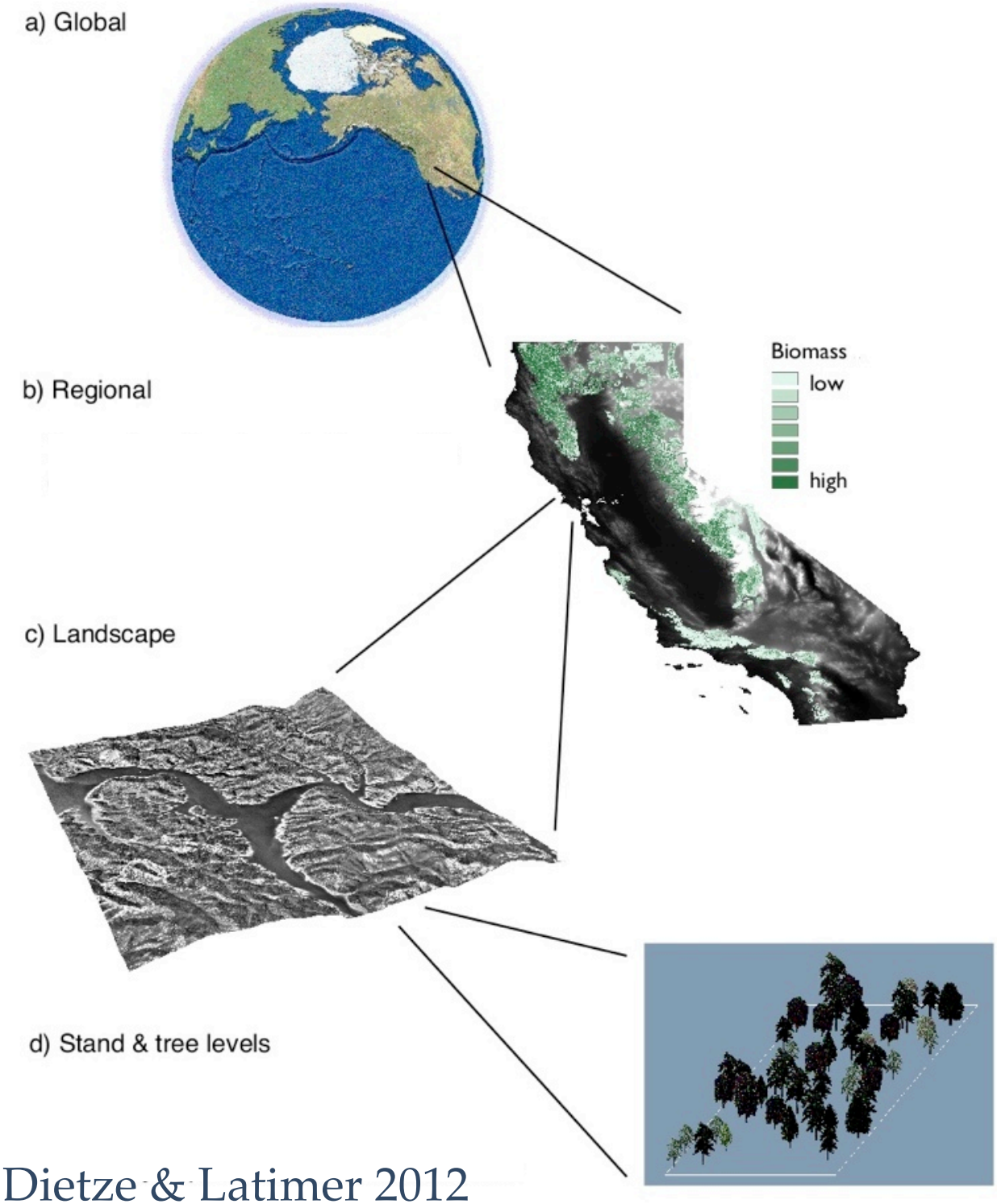
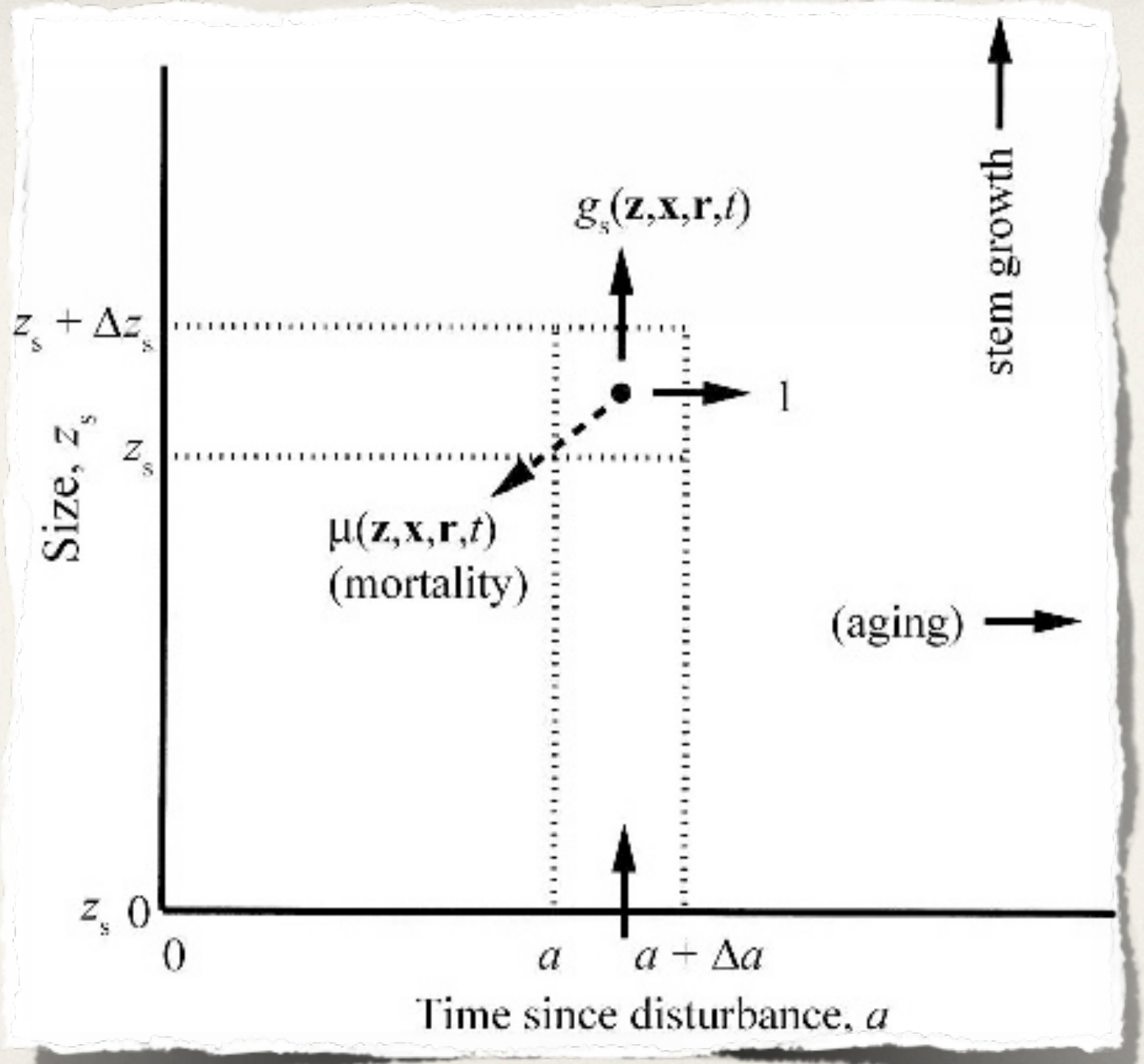
Ecosystem Demography 2

