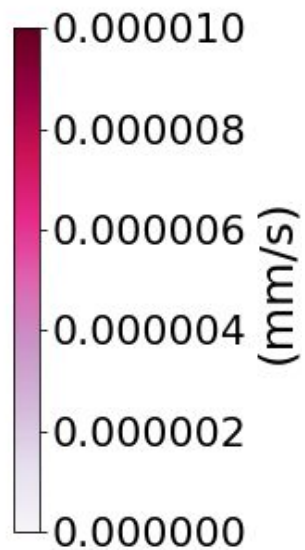
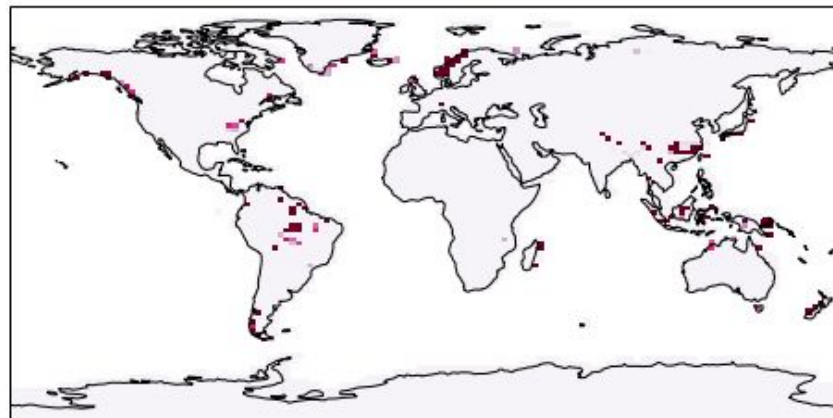
Decomposition cascade

Century Soil C pool structure

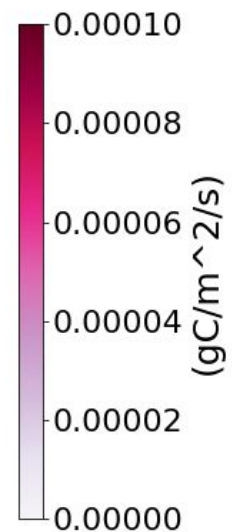
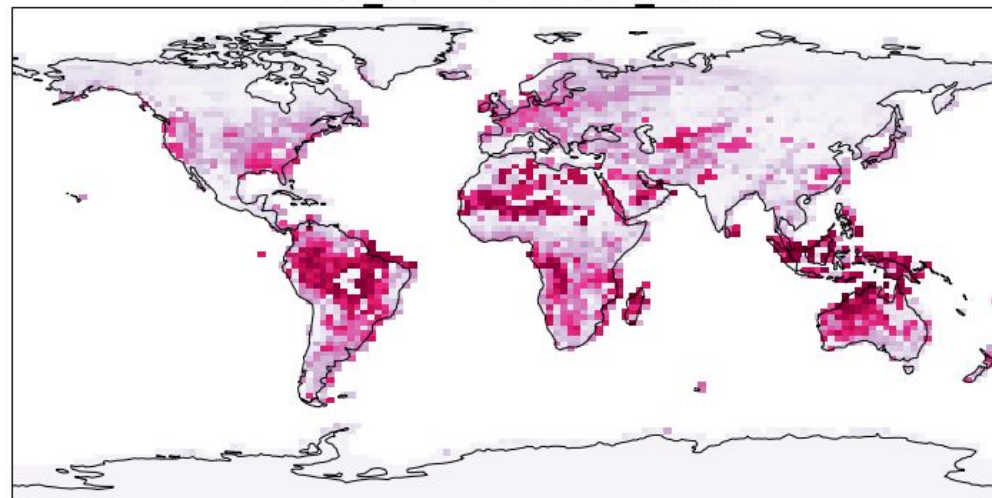


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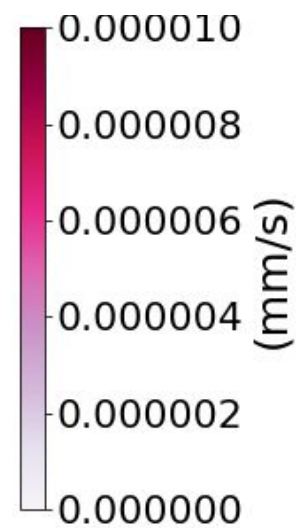
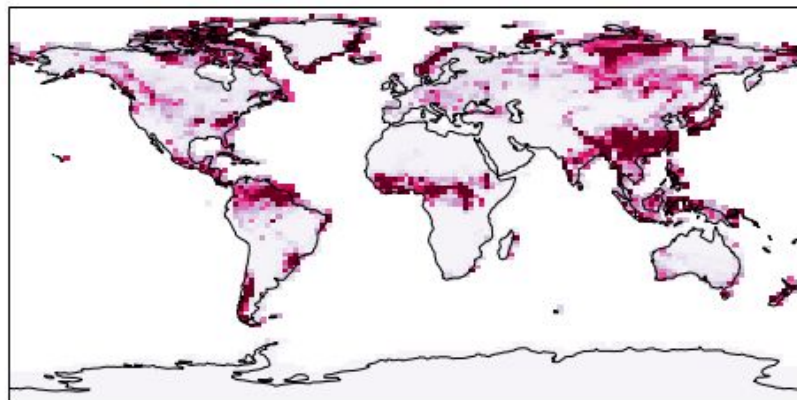
Subsurface runoff



