

Optimizing flight-line distance for soil decontamination

application to contaminated Fukushima territories

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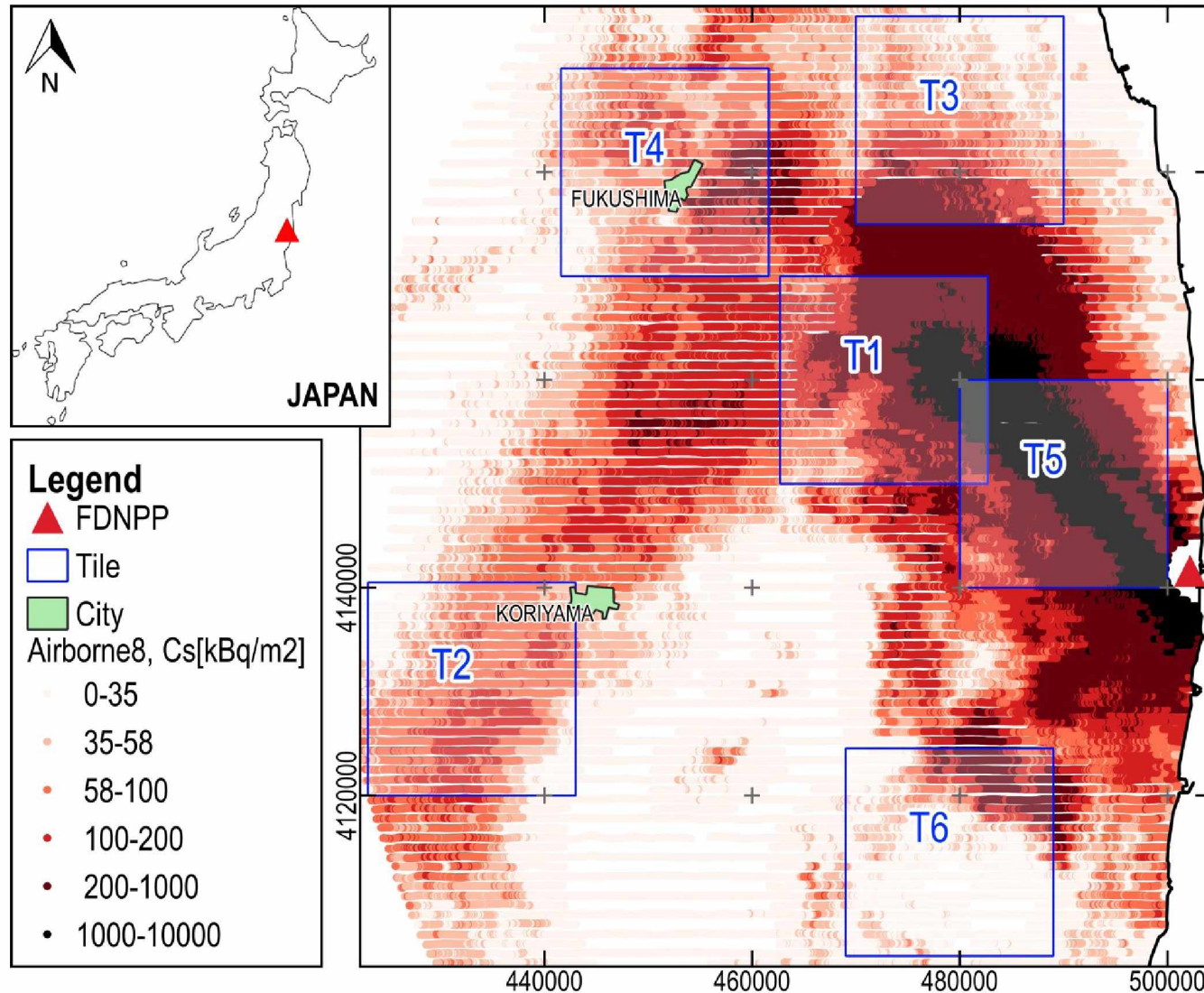
IRSN/PSE-ENV/SEDRE/LELI