Michael Dietze

NACP AIM4
Feb 5, 2013



Dietze & Latimer 2012


$g_s(\mathbf{z},\mathbf{x},\mathbf{r},t)$
stem growth
$z_s + \Delta z_s$
1
Size, z_s
z_s
$\mu(\mathbf{z},\mathbf{x},\mathbf{r},t)$
(mortality)
(aging)
z_s 0
0
a
$a + \Delta a$
Time since disturbance, a

Ecological Statistical Mechanics

$$\underbrace{\frac{\partial}{\partial t}C_i(z,a,t)}_{\text{ch. in biomass}} = -\frac{\partial}{\partial z}\underbrace{[g_i(z,\underline{\bar{r}},t)C_i(z,a,t)]}_{\text{growth}} - \underbrace{\frac{\partial}{\partial a}C_i(z,a,t)}_{\text{aging}} - \underbrace{\mu_i(z,\underline{\bar{r}},t)C_i(z,a,t)}_{\text{mortality}}.$$

of plant type i

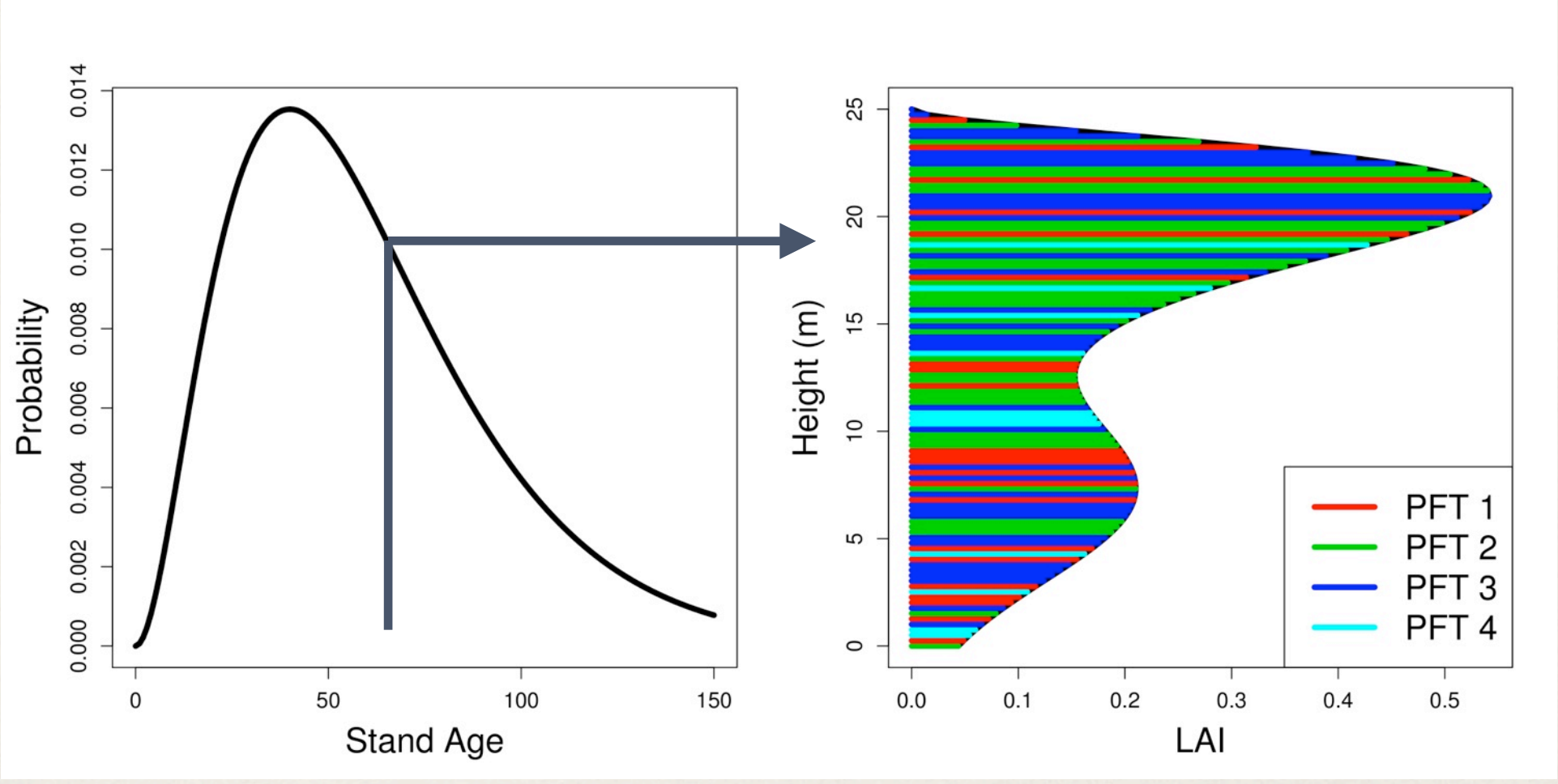
Cohort

$$\underbrace{\frac{\partial}{\partial t}p(a,t)}_{\text{ch. in landscape age distribution}} = \underbrace{-\frac{\partial}{\partial a}p(a,t)}_{\text{aging}} - \underbrace{\lambda(a,t)p(a,t)}_{\text{disturbance}},$$