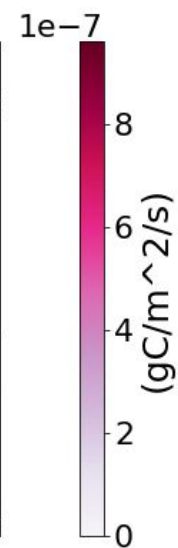
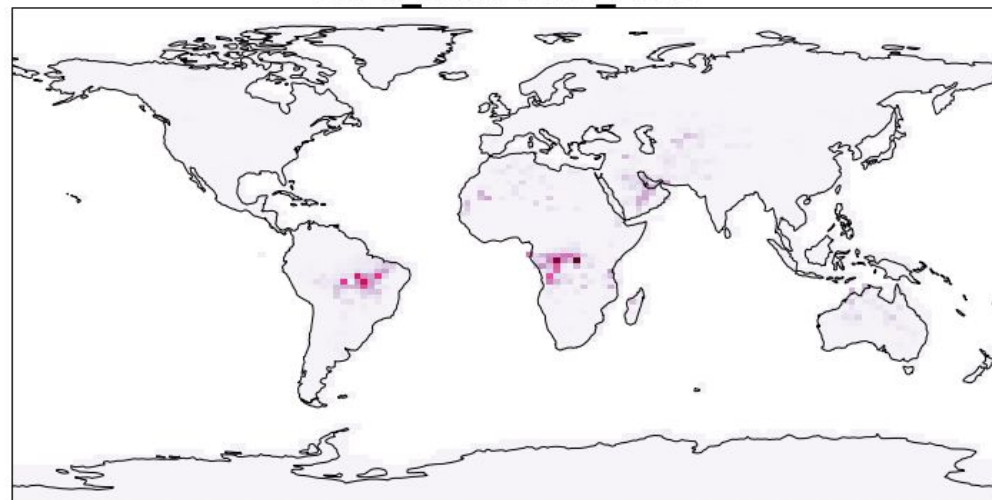
DOC SUBSURFACE_ACC



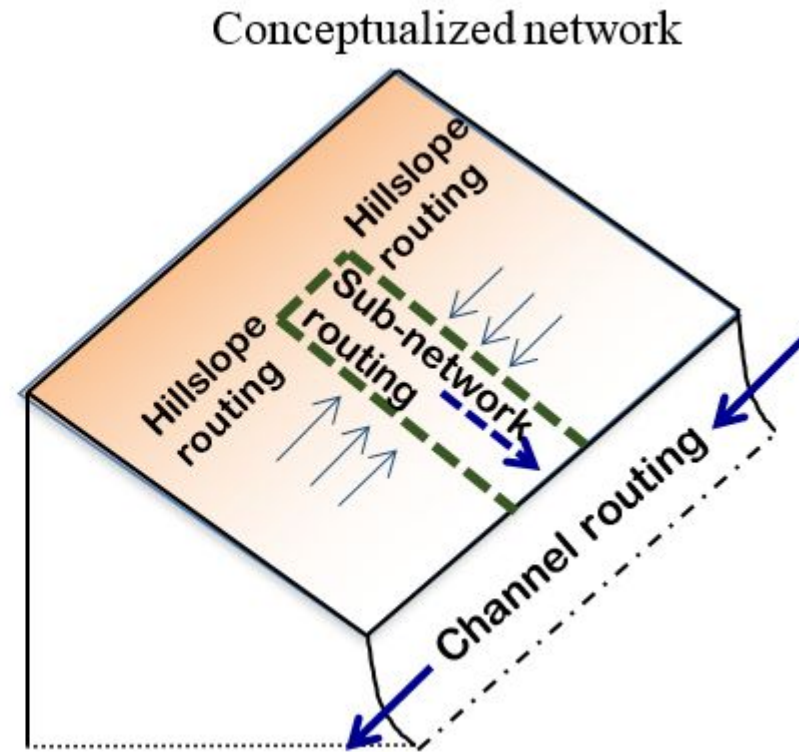
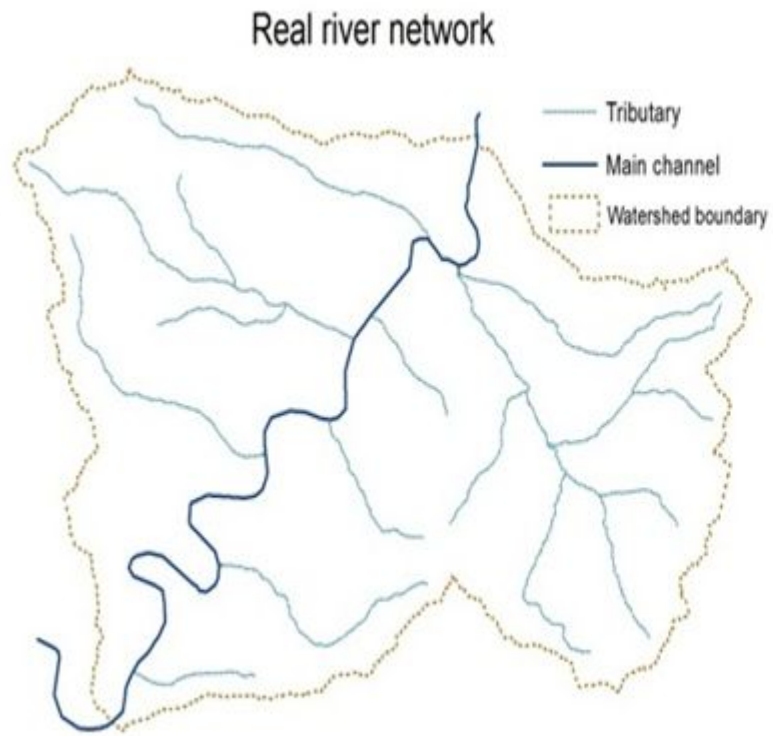
Surface water runoff