3rd European Radiological Protection Research Week (ERPW)

Rovinj, Croatia- October 2018

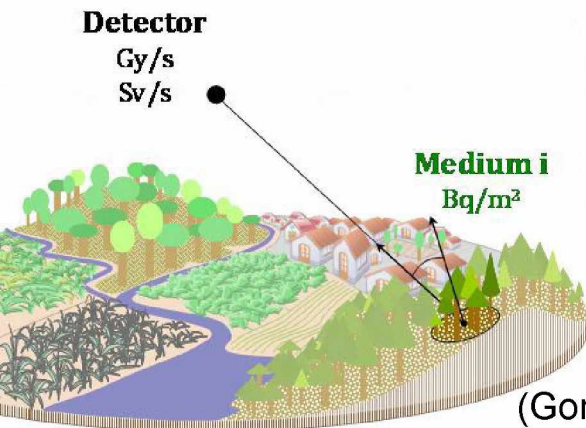
Cs-137 deposit over Fukushima region



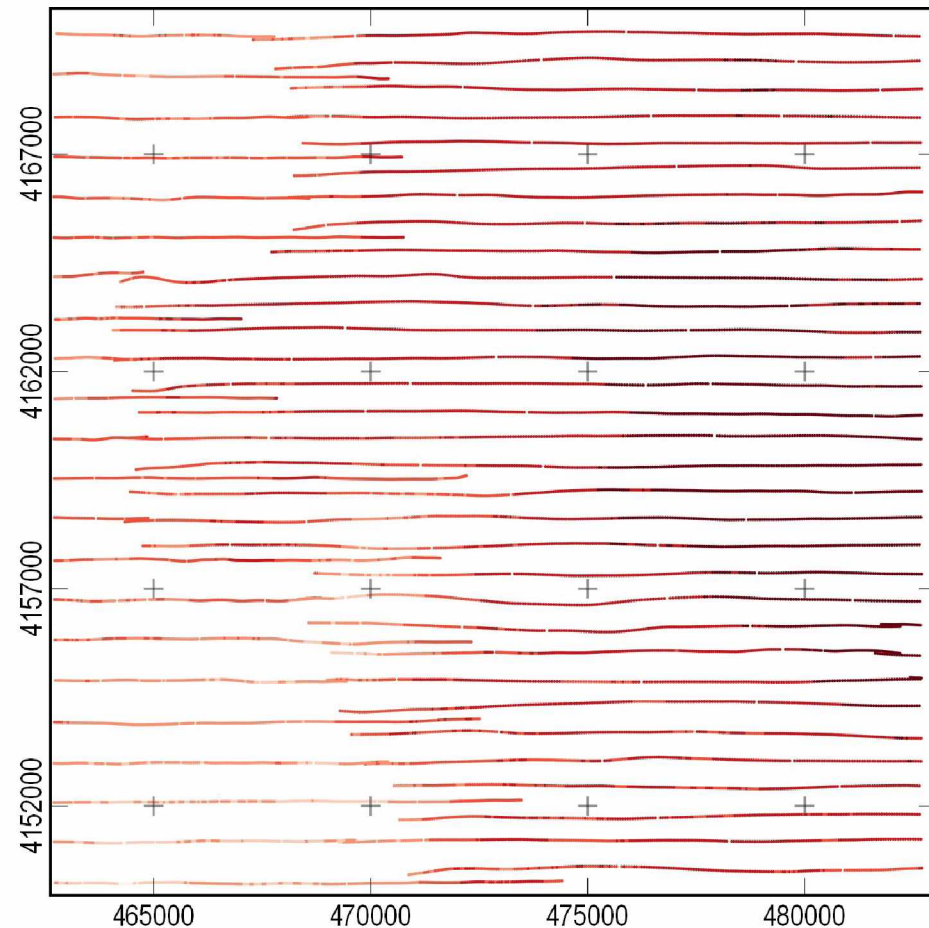
Airborne resolutions

- Density of measurements:
 - ~40 m within flight-lines
 - >620 m between flight-lines
- Field Of View (FOV) radius: ~350 m

