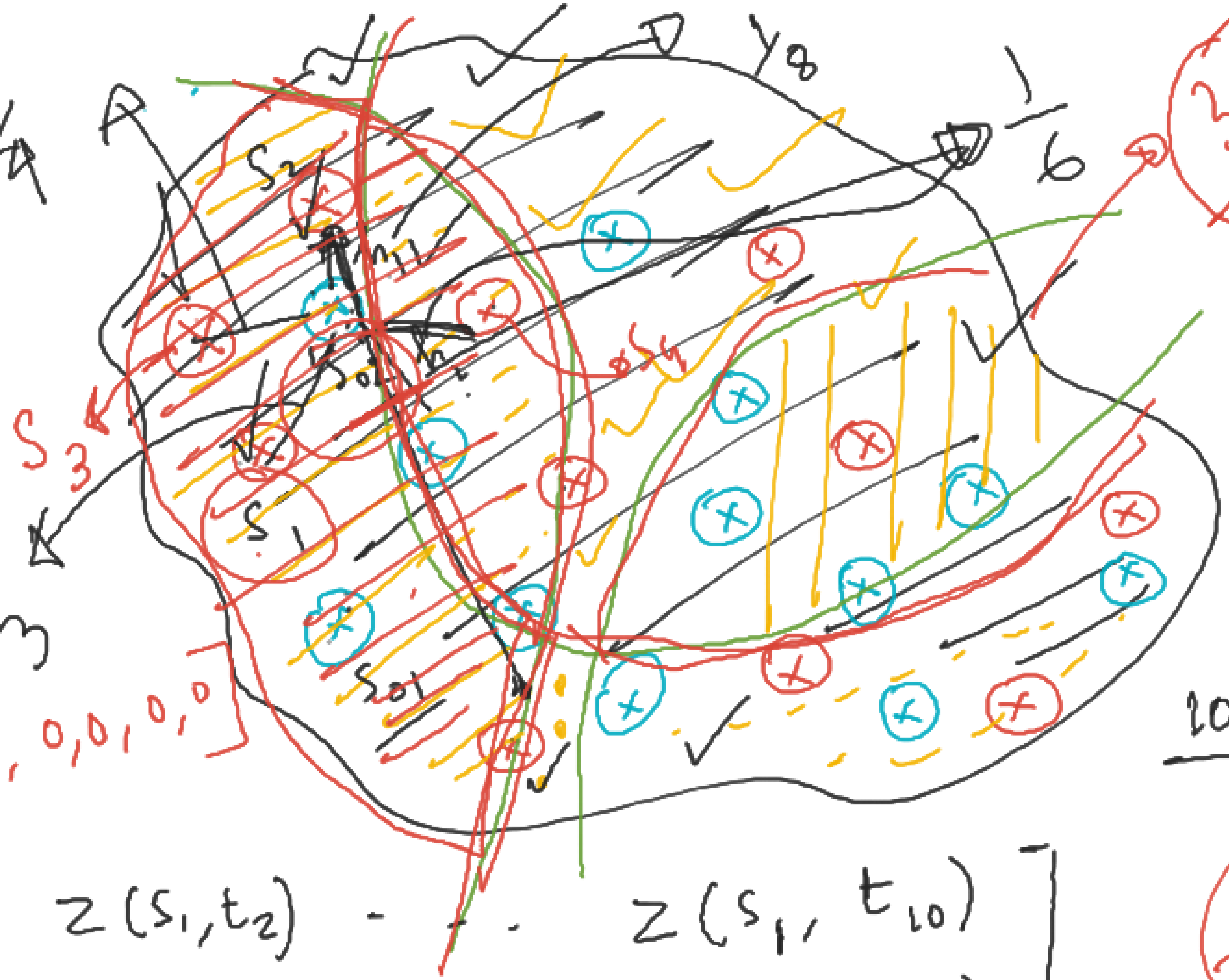
Results.