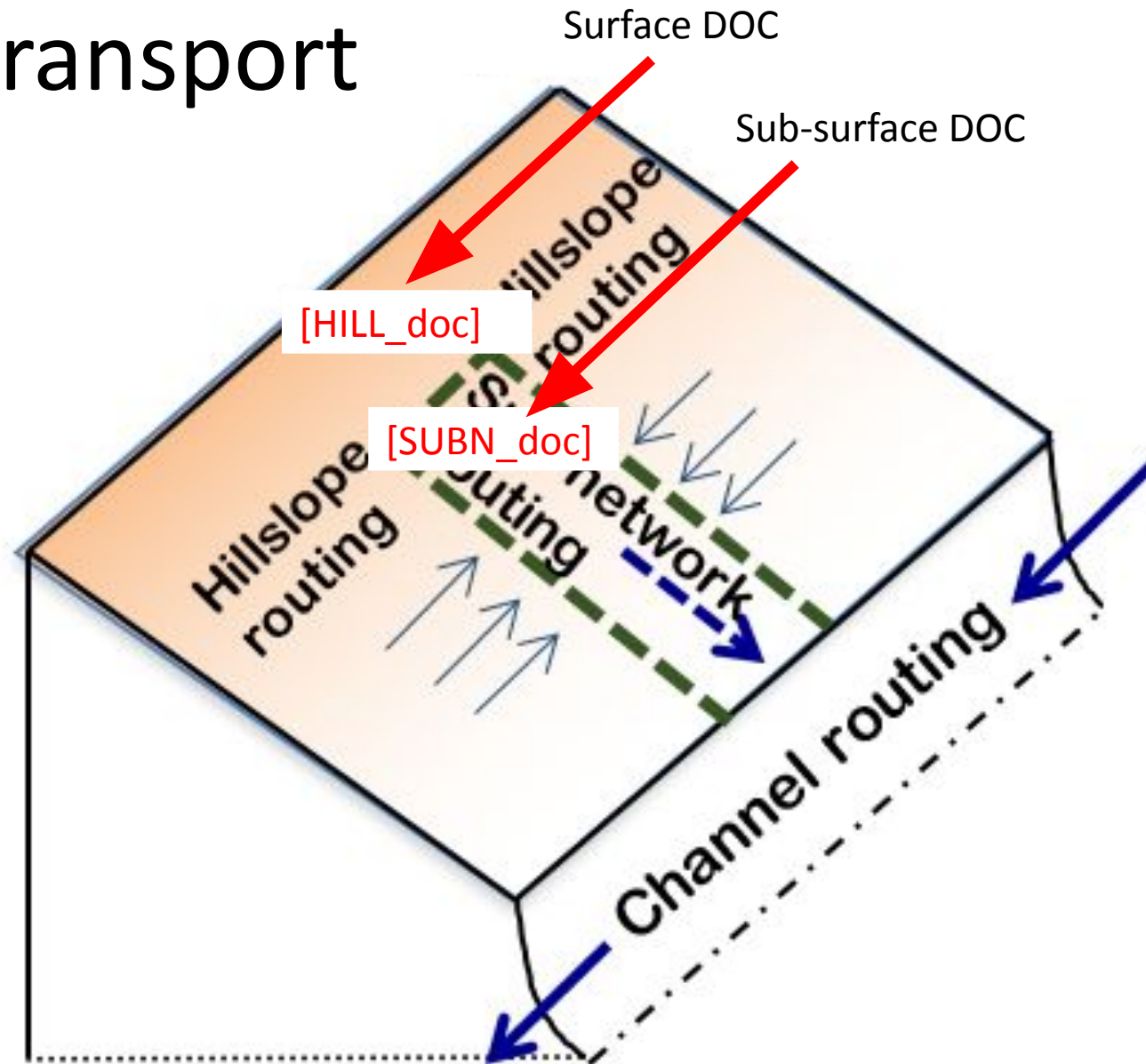
DOC SURFACE_ACC



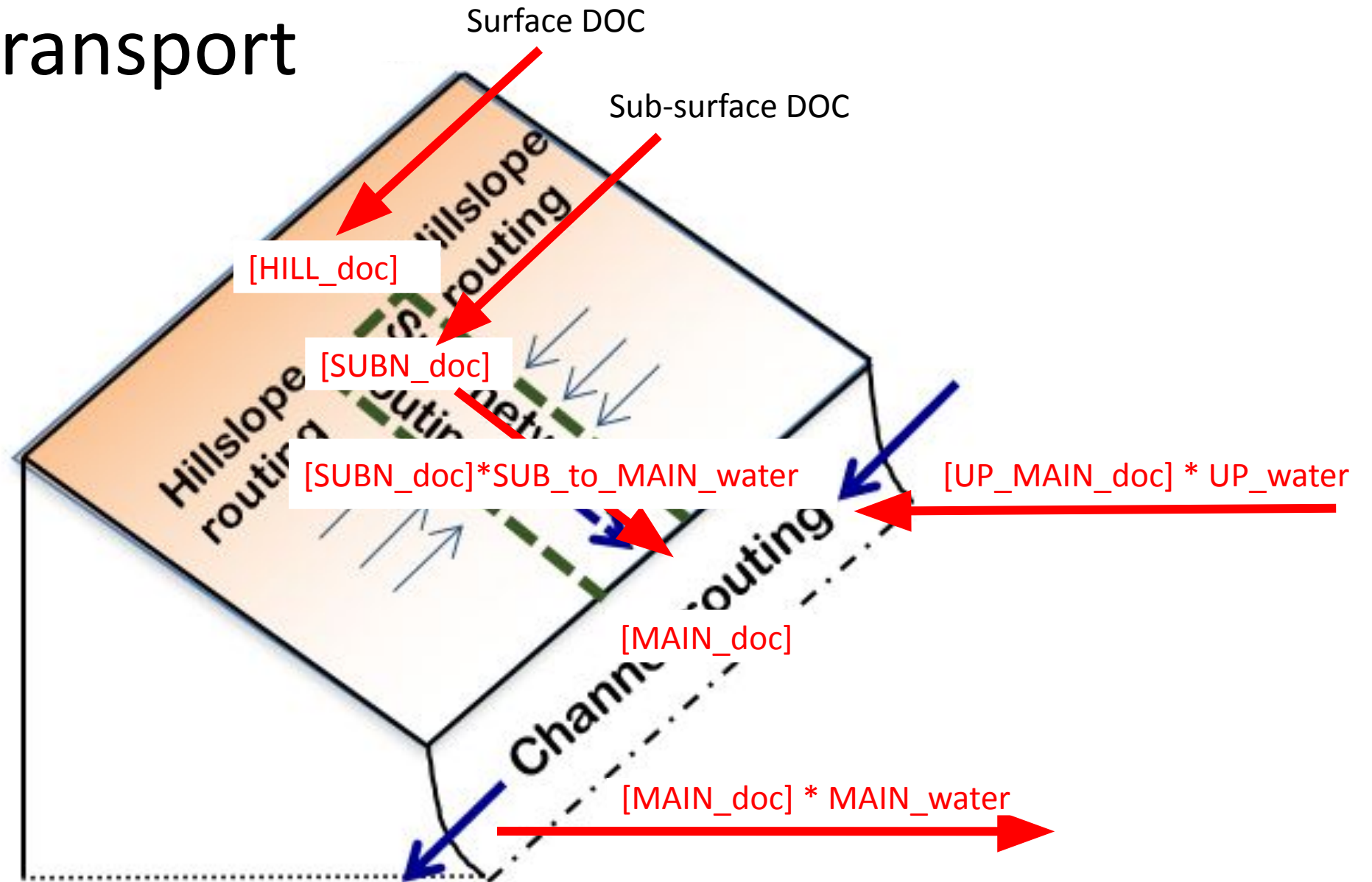
