Counting disturbance events
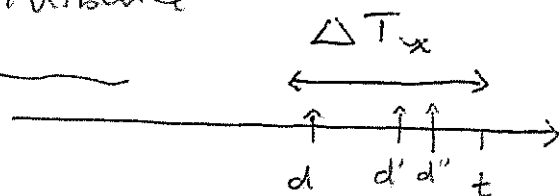

Three event disturbance events take place in the time window with duration ΔT_x up to time t.

x is a <u>category</u> of disturbance, such that:

$$x \in \{ \text{timber}, \text{u\_clear}, \text{browse}, \text{g-fire}, \text{c-fire} \}$$

- Clear-cutting for timber
- understory clearance
- livestock/ wildlife browsing
- ground fire
- canopy fire.

Let a disturbance event be completely specified by an ordered set $d_{xi}(\tau) = (\tau, i, x)$ such that $\tau \in (0, \ldots, t)$ and $i \in (1, \ldots, N)$ where t is the current time and N is the total number of simulation cells. I.e a disturbance has a category, a time, and a place.

I.e. within ΔT_x

Define the number of <u>ecologically relevant</u> disturbance events of type x which have occurred in cell i up to and including time t as:

$$N_{xi}(t) = \sum_{\tau=0}^{t} d_{xi}(\tau) \, \delta_{ij} \, \delta_{xx'} \, \Theta(\tau - t + \Delta T_x)$$

$$= N_{xi}(t; \Delta T_x)$$

where: $\delta_{ij} = \begin{cases} 0 & \text{if } i \neq j \\ 1 & \text{if } i = j \end{cases}$, $\Theta(x) = \begin{cases} 0 & \text{if } x < 0 \\ 1 & \text{if } x \geq 0 \end{cases}$

required data:

ΔT_x for each of the five disturbance
categories.

eco. relevant

Finally the frequency of ^disturbance events is of
type x in cell i evaluated at time t is

$$f_{xi}(t) = \frac{N_{xi}(t)}{\Delta T_x}$$