1) 7 - SR

3 - SC

$2^3 - 1$

2) $p = [1, 0, 0, 0, 0, 0]$



30 45 days

10

- To interpolate along whole spatial surface.
- 'n' no. observed spatial loc
- k observed ⊗ → unobserved

10 // timestands ⊗ → observed

10

1 day → spatial clusters

$$Z^S = \begin{bmatrix} z(s_1,t_1) & z(s_1,t_2) & \cdots & z(s_1,t_{10}) \\ z(s_2,t_1) & z(s_2,t_2) & \cdots & z(s_2,t_{10}) \end{bmatrix}_{2\times 10}$$

$$r^s = \begin{array}{c} \\ \\ \\ \end{array}\begin{array}{cccc} r_{t_1} & r_{t_2} & & r_{t_{10}} \\ \end{array}$$

$$r^s = \begin{bmatrix} z(s_1,t_1)/z(s_2,t_1), & \dfrac{z(s_1,t_2)}{z(s_2,t_2)}, & \cdots, & \dfrac{z(s_1,t_{10})}{z(s_2,t_{10})} \\ z(s_2,t_1)/z(s_3,t_1) & & \cdots & \dfrac{z(s_2,t_{10})}{z(s_3,t_{10})} \\ z(s_1,t_1)/z(s_3,t_1) & & \cdots & \dfrac{z(s_1,t_{10})}{z(s_3,t_{10})} \end{bmatrix}_{3\times 10}$$

= Spatial ~~Influence~~ ratio

$r^S =$ 7-10 day

$$\begin{bmatrix} r^{12}_{t_1} = \frac{1}{2} & r^{12}_{t_2} = \frac{1}{3} & r^{12}_{t_3} = \frac{1}{2} & \cdots & r^{12}_{t_{10}} = \frac{1}{2} \\ r^{23}_{t_1} = \frac{1}{4} & r^{23}_{t_2} = \frac{1}{8} & r^{23}_{t_3} = \frac{1}{9} & \cdots & r^{23}_{t_{10}} = \frac{1}{7} \\ r^{13}_{t_1} = \frac{1}{2} & r^{13}_{t_2} = \frac{1}{6} & r^{13}_{t_3} = \frac{1}{4} & \cdots & r^{13}_{t_{10}} = \frac{1}{7} \end{bmatrix}$$