Mosart transport



Mosart transport

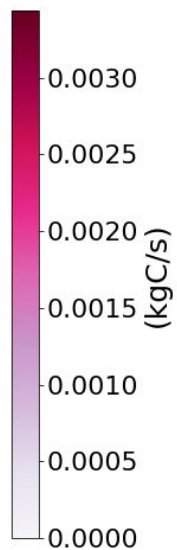
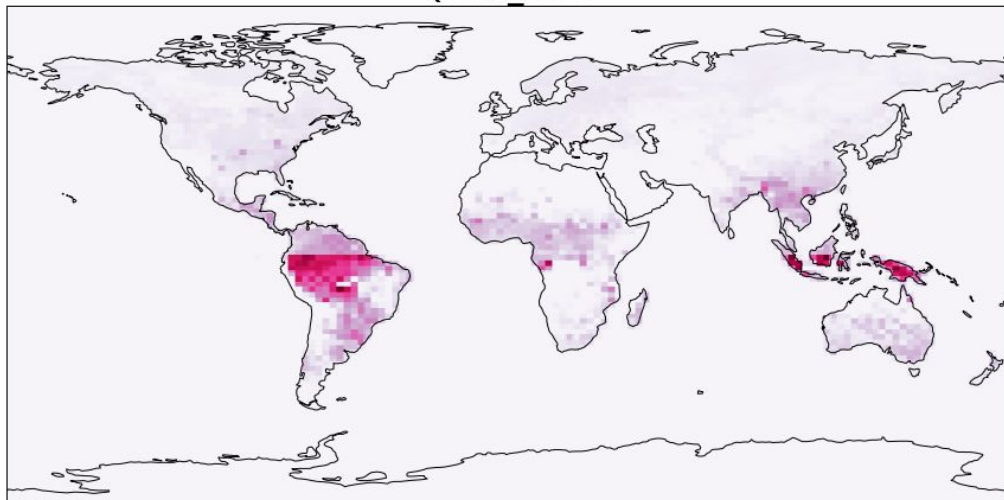


