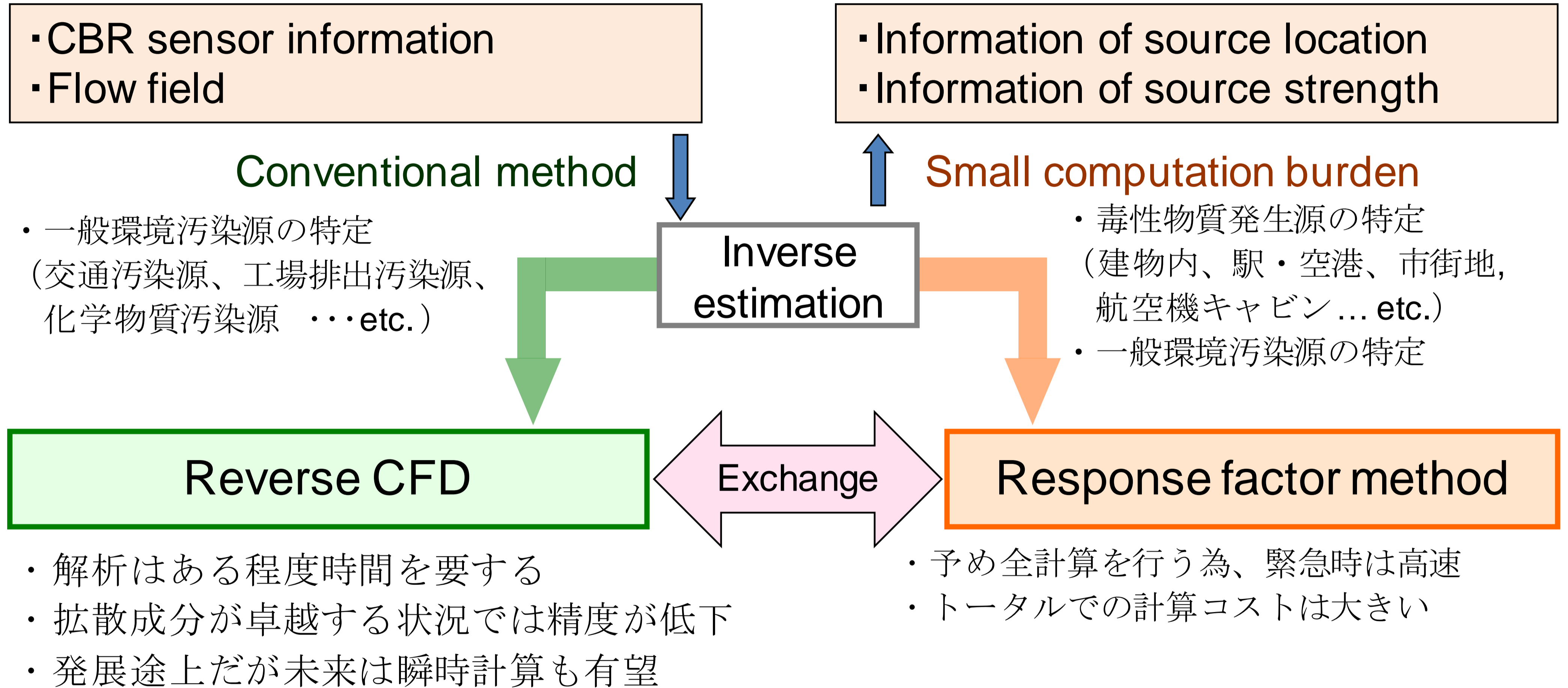
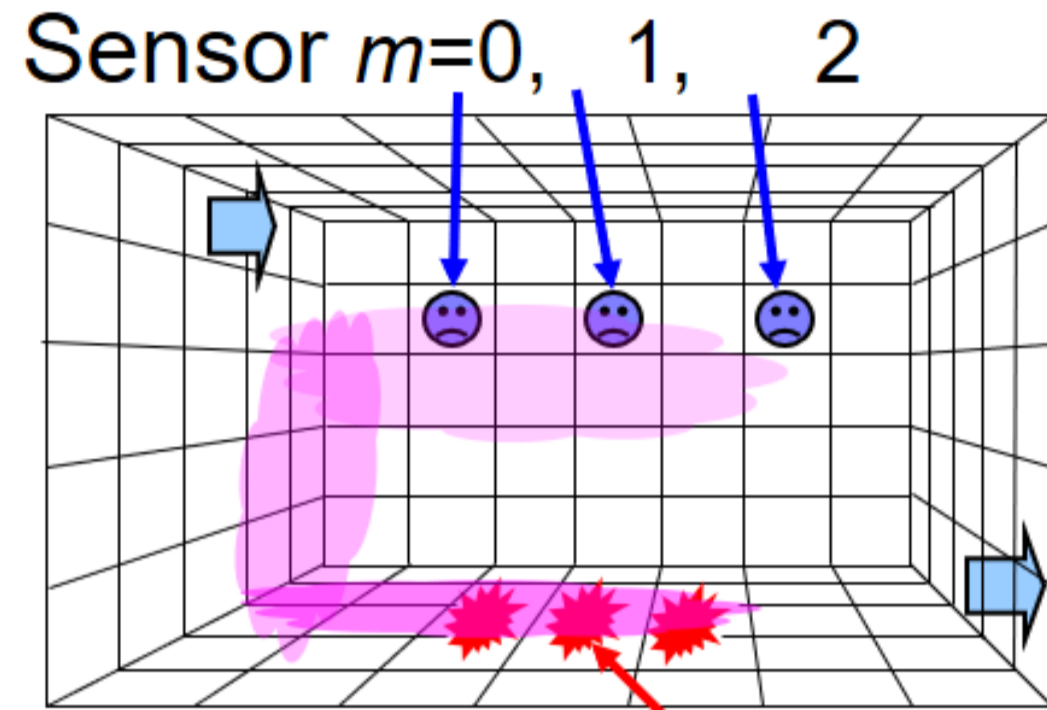


