1

$$\mu(\underline{s}) = \mu \qquad \forall \underline{s} \in B$$

$$\mu(B) = \frac{1}{|B|} \int_B \mu \, d\underline{s} = \frac{|B|}{|B|} \mu = \mu$$

$$\mu(\underline{s}) = \beta_0 + \beta_1 x(\underline{s})$$

$$\mu(B) = \int_B \mu(s)\,ds \quad \text{for a block } B.$$

$$= \beta_0 + \beta_1 \int_B \frac{x(\underline{s})}{|B|}\,ds$$

$$= \beta_0 + \beta_1 x(B), \text{ say}$$

spatial average of covariate over block B.

3

$$\mu(A_i) = \int_{A_i} \mu(\underline{s})\, d\underline{s} \,/\, |A_i|$$

for each block A_i

$$\mathrm{var}(A_i) = \int_{A_i}\int_{A_i} C(\underline{s}-\underline{s}')\, d\underline{s}\, d\underline{s}' \,/\, |A_i|^2$$

$$\mathrm{cov}(A_i, A_j) = \int_{A_i}\int_{A_j} \underbrace{C(\underline{s}-\underline{s}')}_{=\,0}\, ds\, ds' \,/\, |A_i||A_j|$$

0 since uncorrelated between blocks

Thus $\{Z_i \equiv Z(A_i) : i = 1, \dots, n\}$ is uncorrelated over the partition elements w/ $\mu(A_i) = |A_i|^{-1} \int_{A_i} \mu(\underline{s})\, d\underline{s}$ & variance $\int_{A_i}\int_{A_i} C(\underline{s} - \underline{s}')\, d\underline{s}\, d\underline{s}' = var(A_i)$ for each i

$$E\left(z(B^*) \mid \underline{z}_b\right) = \mu(B^*) + C_{b,b}^T(B^*)\, \Sigma_b^{-1} \left(\underline{z}_b - \underline{\mu}_b\right)$$

$$\mathrm{var}\left(z(B^*) \mid \underline{z}_b\right) = \mathrm{var}\left(z(B^*)\right) - C_{b,b}^T(B^*)\, \Sigma_b^{-1}\, C_{b,b}(B^*)$$

$$\underline{z}_b = \left(z(B_i)\right) \qquad \underline{\mu}_b = \mu(B_i)$$

$$\left(C_{b,b}^T(B^*)\right)_i = \mathrm{cov}\left(z(B^*), z(B_i)\right)$$

$$\left(\Sigma_b\right)_{i,j} = \mathrm{cov}\left(z(B_i), z(B_j)\right)$$

Note that

$$\int_{B^*} \mu(s)\, ds = \sum_{i=1}^{n} \int_{B^* \cap B_i} \mu(s)\, ds$$

$$= \sum_{i=1}^{n} |B^* \cap B_i|\, \mu_i$$

Now use the fact that $y(B_i) \simeq \mu_i$ for each i.