Mosart transport

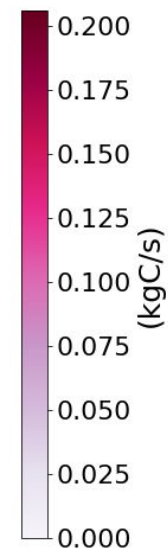
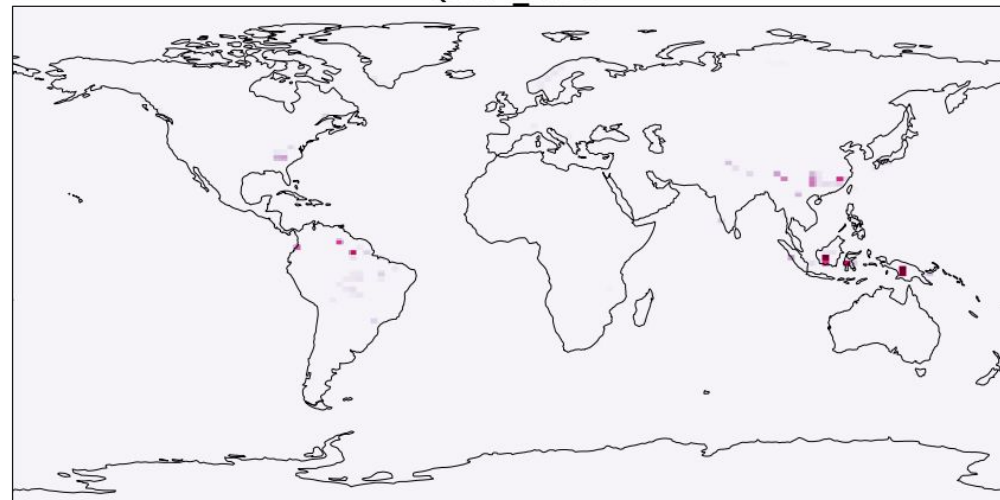