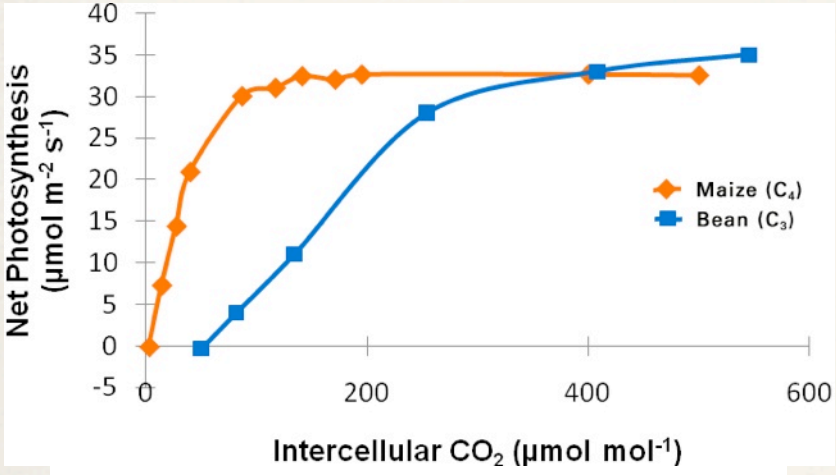
Patch

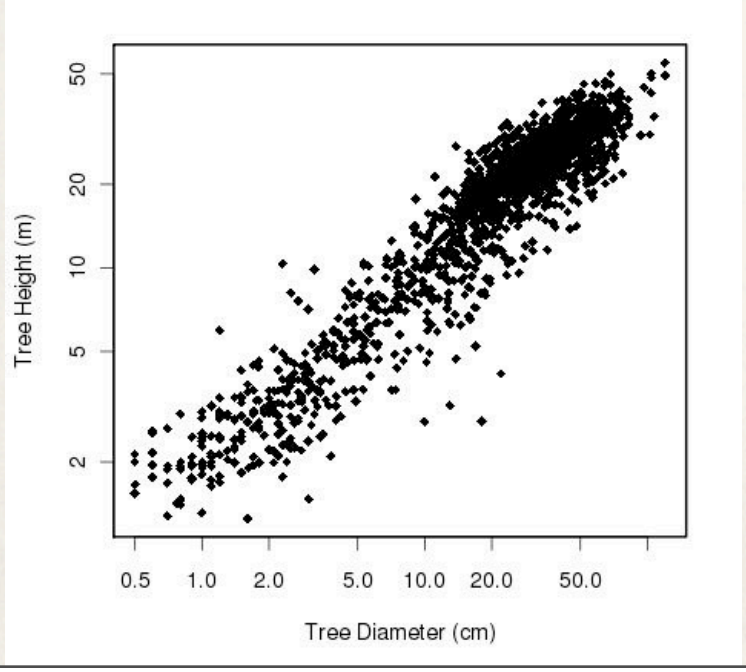
(Moorcroft et al. 2001)