Outline of Development



Development of two different estimation techniques by different purposes

Estimation Using Response Factor Method



Contaminant source

$S \times N$ vector

S: discretized space no
N: Observation steps

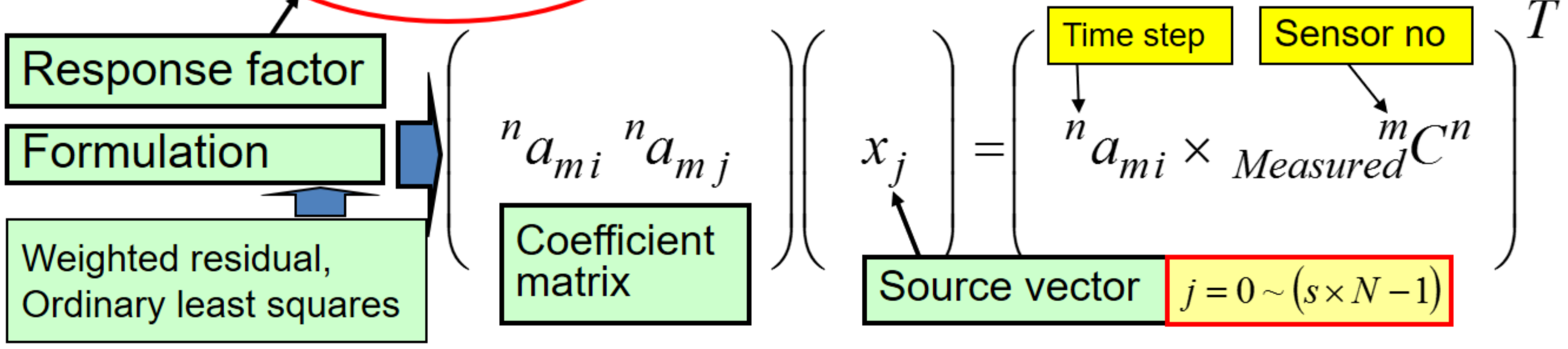
$$m C^n = \sum_{s=0}^{S-1} \sum_{k=0}^{N3} m F^k q^{n-k}$$

Labels: Sensor no (m), Response coefficient (F), Time step (s), Unknown source (q)