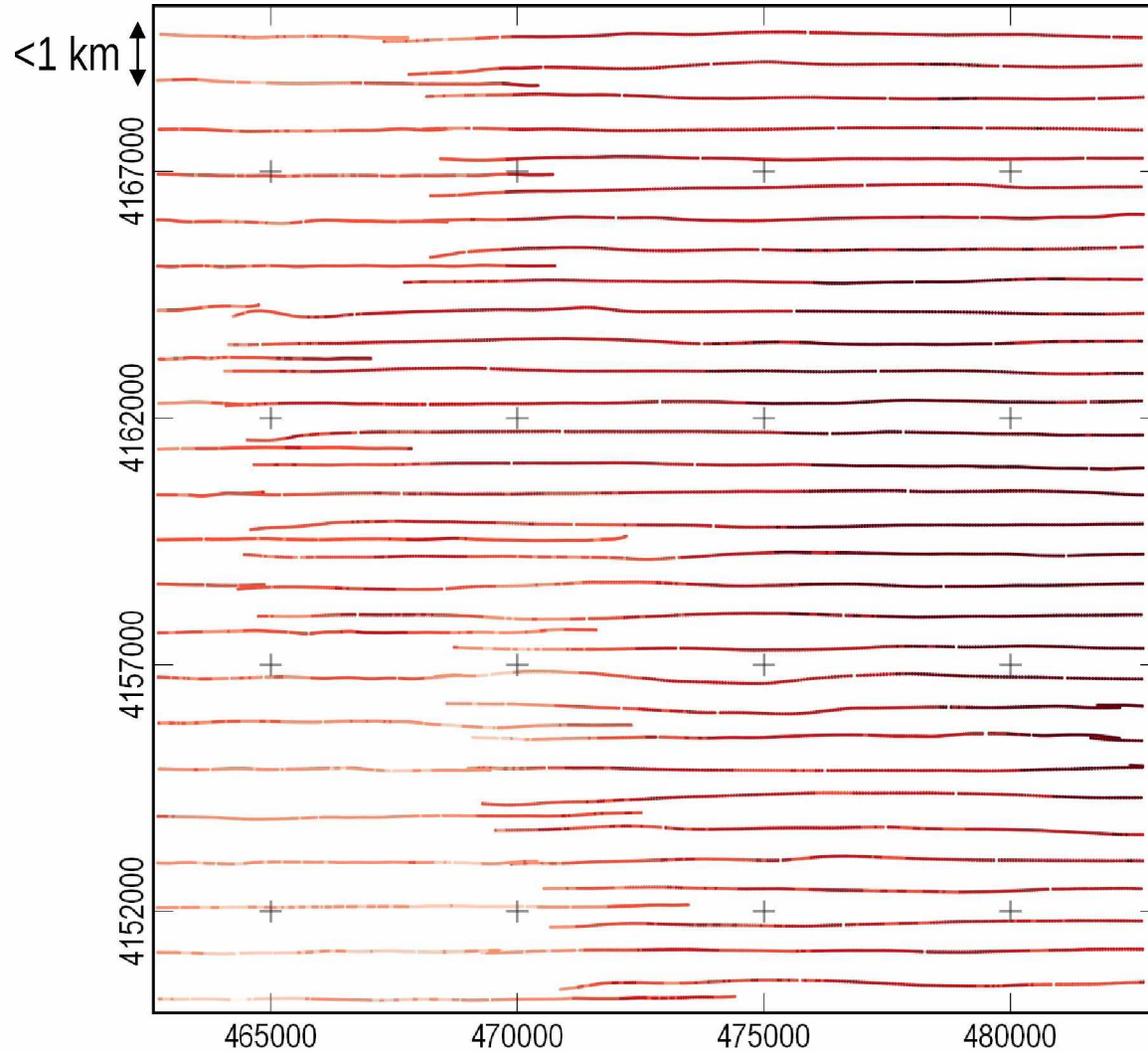
$$\frac{1}{620 + 700} < fr_{Nyg}^{vol} = \frac{1}{d_{SR} + d_{FOV}} < \frac{1}{40 + 700}$$