lag

$h_{12} = \|S_1 - S_2\|$

$h_{13} = \|S_1 - S_3\|$

$h_{23} = \|S_2 - S_3\|$

S-1 : Th

SLD: $\Omega_h \longrightarrow \mathbb{R}^+$

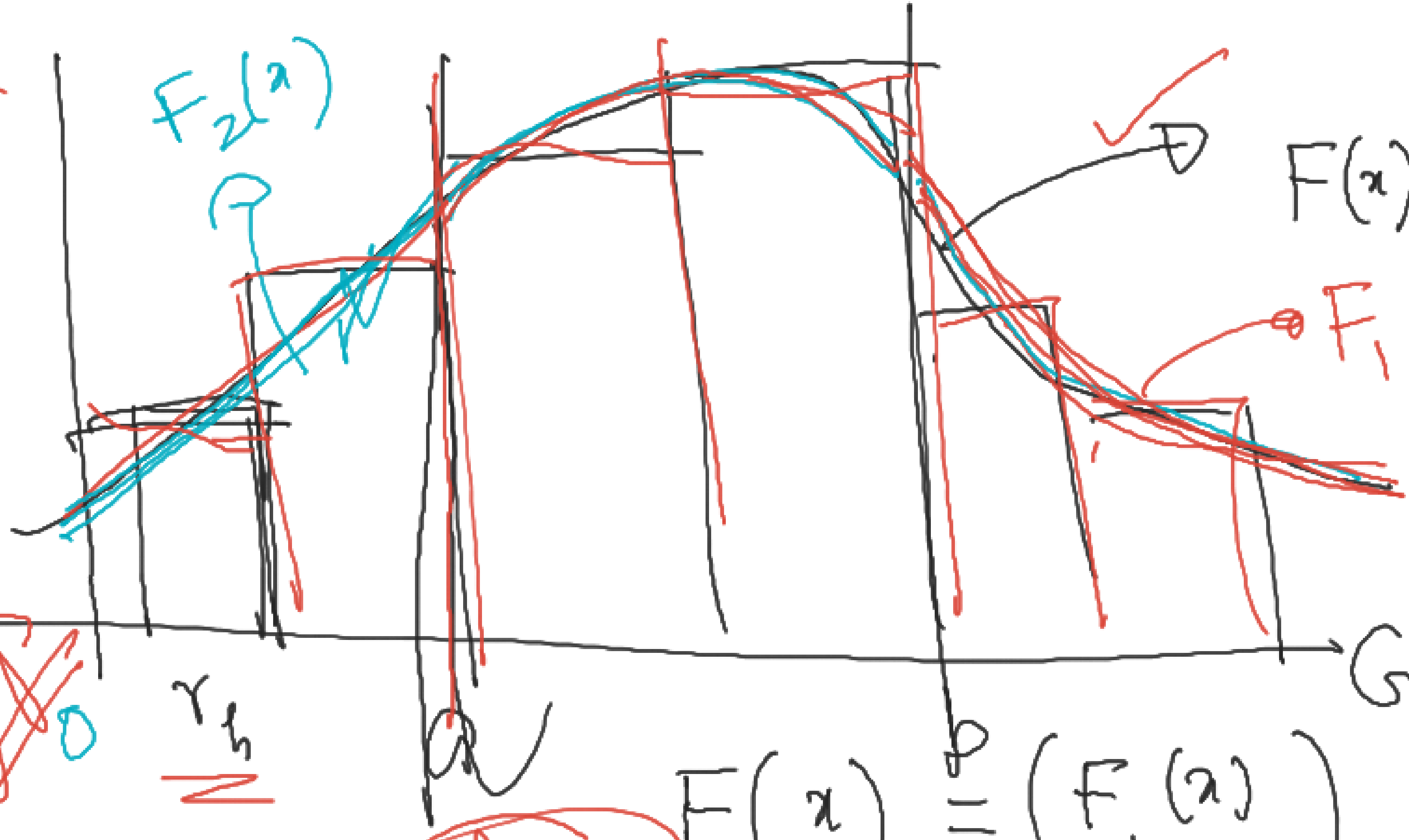
$SLD(x) = \max\{\|h\| \in [0, D_h) \ni r_h = x\}$

$r_h \in [0, \frac{1}{4}) \longrightarrow$ what is Maximum lag?

$SLD(\frac{1}{4}) = \max\{\|h\| \in [0, D_h) \ni r_h = \frac{1}{4}\}$

(1) day

F(h)



$$F(x) = \left(F_1(x)\right)^{G_1(x)} \left(F_2(x)\right)^{1-G_1(x)}$$

a : upper bound of left tail

b : lower bound of Right tail

$$G_1\left(\frac{x-a}{b-a}\right) \qquad 1 - G_1\left(\frac{x-a}{b-a}\right)$$

$$F(x) = \left(F_1(x)\right)\left(F_2(x)\right)$$

Extreme Valued

Extreme Valued

2-3 days

(b-1) day

CDF of Beta Dist?

$$F(h) = P[\{r_h \mid SLD(r_h) \le h\}] = P[\{\omega \mid X(\omega) \le x\}]$$

$a = h'_{th}$

$b = h'_{max}$

$$\left(\frac{\cancel{x}\, h - h'_{th}}{h'_{max} - h'_{th}} \right)$$

1 day

Spatial CDF of an event : $F(h)$

Temporal CDF of an event : $G(\tau)$

Joint CDF

$$P\left[\{ (\alpha, \beta) \mid SLD(\alpha) \leq h \ ; \ TLD \leq \tau \} \right]$$

$$= H(h, \tau) = C\left(F(h), G(\tau) \right)$$

"Copula"

$$\underline{H(h,\tau)} \longrightarrow \underline{f(h,\tau)}$$

CDF PDF

$$\underline{\underline{(h^*,\tau^*)}} = \arg\max \left\{ f_{SLD,TLD}(u,v) \;\middle|\; \|h\| \leq u,\ \|\tau\| \leq v \right\}.$$