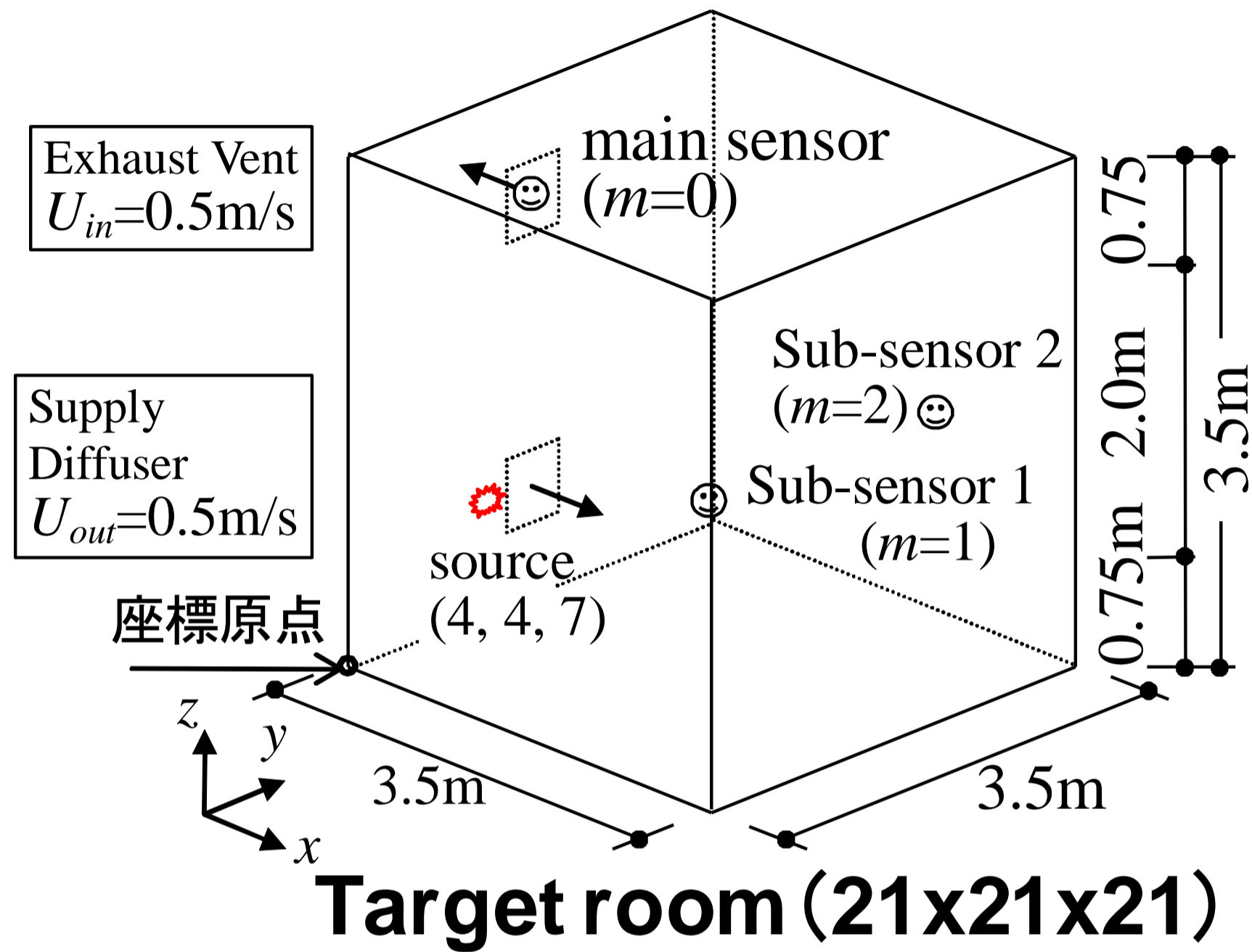
$N3 = n \quad (n < N2)$
 $N3 = N2 - 1 \quad (n \geq N2)$

$$(x_j) = \begin{pmatrix} ({}^0q^0 & {}^0q^1 & \dots & {}^0q^{N2-2} & {}^0q^{N2-1}) & ({}^1q^0 & \dots \\ \dots & ({}^sq^0 & {}^sq^1 & \dots & {}^sq^{N2-2} & {}^sq^{N2-1}) & ({}^{s+1}q^{n=0} & \dots \\ \dots & ({}^{S-1}q^0 & {}^{S-1}q^1 & \dots & {}^{S-1}q^{N2-2} & {}^{S-1}q^{N2-1}) \end{pmatrix}^T$$