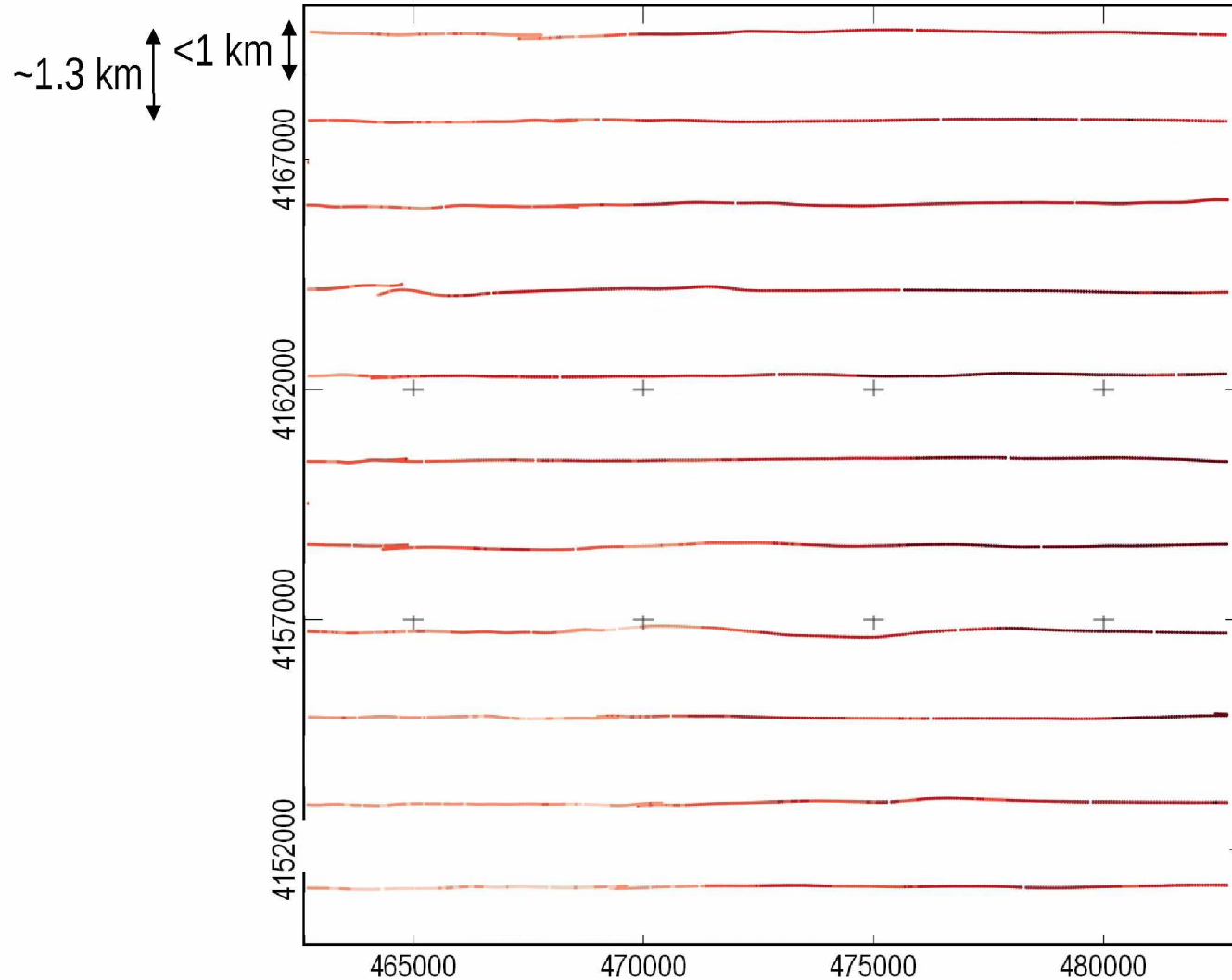
(Gonze et al. 2015)



