

[illegible]

[illegible]

[illegible]

Results:

(1) 7 - SR

3 - SC

$2^3 - 1$

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

$Z^S = \begin{bmatrix} z(s_1, t_1) & z(s_1, t_2) & \dots & z(s_1, t_{10}) \\ z(s_2, t_1) & z(s_2, t_2) & \dots & z(s_2, t_{10}) \\ \vdots & \vdots & \ddots & \vdots \\ z(s_n, t_1) & z(s_n, t_2) & \dots & z(s_n, t_{10}) \end{bmatrix}$

$r_t = \begin{bmatrix} r_{t_1} & r_{t_2} & \dots & r_{t_{10}} \end{bmatrix}$

$\gamma^S = \left[\frac{z(s_1, t_1)}{z(s_2, t_1)}, \frac{z(s_1, t_2)}{z(s_2, t_2)}, \dots, \frac{z(s_1, t_{10})}{z(s_2, t_{10})} \right]^T$

= Spatial Influence ratio

To interpolate along whole Spatial Surface.

n' no. observed Spatial loc.

k observed timesstands

unobserved

observed

spatial clusters

1 day

Results:

(1) $\frac{7 - SR}{3 - SC}$

$\frac{2^3 - 1}{V_m}$

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


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

r_t

$r^S = \left[\frac{z(s_1, t_1)}{z(s_2, t_1)}, \frac{z(s_1, t_2)}{z(s_2, t_2)}, \dots, \frac{z(s_1, t_{10})}{z(s_2, t_{10})} \right]_{R^{1 \times 10}}$

= Spatial Influence ratio

$\frac{Z(s_1, t_i)}{Z(s_j, t_i)}$



To interpolate along whole Spatial Surface.

"n" no. observed Spatial loc.

k observed × unobserved

timestands x → observed.

spatial Clusters

Tangy

$\frac{Z(s_1, t_i)}{Z(s_j, t_i)}$

[illegible]

Results:

① $7 - SR$
 $3 - SC$
 $2^3 - 1$

② $p = [1, 0, 0, 0, 0, 0]$

$Z^S = \begin{bmatrix} z(s_1, t_1) & z(s_1, t_2) & \dots & z(s_1, t_{10}) \\ z(s_2, t_1) & z(s_2, t_2) & \dots & z(s_2, t_{10}) \\ \vdots & \vdots & \ddots & \vdots \\ z(s_n, t_1) & z(s_n, t_2) & \dots & z(s_n, t_{10}) \end{bmatrix}$

$r^S = \begin{bmatrix} \frac{z(s_1, t_1)}{z(s_2, t_1)} & \frac{z(s_1, t_2)}{z(s_2, t_2)} & \dots & \frac{z(s_1, t_{10})}{z(s_2, t_{10})} \\ \frac{z(s_2, t_1)}{z(s_3, t_1)} & \frac{z(s_2, t_2)}{z(s_3, t_2)} & \dots & \frac{z(s_2, t_{10})}{z(s_3, t_{10})} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{z(s_{n-1}, t_1)}{z(s_n, t_1)} & \frac{z(s_{n-1}, t_2)}{z(s_n, t_2)} & \dots & \frac{z(s_{n-1}, t_{10})}{z(s_n, t_{10})} \end{bmatrix}$

r^S is Spatial Influence ratio

Diagram illustrating spatial clusters and observed/unobserved data points.

Legend:

- \otimes observed
- \oplus unobserved
- \otimes timesteps
- \otimes observed
- \otimes spatial clusters

Annotations:

- 30 AS Jamb
- To interpolate along whole Spatial Surface.
- n no. observed Spatial loc.
- k observed
- 10 timesteps
- 1 day

Results:

(1) SR

SC

V_m

(2)

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

$Z^S = \begin{bmatrix} z(s_1, t_1) & z(s_1, t_2) & \dots & z(s_1, t_{10}) \\ z(s_2, t_1) & z(s_2, t_2) & \dots & z(s_2, t_{10}) \\ \vdots & \vdots & \ddots & \vdots \\ z(s_n, t_1) & z(s_n, t_2) & \dots & z(s_n, t_{10}) \end{bmatrix}$

r_{t_2}

t_{10}

$\gamma^S = \left[\frac{z(s_1, t_1)}{z(s_2, t_1)}, \frac{z(s_1, t_2)}{z(s_2, t_2)}, \dots, \frac{z(s_1, t_{10})}{z(s_2, t_{10})} \right]^T R^{3 \times 10}$

= Spatial Influence ratio

$\frac{Z(s_1, t_1)}{Z(s_2, t_1)}$

$\frac{Z(s_1, t_{10})}{Z(s_2, t_{10})}$

To interpolate along whole spatial surface.

n no. observed spatial loc.