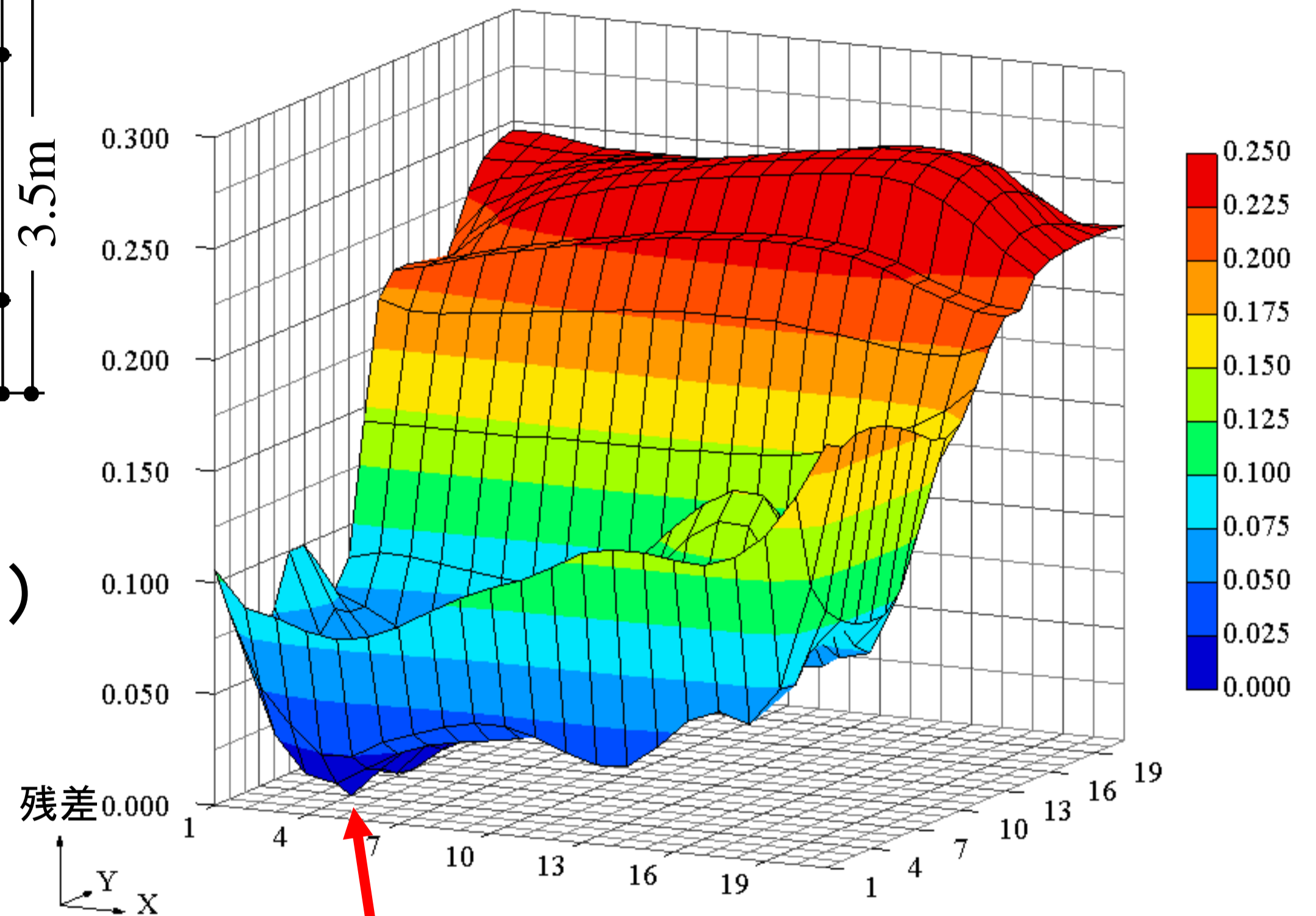
$${}^n a_{mj} = {}^s F^{k=n-j\%N2} \quad (k = n - j\%N2 \geq 0), \quad {}^n a_{mj} = 0 \quad (k < 0)$$