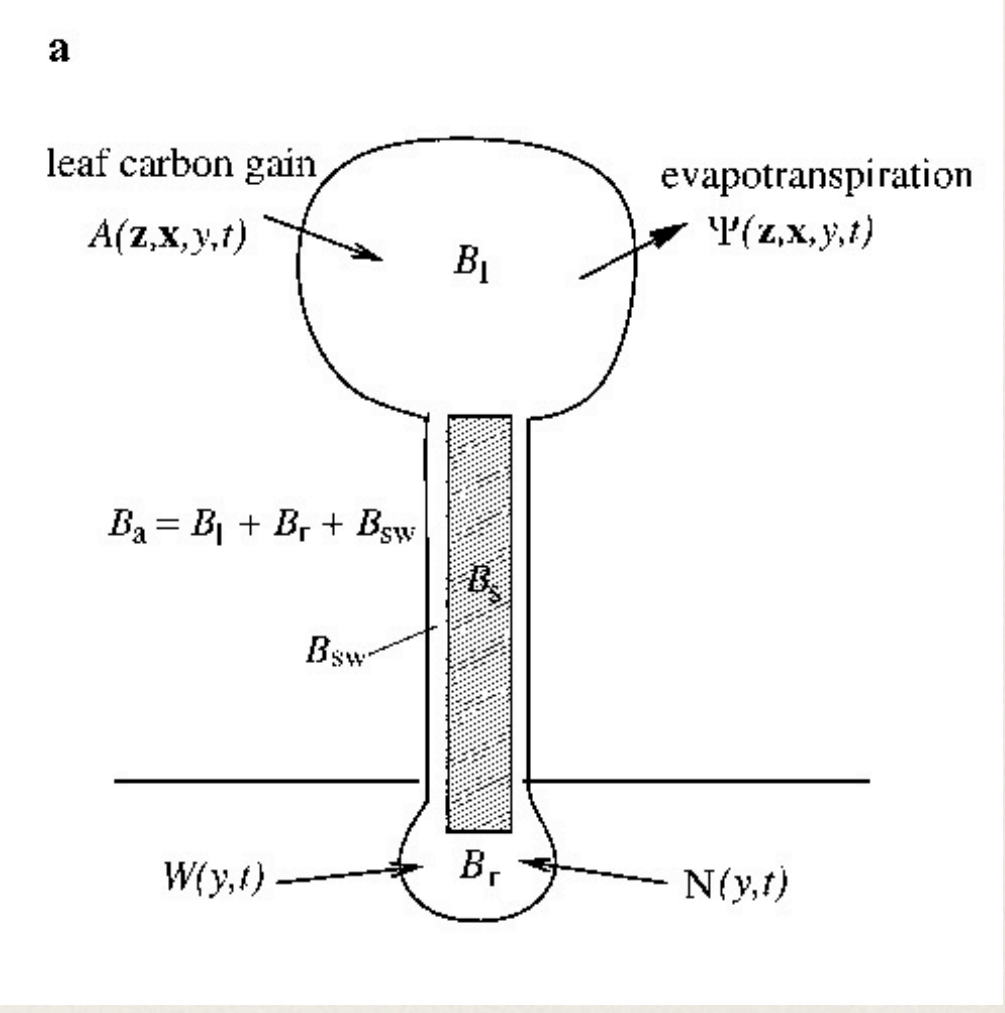
Size & Age Structured Approx



Cohort: Ecophysiology

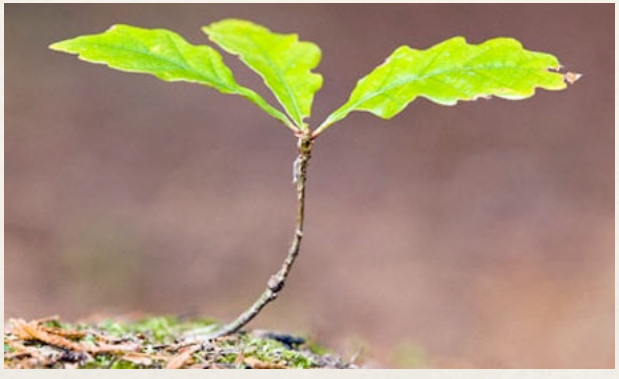




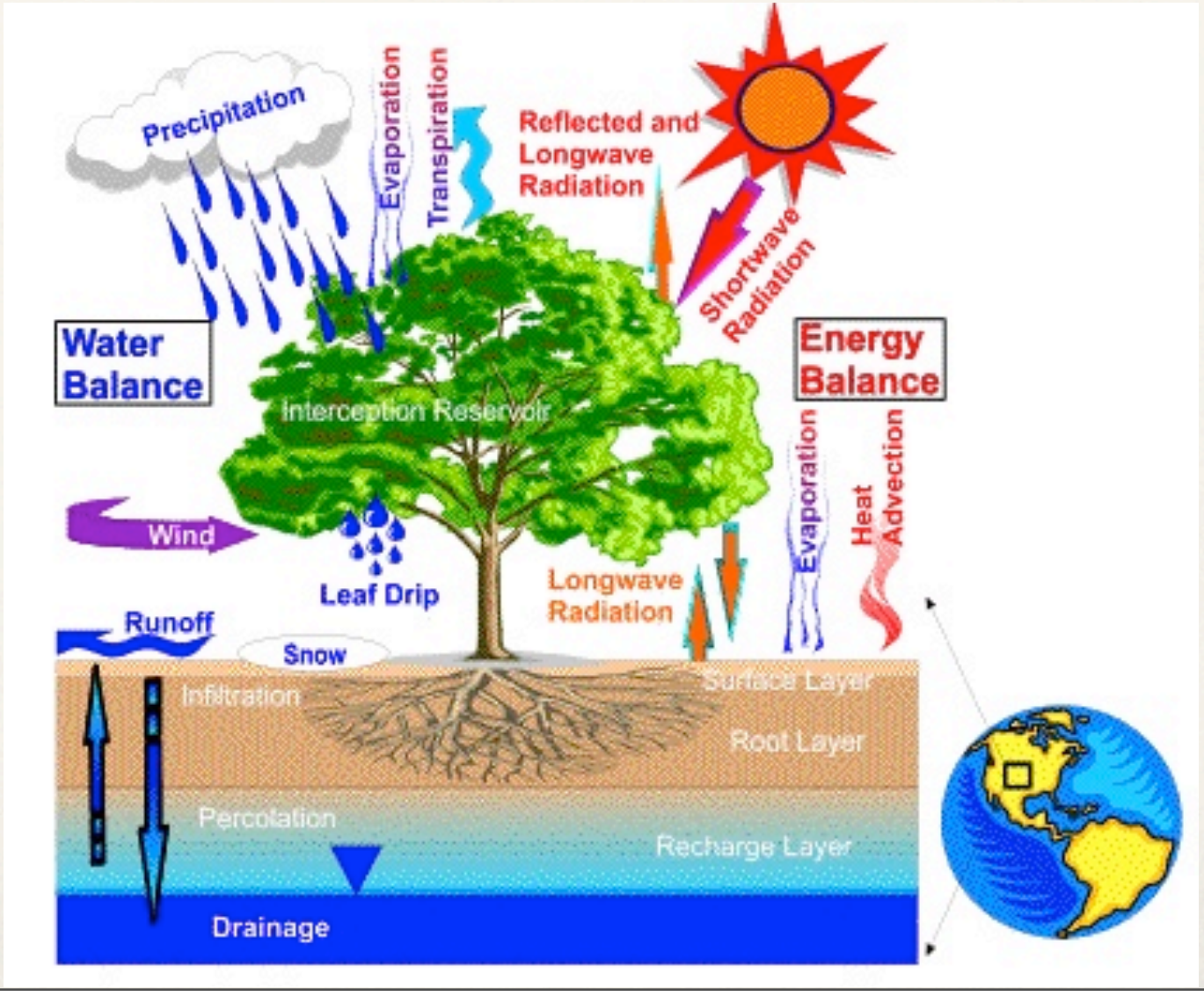


Cohort: Demography

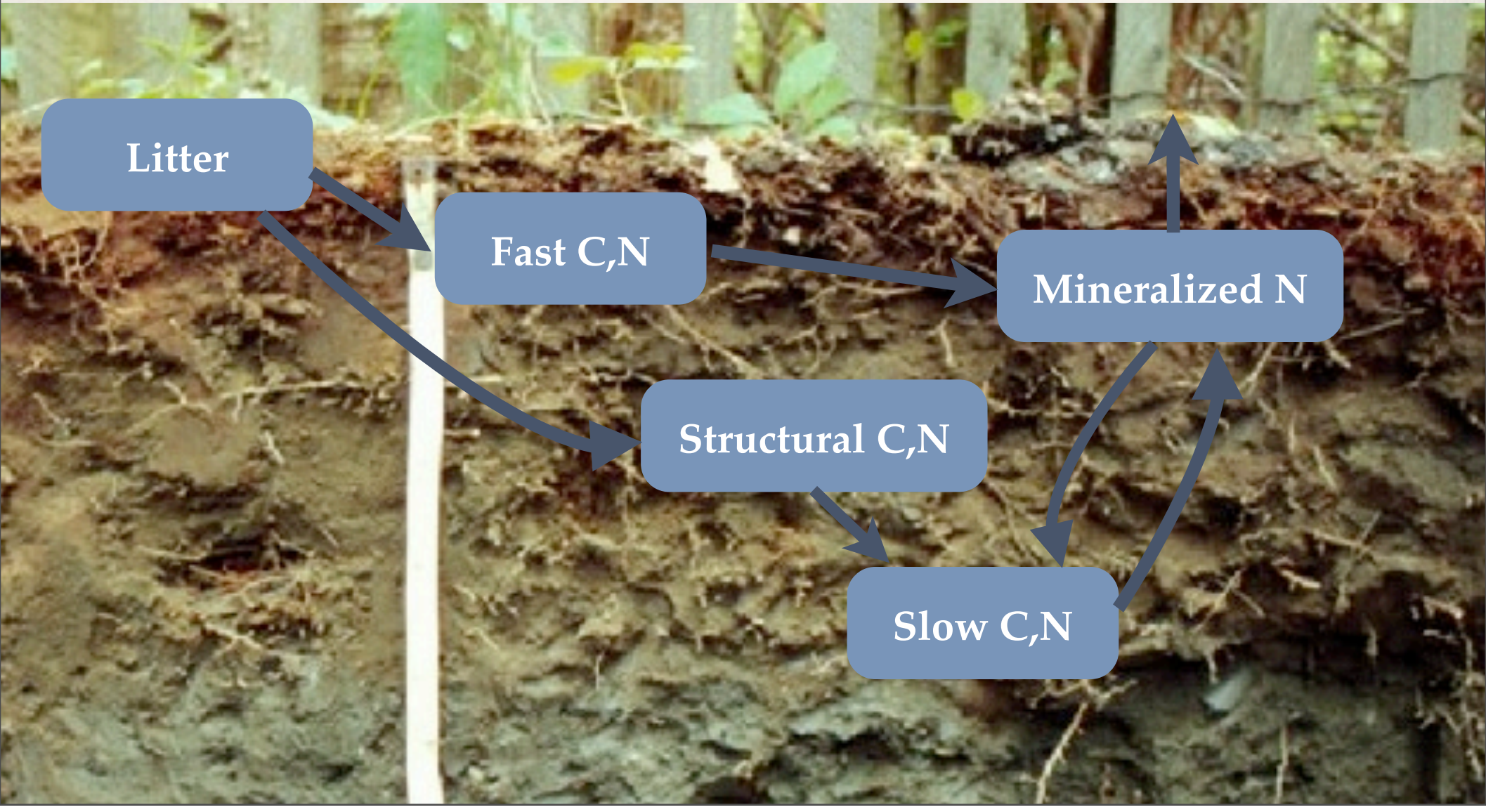
Carbon



