IDEA:

Threshold $u(x,t)$ varying in space and time.

Function $V(x,t)$ describing the spatio-temporal variation of the geophone network.

$0 \le V(x,t) \le 1$

θ scaling factor (unknown parameter) ✓

$u(x,t) = \theta V(x,t)$

x might be average squared distance from three geophones.

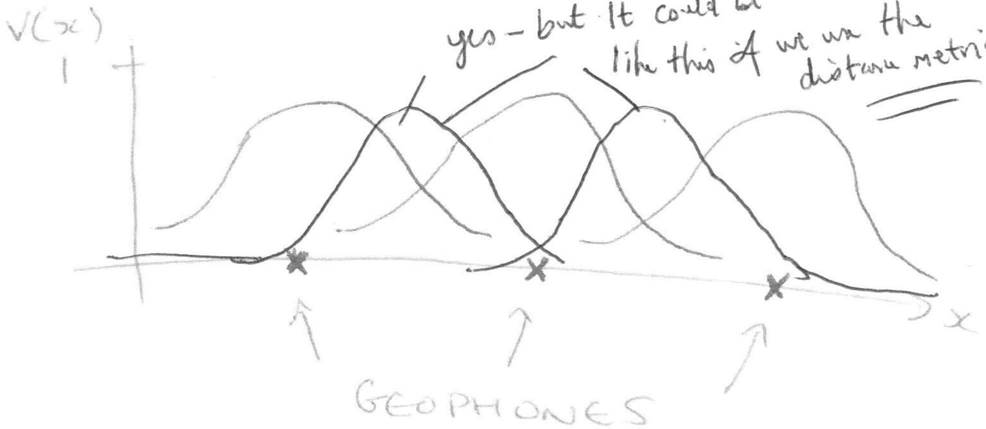
Initially

DISTANCE TO GEOPHONE.

Assume $V(x,t) = V(x)$

Assume x is one-dimensional distance so $V(x)$ describes some probability of detection as you move away from geophones in 1-D space.

yes – but It could be like this if we use the distance metric above.



No – x is position in space of point. The function value of $V(x,t)$ is to be linked to this average - - - - - - - three nearest geophones.

Assume magnitudes don't affect $V(x)$ ✓ and uniform position of earthquakes across space.

yes V will effect observation of the magnitudes. small V gives lower observed magnitudes – ~~extra~~ – large V less magnitudes missed

Then, $V(x)$ simply varies with distance from geophones. ✓

NEXT:

Allow magnitude distribution to be $M \sim GPD_u(\sigma, \xi)$ constant over space and time. ✓ fix $u=0$

Still 1-D space where x is distance from geophone, magnitude will now affect $V(x)$ such that $V(x) = V(x, m)$ ✓

~~2. Fit Split data space~~

THEN

Allow x to be 2-D ✓ or some function of distance from multiple geophones.

Long term

1. Let GPD $M_x \sim GPD(\sigma(x), \xi)$ with $\sigma(x)$ capturing "Stephen's" covariates.

Plan.

1. Simulate x uniformly on $[0,1]^2$. do this n times independently — gives locations.

2. For each x, event, simulate GPD magnitude. $M_{x_1}, \dots, M_{x_n}$.

3. Code M_{x_j} ~~by~~ $\{1/0$ by $C_{x_j} = \begin{cases} 1 & \text{if } M_{x_j} \geq u(x_j) \\ 0 & \text{if } M_{x_j} < u(x_j) \end{cases}$

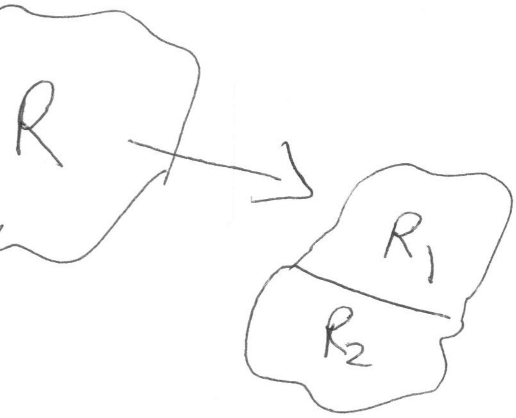
C_{x_j} explains if ~~points~~ magnitude at x_j are censored or not.

4 Plot. M_{x_j} data $| C_{x_j} = 1$ over j. } look to see difference.
M_{x_j} data } — easy if x is in 1-dim.

Data

1. Sample ~~spa~~ space R

$$R = R_1 \cup R_2 \quad R_1 \cap R_2 = \emptyset$$



You will fit

$M_{R_1} \sim GPD(\sigma_1, \xi_1)$ $\longrightarrow$ test if $\sigma_1 = \sigma_2, \xi_1 = \xi_2$

using LRT (605)

$M_{R_2} \sim GPD(\sigma_2, \xi_2)$