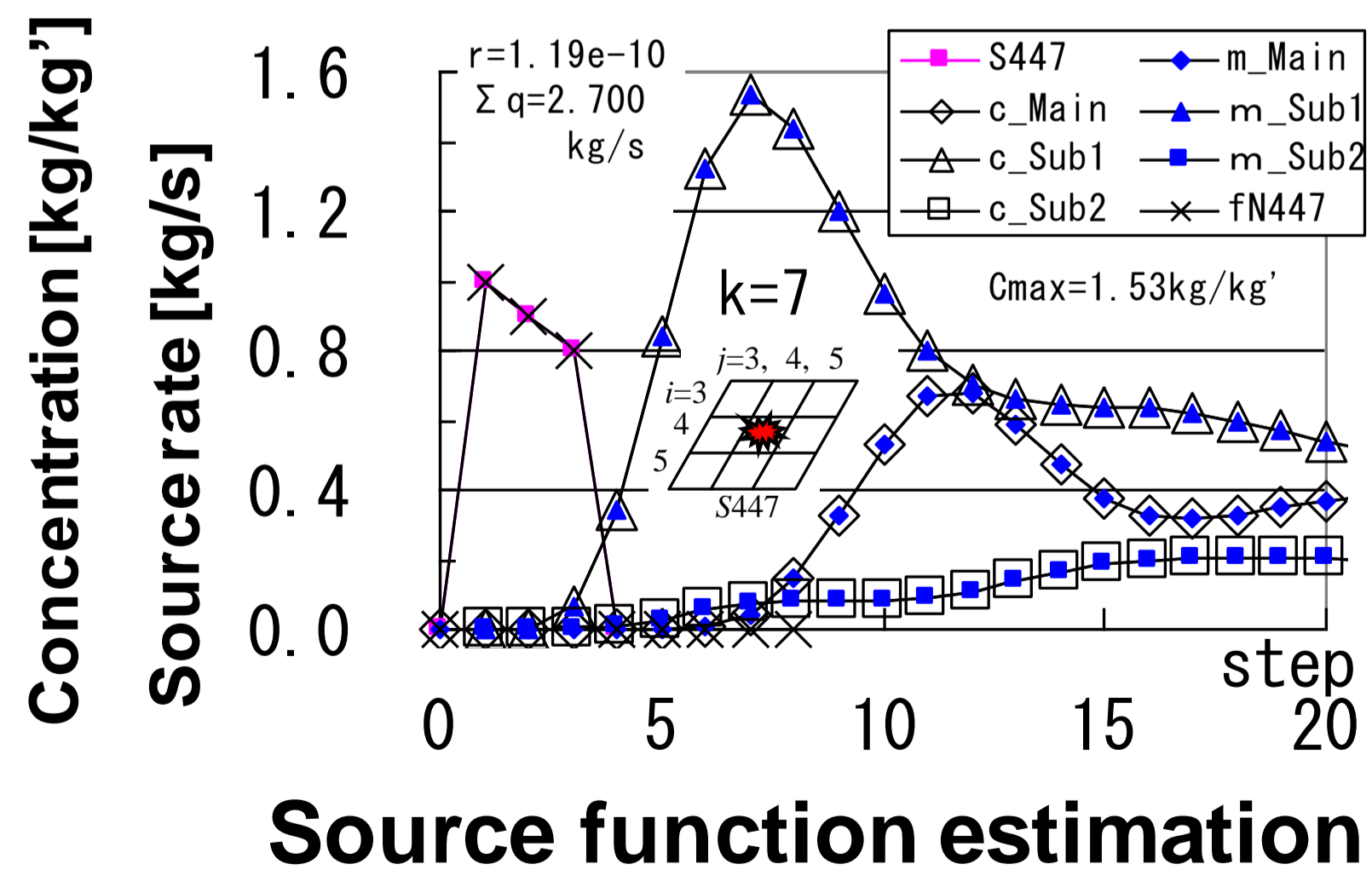
Estimation Using Point Search Method