$\|$

└→ 3/4 days.

$$\boxed{(r_h^*, r_\tau^*)}$$

$h_i < h_{i+1}$

$$\mathbb{M} = \{(h_1, \tau_1), (h_2, \tau_2), (h_3, \tau_3), \ldots, (h_K, \tau_K)\}$$

$$\$ = \{(\gamma_{h_1}, \gamma_{\tau_1}), (\gamma_{h_2}, \gamma_{\tau_2}), (\gamma_{h_3}, \gamma_{\tau_3}), \ldots, (\gamma_{h_K}, \gamma_{\tau_K})\}$$

$$a : \mathbb{M} \to \$ \Rightarrow a(h_i, \tau_i) = (\gamma_{h_i}, \gamma_{\tau_i})$$

?

$Z(S_{02}, t_1)$? $\quad Z(S_1, t_1) \quad Z(S_2, t_1) \quad Z(S_3, t_1)$

$\|S_3 - S_{02}\| = h_{302} \leq h_1$

$\|S_1 - S_{02}\| = h_{102} \leq h_3$

$h_1 \to \gamma_{h_1}$

$\|S_2 - S_{02}\| = h_{202} \leq h_2$

10 days

4 days

$\|S_1 - S_{02}\| = \cancel{\#}9$

$\|S_2 - S_{02}\| = 7$

$\|S_3 - S_{02}\| = \underline{2}$

r_{h_1}

$h_1 = 4, \tau_1 = 0$

$h_2 = 8, \tau_2 = 0$

$h_3 = 10, \tau_1 = 0$

$\mathbb{R}^+$

Spatial Direction

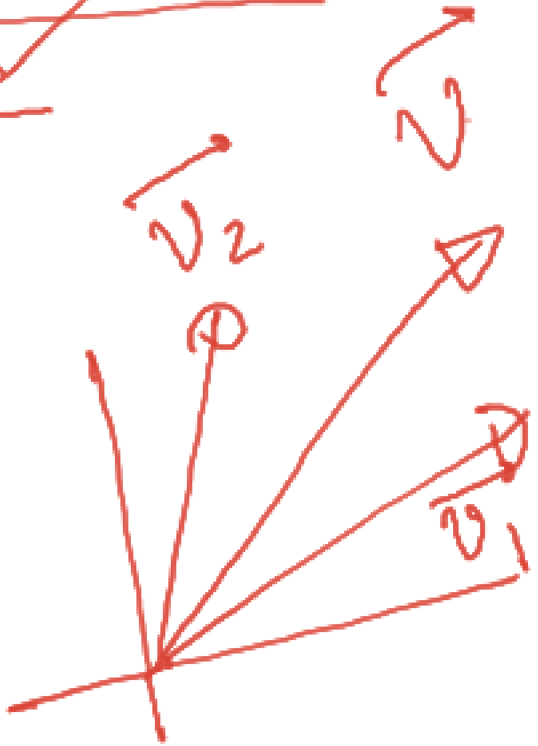
Temporal Direction

$$a(4,0) = \underline{(r_4, 0)} = a(4, (t_2 - t_1)) = (r_4, r_{t_2 - t_1})$$

$$\underline{Z(s_3, t_1) = 25\ mg/m^3}$$

$$Z(S_{02}, t_1) = Z(S_3, t_1) \times \sqrt{0 + r_4^2}$$

$$Z(S_0, t_2) = Z(S_3, t_1) \times \sqrt{r_4^2 + r_{t_2 - t_1}^2}$$



Himalayan → $(20^\circ N, 15^\circ E)$ → 10 J-1
6 J-2
12 J-3 ← 90days

→ $37^\circ N, 8^\circ E$ → 8 J-1
10 J-3
27 J-4

Shape file.

$(26^\circ N, 10^\circ E)$ ← undiscover

→ J-1 J-2 J-3

? ? ?