MOSART INPUT

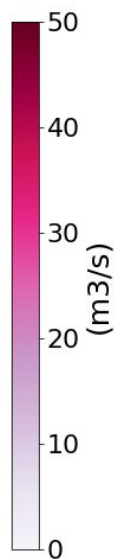
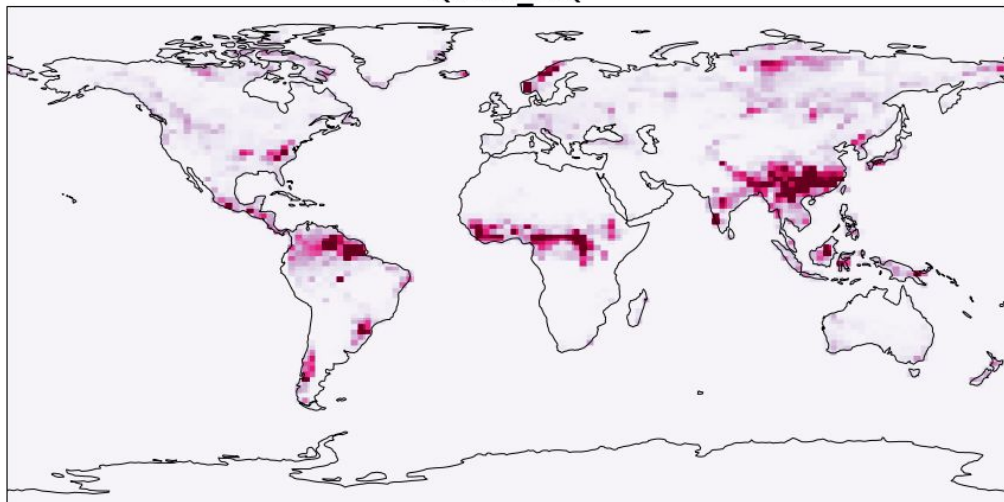
QSUR_DOC



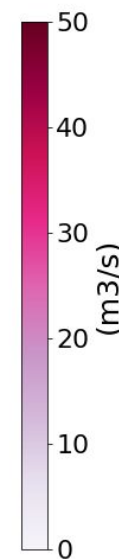
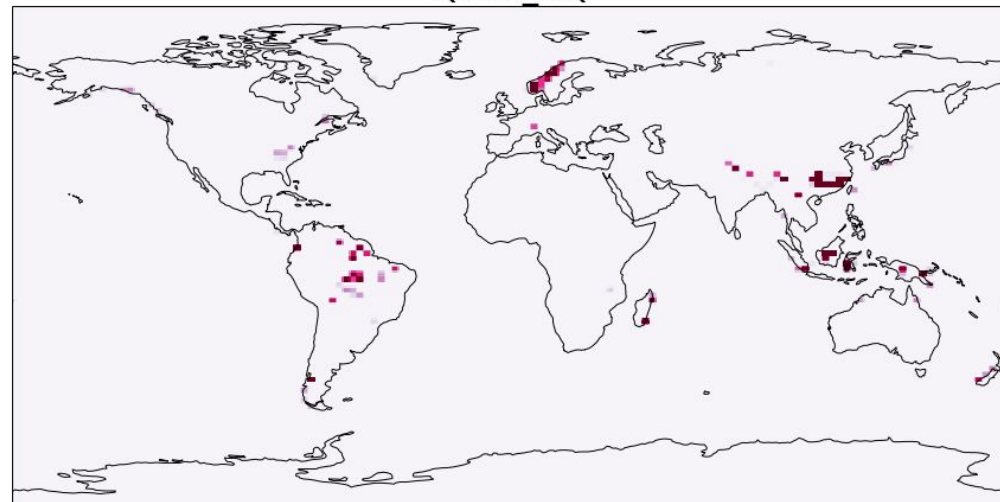
QSUB_DOC