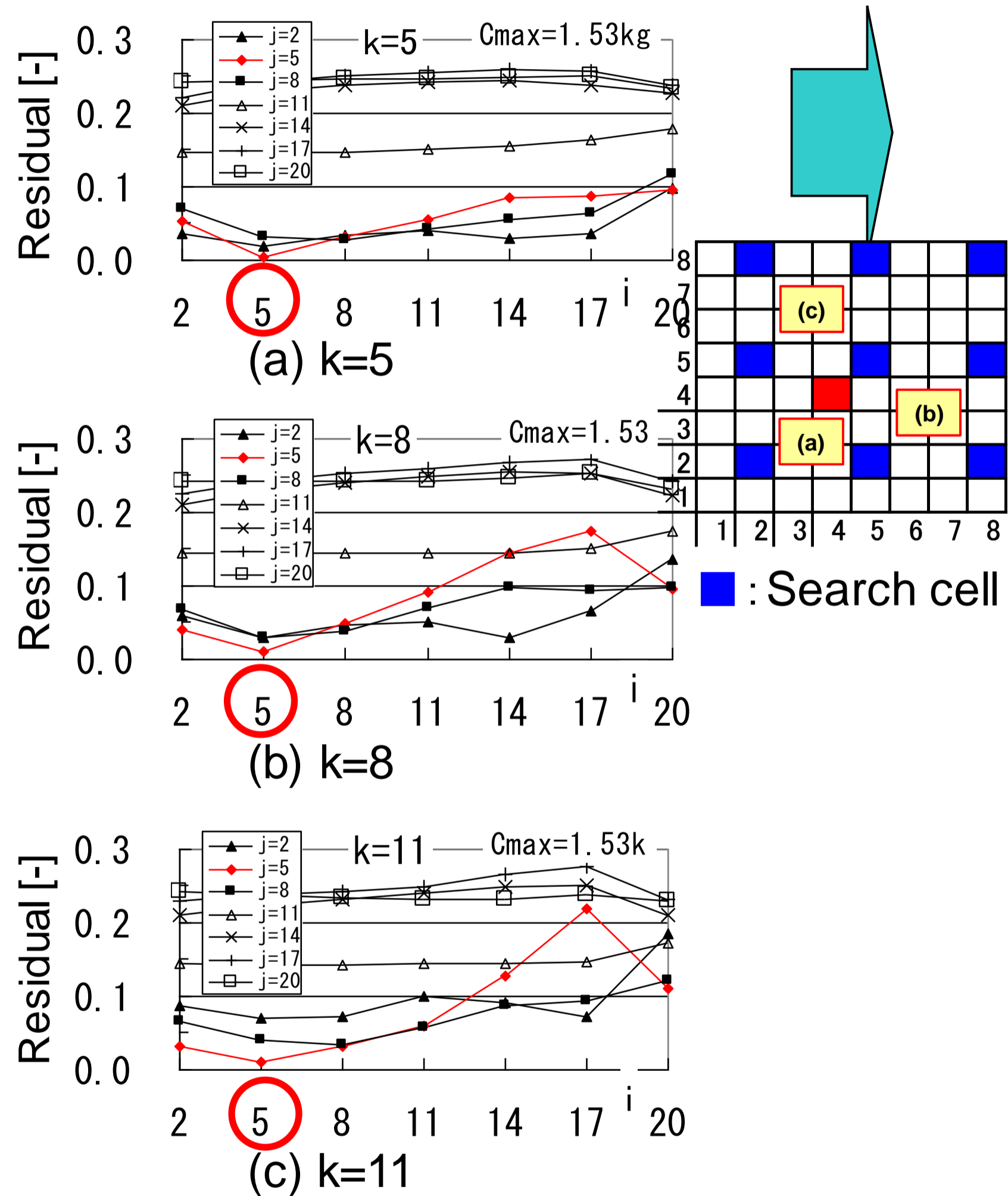
Residual obtained by point search method



