Overhead Slides for

Chapter 21

of

Fundamentals of Atmospheric Modeling

by

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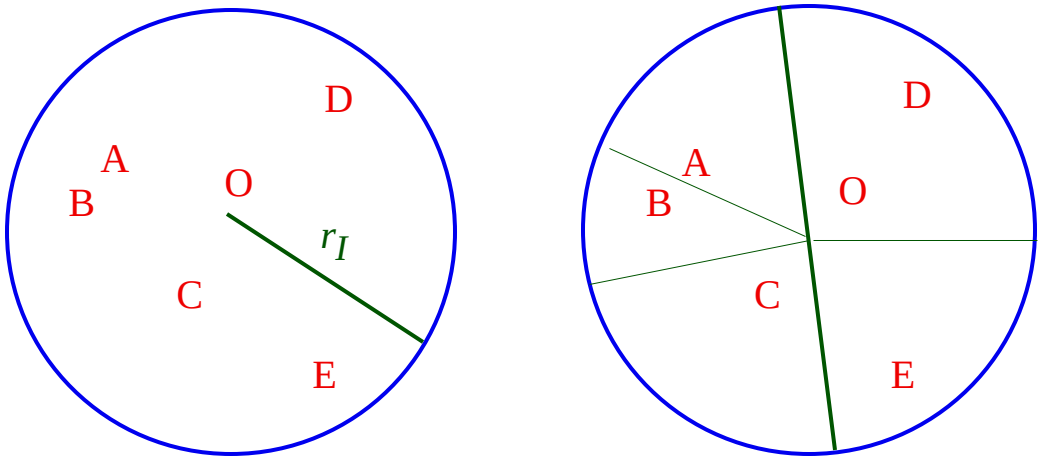
Inverse Square Interpolation

Figs. 21.1 a and b. (a) Domain of influence around point O. The letters A, B, C, D, and E represent locations where data are available for interpolation to point O. (b) Division of the domain of influence into sectors.



Inverse square interpolation

$$V_O \approx \frac{V_A d_{AO}^{-2} + V_B d_{BO}^{-2} + V_C d_{CO}^{-2} + V_D d_{DO}^{-2} + V_E d_{EO}^{-2}}{d_{AO}^{-2} + d_{BO}^{-2} + d_{CO}^{-2} + d_{DO}^{-2} + d_{EO}^{-2}} \qquad (21.5)$$

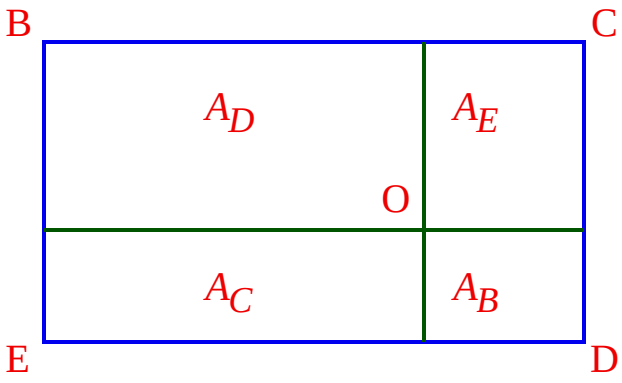
Modified inverse square interpolation

$$V_O \approx \frac{\theta_A V_A d_{AO}^{-2} + \theta_B V_B d_{BO}^{-2} + \theta_C V_C d_{CO}^{-2} + \theta_D V_D d_{DO}^{-2} + \theta_E V_E d_{EO}^{-2}}{\theta_A d_{AO}^{-2} + \theta_B d_{BO}^{-2} + \theta_C d_{CO}^{-2} + \theta_D d_{DO}^{-2} + \theta_E d_{EO}^{-2}}$$

(21.6)

Bilinear Interpolation

Fig. 21.2. Location of point O in a rectangle with points B, C, D, and E at the corners.



$$V_O \approx \frac{A_B V_B + A_C V_C + A_D V_D + A_E V_E}{A_B + A_C + A_D + A_E} \qquad (21.8)$$

Statistics

Overall normalized gross error

$$\mathrm{NGE} = \frac{1}{N_{tim} N_{obs}} \sum_{j=1}^{N_{tim}} \left[\sum_{i=1}^{N_{obs}} \frac{\left| P_{x_i,t_j} - O_{x_i,t_j} \right|}{O_{x_i,t_j}} \right] \tag{21.9}$$

Location-specific normalized gross error

$$\mathrm{NGE}_x = \frac{1}{N_{tim}} \sum_{j=1}^{N_{tim}} \frac{\left| P_{x,t_j} - O_{x,t_j} \right|}{O_{x,t_j}} \tag{21.10}$$

Time-specific normalized gross error

$$\mathrm{NGE}_t = \frac{1}{N_{obs}} \sum_{i=1}^{N_{obs}} \frac{\left| P_{x_i,t} - O_{x_i,t} \right|}{O_{x_i,t}} \tag{21.11}$$

Normalized bias

$$\mathrm{NB} = \frac{1}{N_{tim} N_{obs}} \sum_{j=1}^{N_{tim}} \left[\sum_{i=1}^{N_{obs}} \frac{P_{x_i,t_j} - O_{x_i,t_j}}{O_{x_i,t_j}} \right] \tag{21.12}$$

Paired peak accuracy

$$\mathrm{PPA} = \frac{P_{\hat{x},\hat{t}} - O_{\hat{x},\hat{t}}}{O_{\hat{x},\hat{t}}} \tag{21.15}$$

Temporally-paired peak accuracy

$$\mathrm{TPPA} = \frac{P_{x,\hat{t}} - O_{x,\hat{t}}}{O_{x,\hat{t}}} \tag{21.16}$$