Patch: Land Surface Biophysics



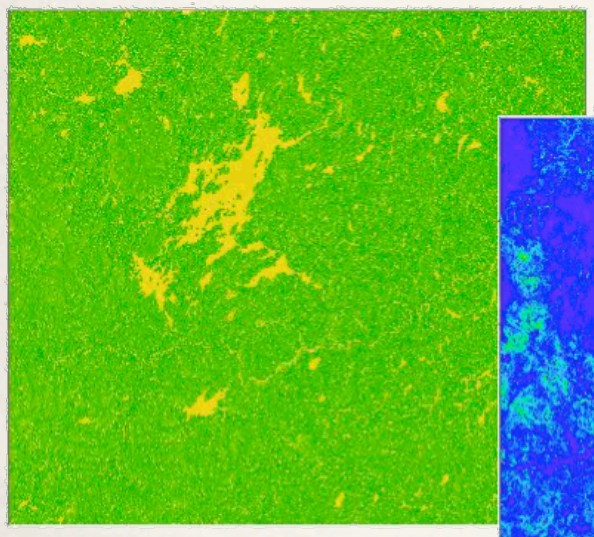
Patch: Biogeochemistry



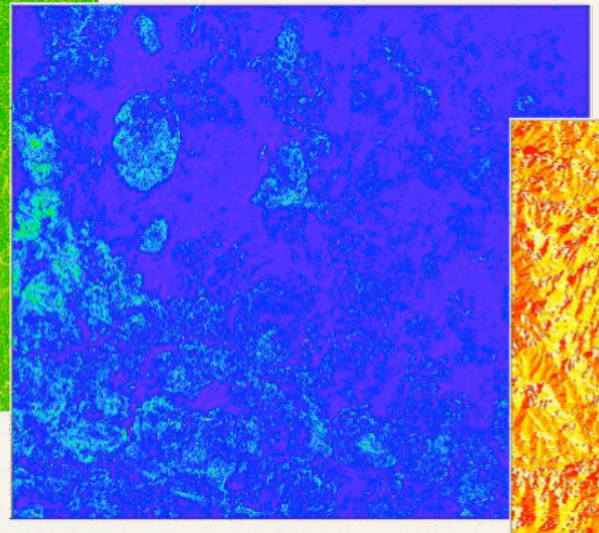
Landscape

Hydrology
Microclimate
Radiation
Soils

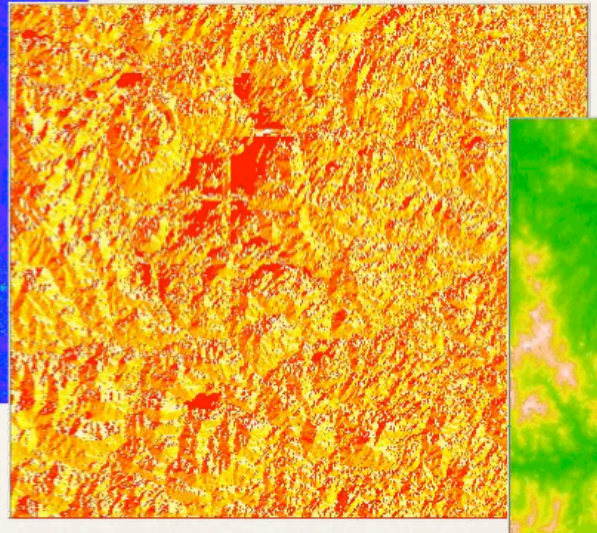
TCI



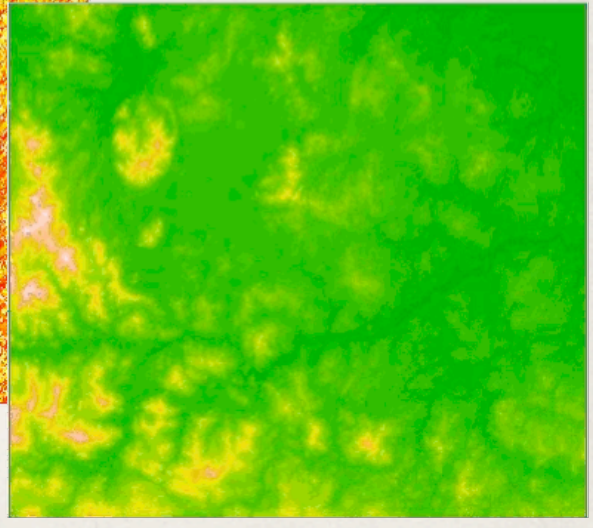