k observed timesstands

unobserved

observed

spatial clusters

Tang

$\gamma^S =$ 7-10 days

$\gamma_{t_1}^{12} = \frac{1}{2}$	$\gamma_{t_2}^{12} = \frac{1}{3}$	$\gamma_{t_3}^{12} = \frac{1}{2}$	\dots	$\gamma_{t_{10}}^{12} = \frac{1}{2}$
$\gamma_{t_1}^{23} = \frac{1}{4}$	$\gamma_{t_2}^{23} = \frac{1}{8}$	$\gamma_{t_3}^{23} = \frac{1}{9}$	\dots	$\gamma_{t_{10}}^{23} = \frac{1}{7}$
$\gamma_{t_1}^{13} = \frac{1}{2}$	$\gamma_{t_2}^{13} = \frac{1}{6}$	$\gamma_{t_3}^{13} = \frac{1}{4}$	\dots	$\gamma_{t_{10}}^{13} = \frac{1}{7}$

$h = \|s_1 - s_2\|$
~~lag~~ $h_{13} = \|s_1 - s_3\|$
 $h_{23} = \|s_2 - s_3\|$
S-1: Th

SLD: $\Omega_h \rightarrow \mathbb{R}^+$
 $SLD(x) = \text{Max} \{ \|h\| \in [0, D_h) \mid \exists \gamma_h = x \}$
 $\gamma_h \in [0, \frac{1}{4}) \rightarrow$ what is Maximum lag?
 $SLD(\frac{1}{4}) = \text{Max} \{ \|h\| \in [0, D_h) \mid \exists \gamma_h = \frac{1}{4} \}$

1) long

$F_2(x)$

$F(h)$

~~10 - 1000~~

r_h

2-3 days

$$F(x) = \begin{pmatrix} F_1(x) \\ F_2(x) \end{pmatrix}$$

$$F(x) = \begin{pmatrix} F_1(x) \\ F_2(x) \end{pmatrix} \begin{matrix} G_1(x) \\ 1 - G_1(x) \end{matrix}$$

a : upper bound of left tail.
 b : lower bound of right tail.

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

$$\begin{pmatrix} F_1(x) \\ F_2(x) \end{pmatrix}$$

Extreme Value

Extreme Value

CDF Beta Dist

$$F(h) = P[\{r_h | SLD(r_h) \leq h\}]$$

$$P[\{\omega | X(\omega) \leq x\}]$$

$$a = h'_{th}$$

$$b = h'_{max}$$

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

Spatial CDF of an event:

Temporal CDF of an event:

$$F(h)$$

$$G(\tau)$$

Joint CDF

$$P[\{(\alpha, \beta) \mid SLD(\alpha) \leq h, \tau LD \leq \tau\}]$$

$$= \underbrace{H(h, \tau)}_{\text{"Copula"}} = C(F(h), G(\tau))$$

$$\frac{H(h, \tau)}{\text{CDF}} \longrightarrow \frac{f(h, \tau)}{\text{PDF}}$$

$$(h^*, \tau^*) = \arg \max_{SLD, TLD} \left\{ f(u, v) \mid \begin{array}{l} \|h\| \leq u, \\ \|c\| \leq v \end{array} \right\}$$

||

↳ 3/4 days.

$$(x^*, y^*)$$

$$M = \{ (h_1, \tau_1), (h_2, \tau_2), (h_3, \tau_3), \dots, (h_k, \tau_k) \}$$

$$S = \{ (x_{h_1}, x_{\tau_1}), (x_{h_2}, x_{\tau_2}), (x_{h_3}, x_{\tau_3}), \dots, (x_{h_k}, x_{\tau_k}) \}$$

$h_i < h_{i+1}$

$$a: M \rightarrow S \Rightarrow a(h_i, \tau_i) = (x_{h_i}, x_{\tau_i})$$

$z(s_1, t_1)$ $z(s_2, t_2)$ $z(s_3, t_1)$

$z(s_{02}, t_1)?$

$\|s_1 - s_{02}\| = h_{102} \leq h_3$

$\|s_2 - s_{02}\| = h_{202} \leq h_2$

$\|s_3 - s_{02}\| = \underline{h_{302}} \leq h_1$

$h_1 \rightarrow x_{h_1}$

10 days

Adms

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

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

$$a(4,0) =$$

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

~~$2(S_{021}^{t1})$~~

$$2(s_0, t_2)$$

$$2(s_3, t_1) \times$$

$$Z(\phi_3, t_1) \times \sqrt{r_4^2 + r_{t_2 t_1}^2}$$

Spinal Directing

Temporal Direction

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

$$\sqrt{0 + 84}$$



A hand-drawn diagram of a circle. A radius vector is drawn from the center to the upper-left edge, labeled r_{h1} .

$$f h_1 = A, \tau_1 = 0$$

$$h_2 = 8, \tau_f = 0$$

$$L_3 = 10, \tau_1 = 0$$

$$\mathbb{R}^T$$

Himalayan $\rightarrow (20^\circ \text{N}, 15^\circ \text{E}) \rightarrow$

10 J-1
6 J-2
12 J-3
90 days

Shape
file

$\rightarrow 37^\circ \text{N}, 8^\circ \text{E} \rightarrow$

8 J-1

10 J-3

27 J-4

unlabeled

$(26^\circ \text{N}, 10^\circ \text{E})$

\rightarrow

J-1

?

J-2

?

J-3

?