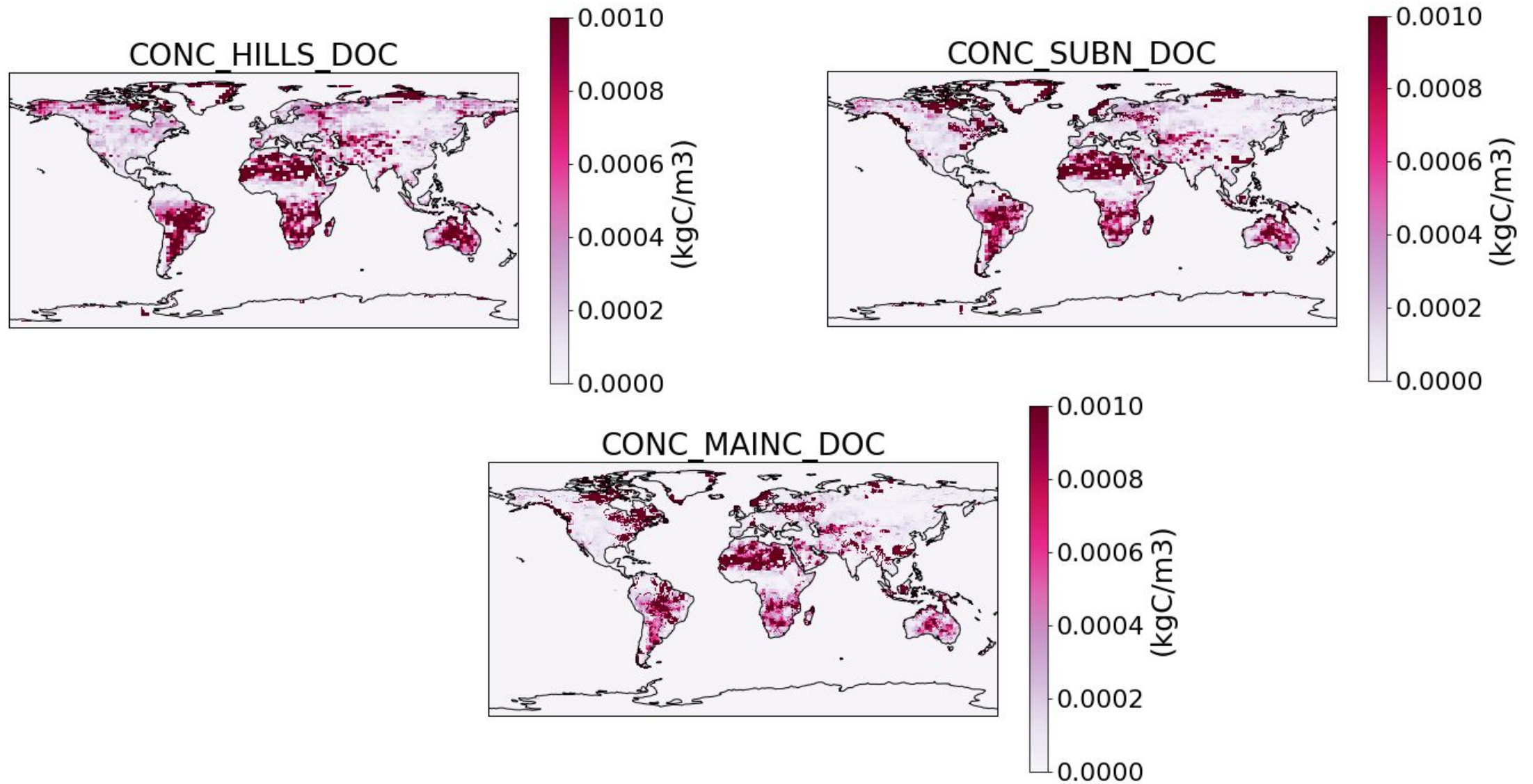
QSUR_LIQ



QSUB_LIQ

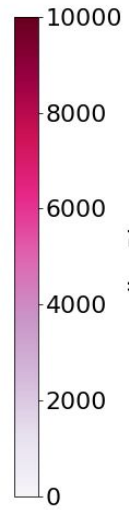
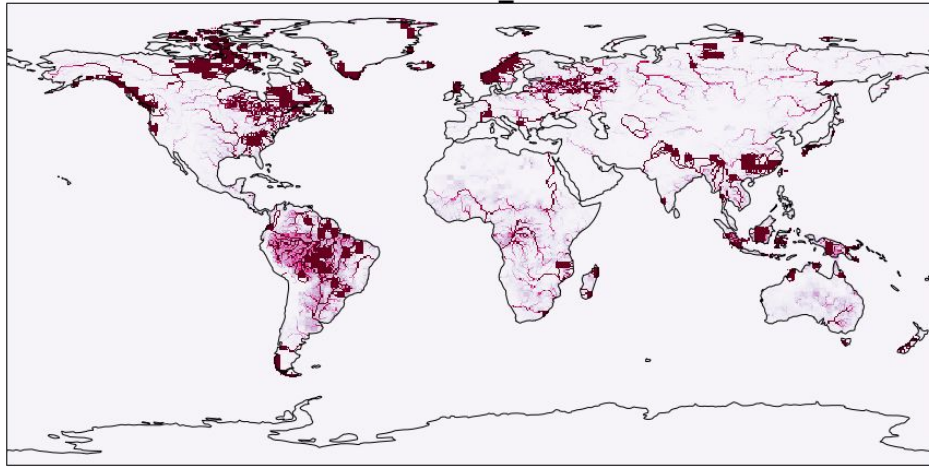