Slope



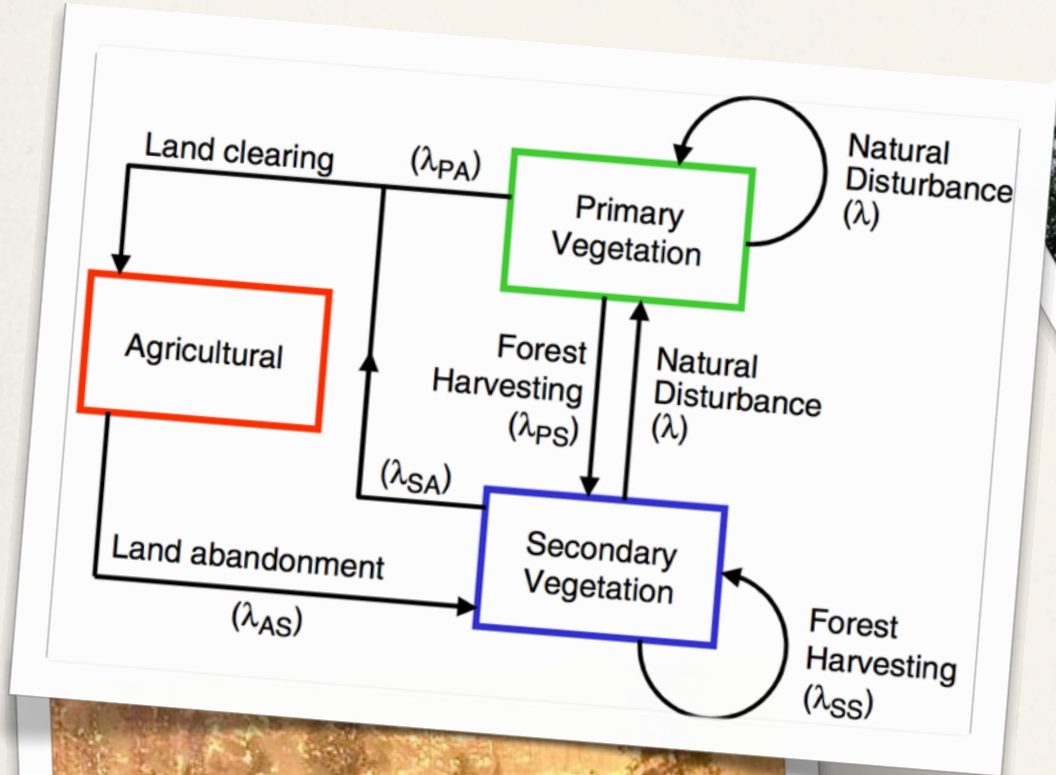
Aspect



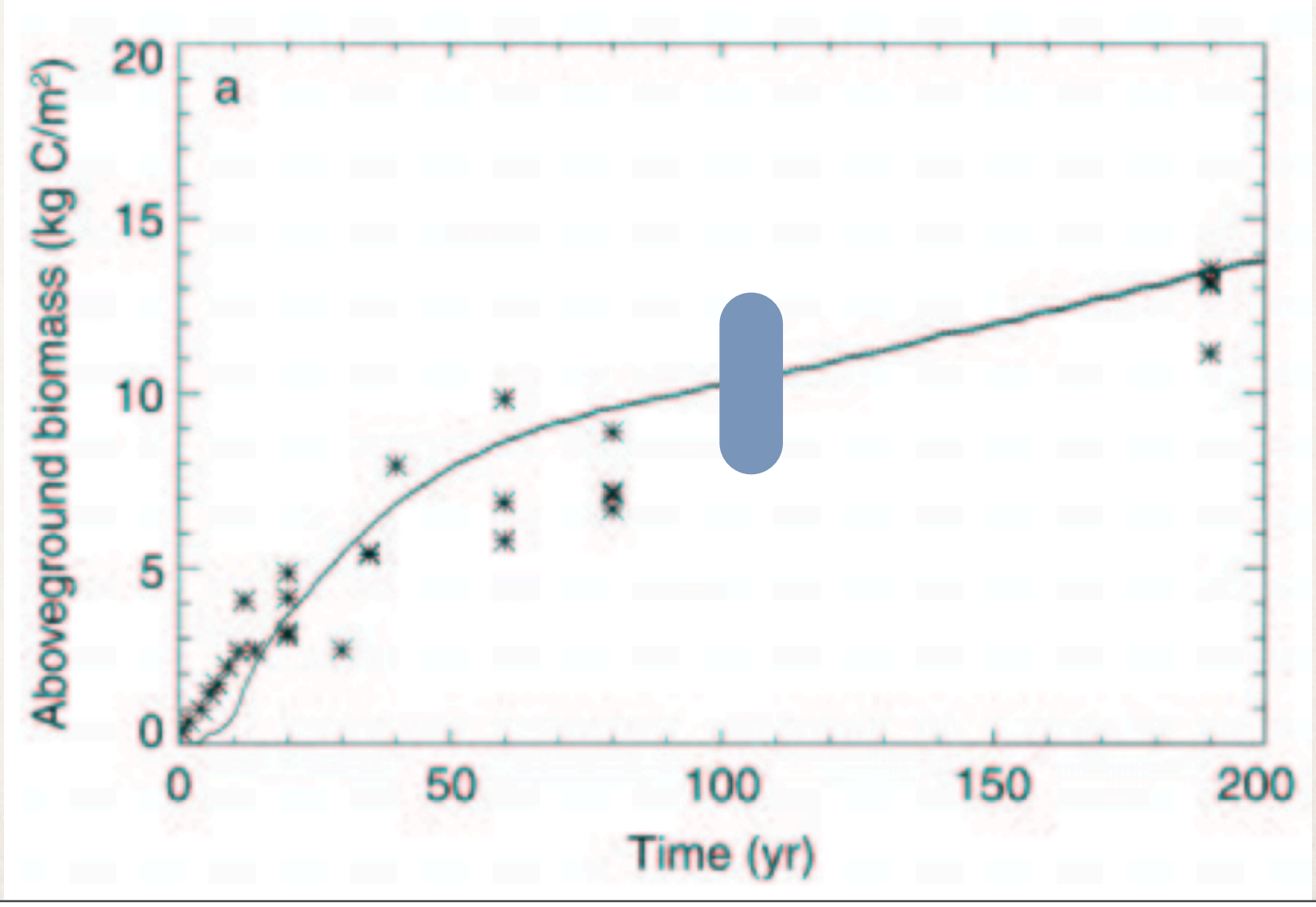
Elevation



Disturbance



Fusion & Fission



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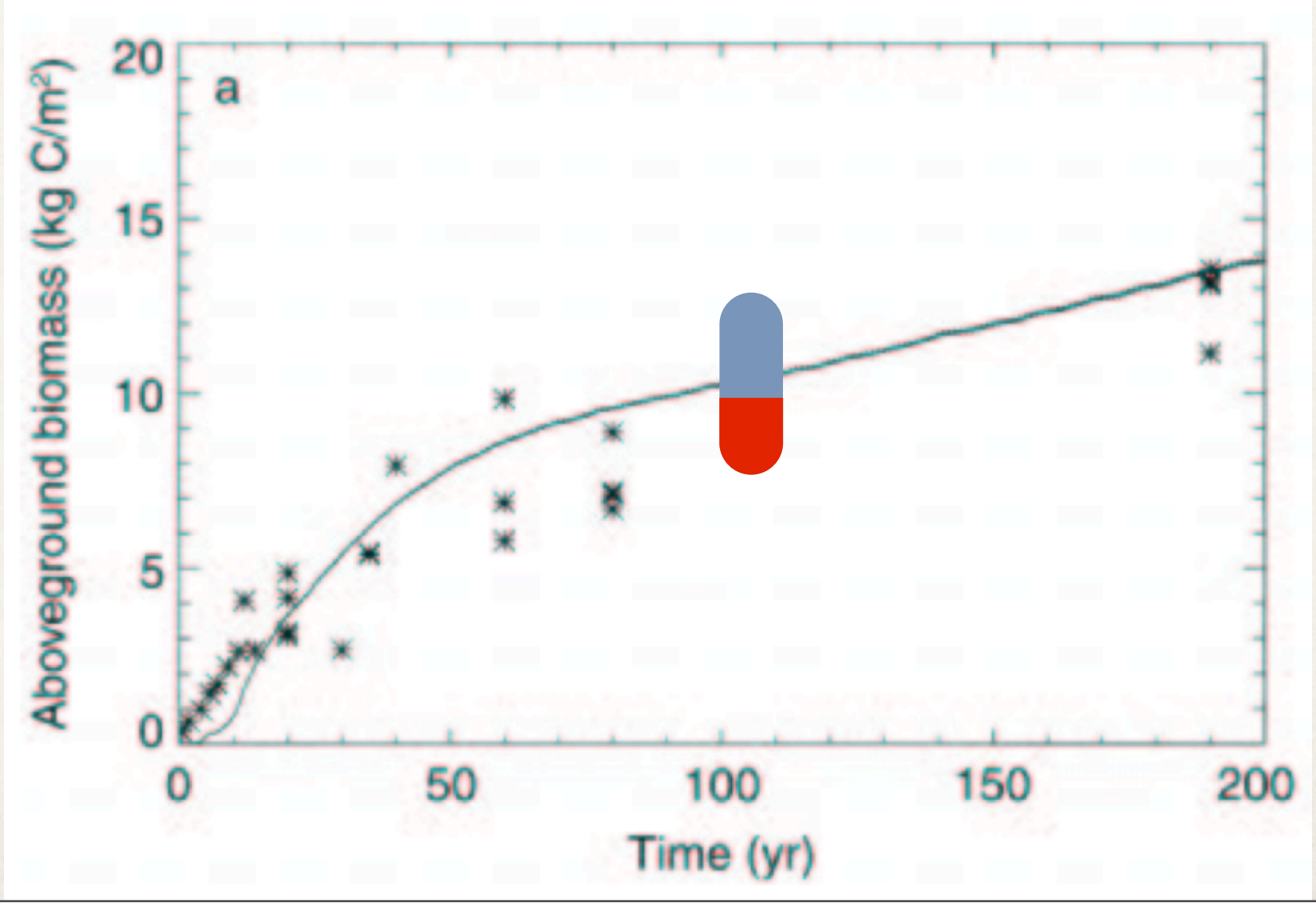