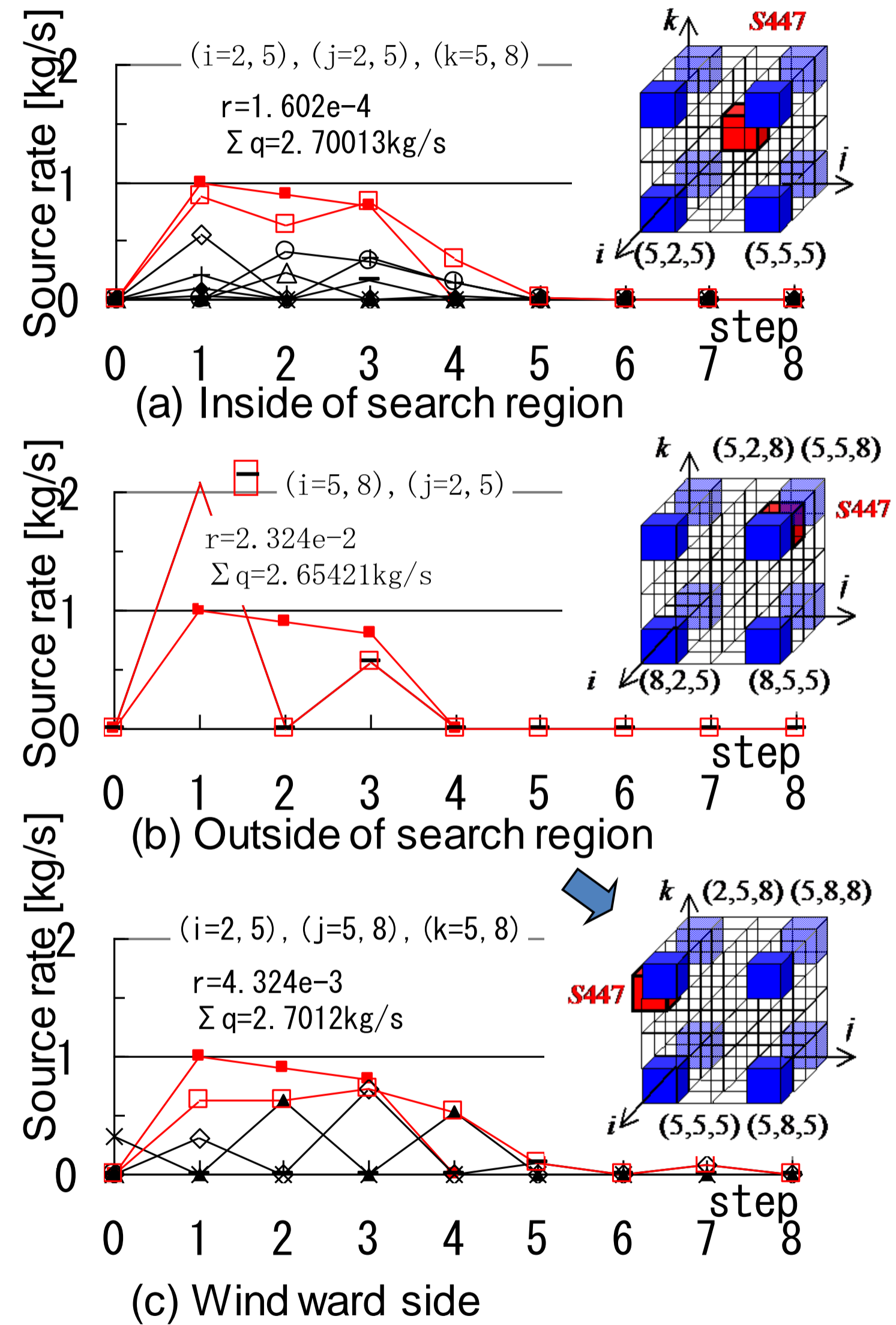
Cell(4, 4, 7), Residual $r=1.2 \times 10^{-10}$



Estimation Using Coarse Mesh



Results of point search method



Estimation using volume search method