MOSART

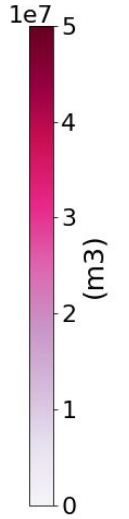
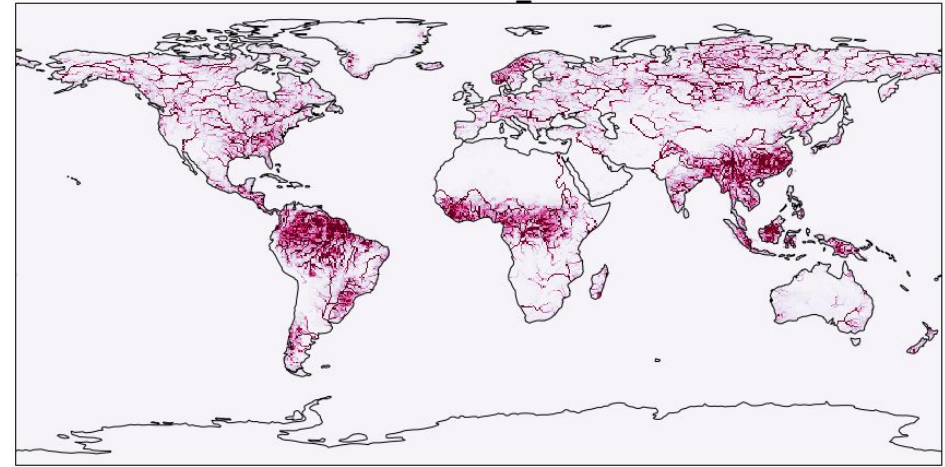


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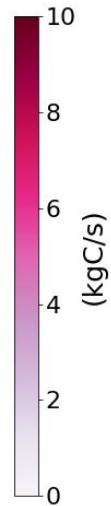
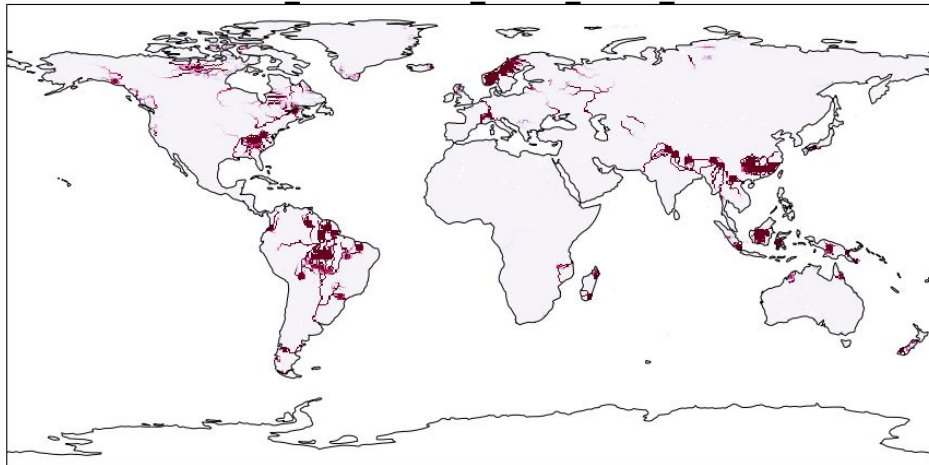
STORAGE_DOC



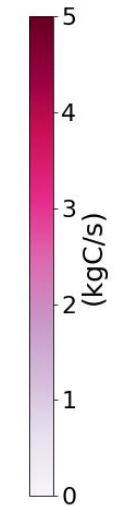
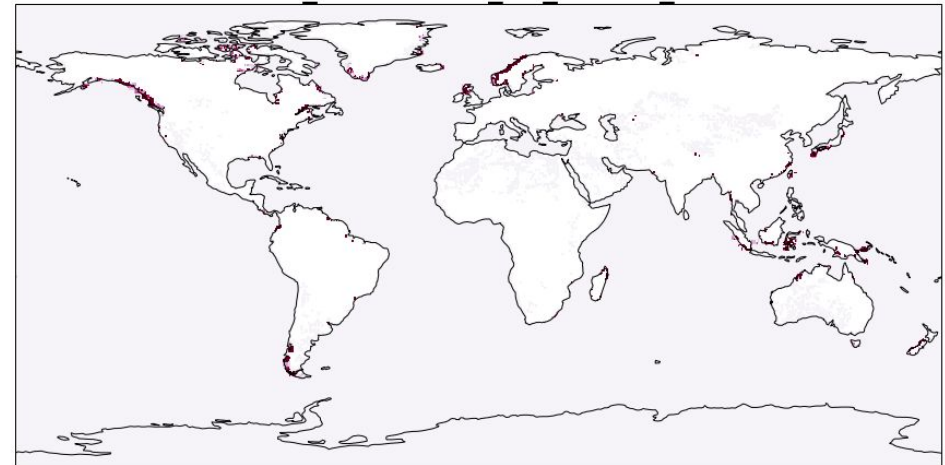
STORAGE_LIQ



RIVER_DISCHARGE_OVER_LAND_DOC



RIVER_DISCHARGE_TO_OCEAN_DOC



Outlook

- Verify DOC mass balance is ~ 0 by integrating over time
- Compare DOC discharge with observations
- Improve the DOC production parameters/equation in (or instead of) the CTSM decomposition cascade.
- Differentiate recalcitrant and labile DOC, and decomposition in the river and on land for the accumulated pools
- Add DON tracer in existing DOM structure
- Flooding of DOM back to land
- Add DOM sink in Ocean model