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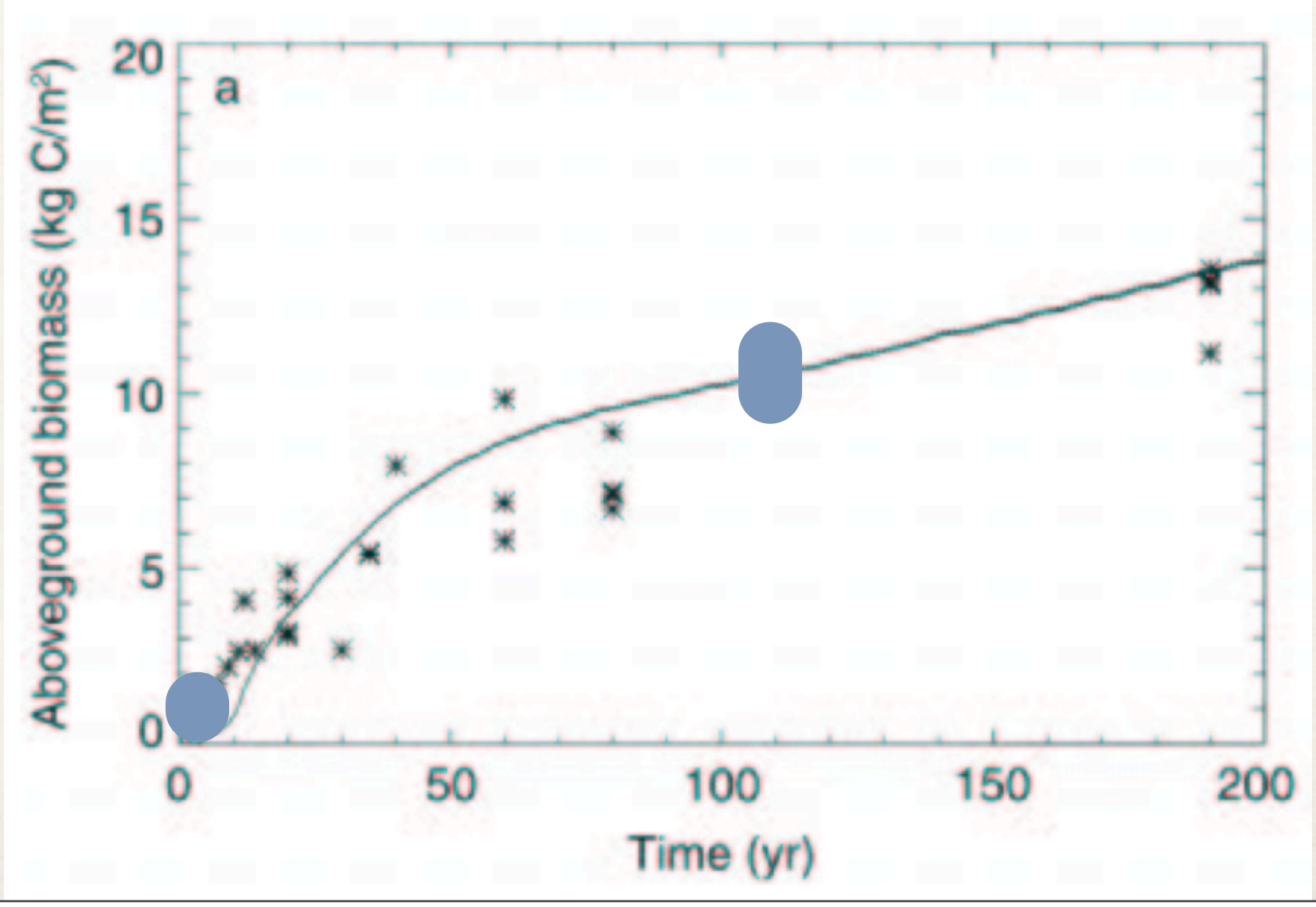

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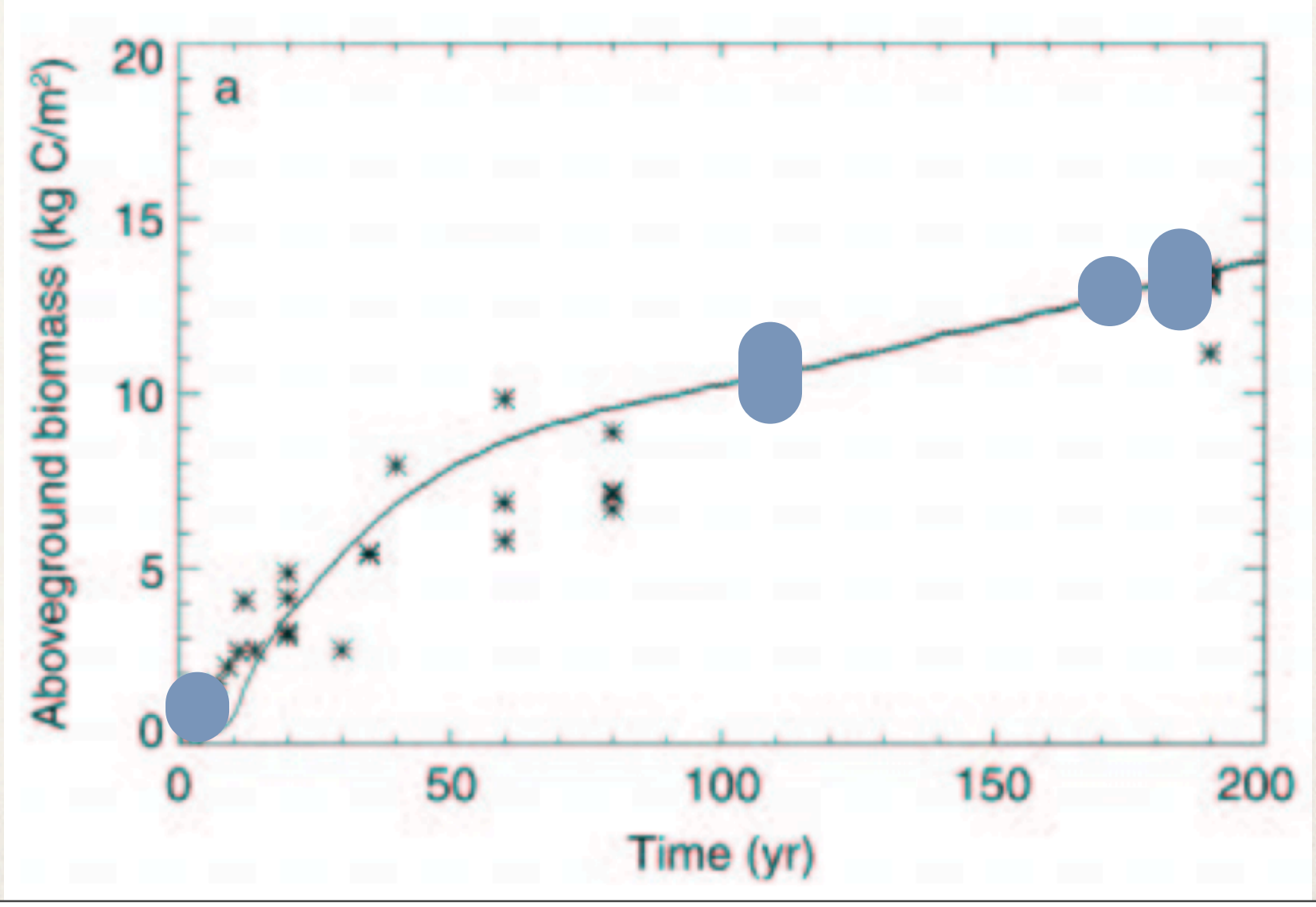

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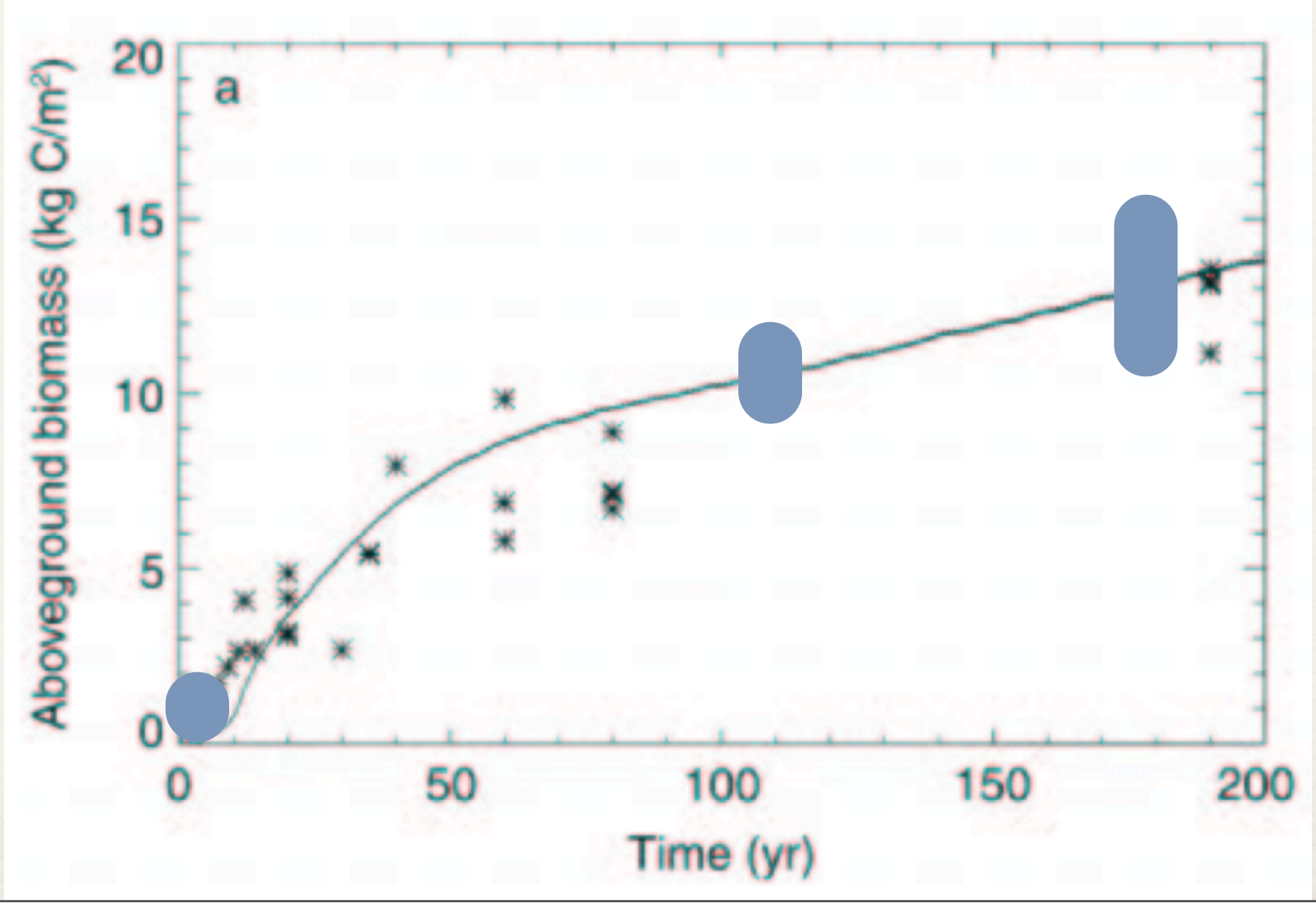
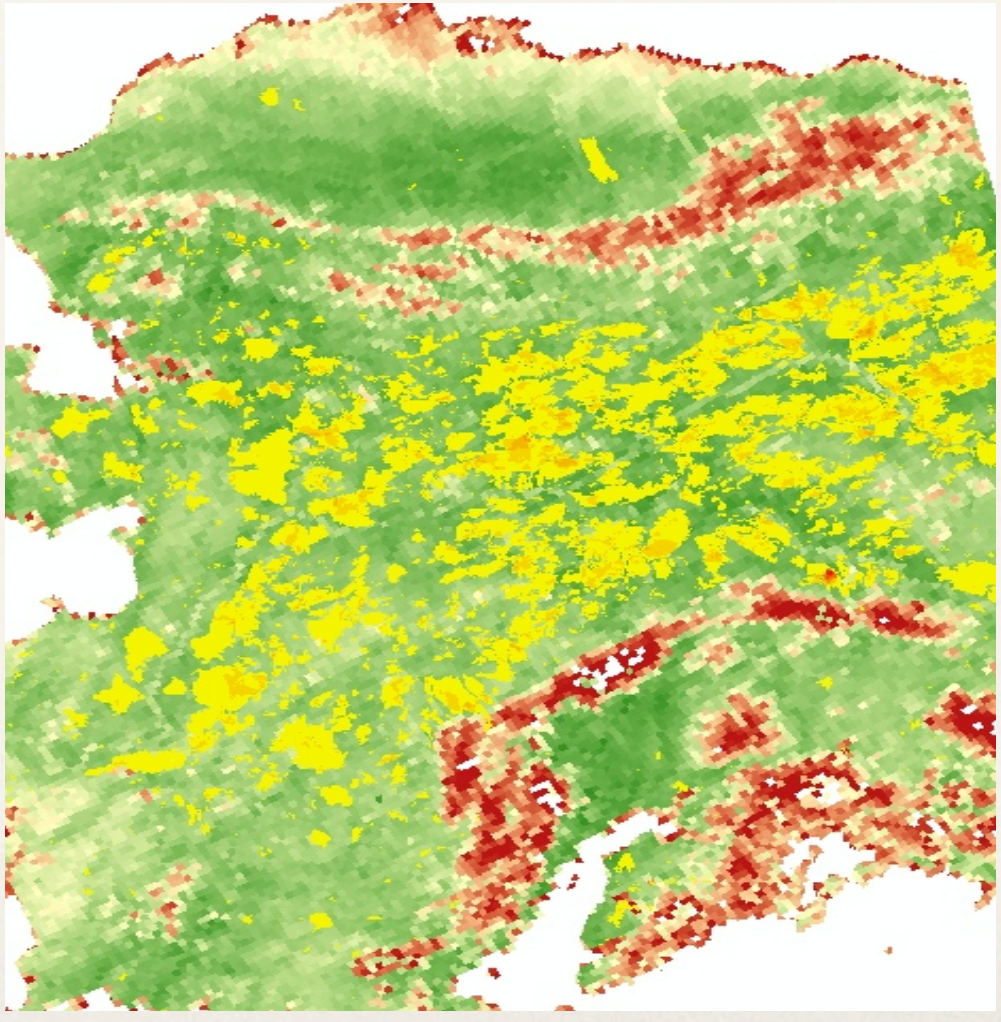


Fire Frequency and NDVI



Number of times a cell has burned in the past 50 years