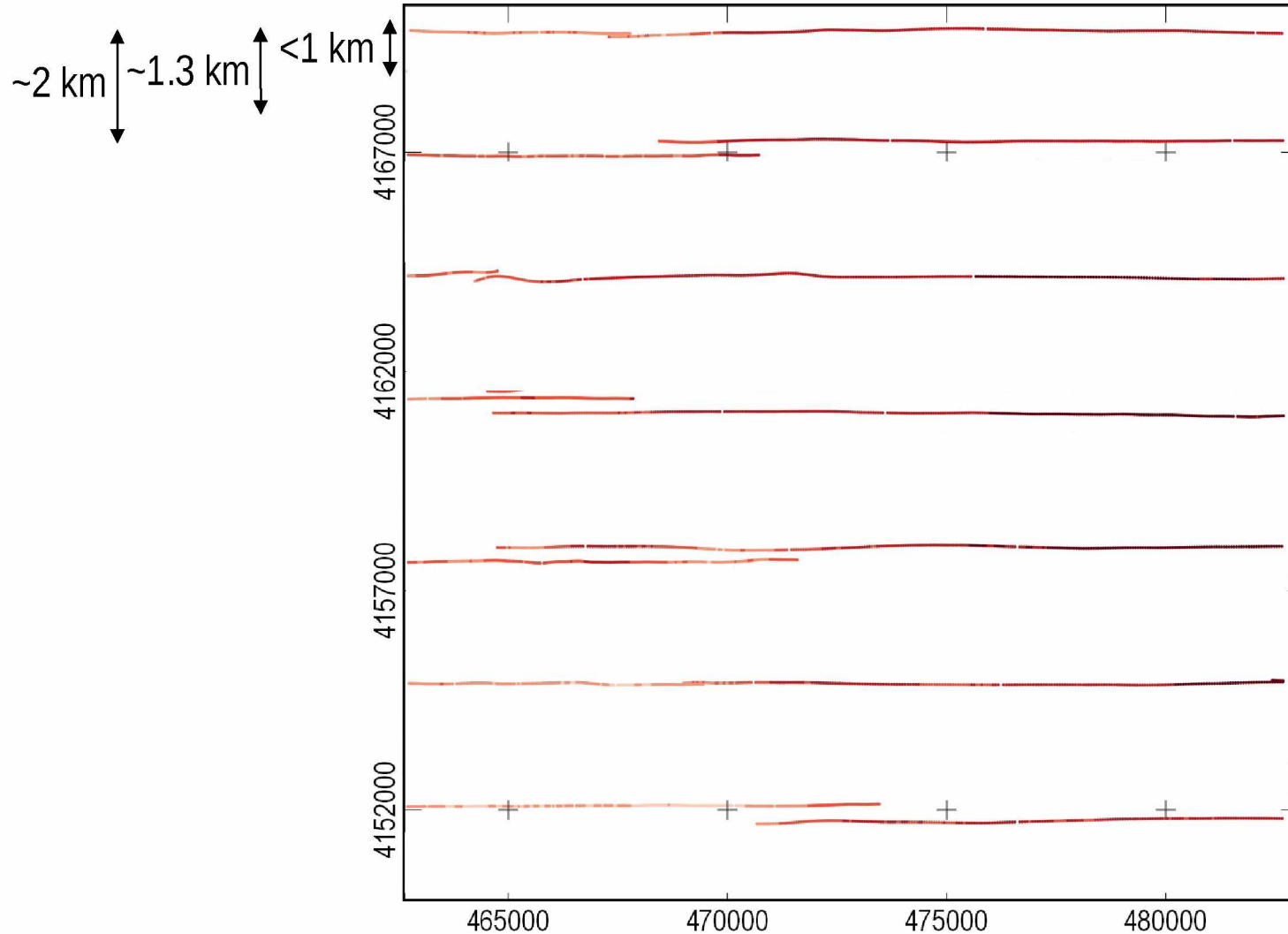
Flight-line selections



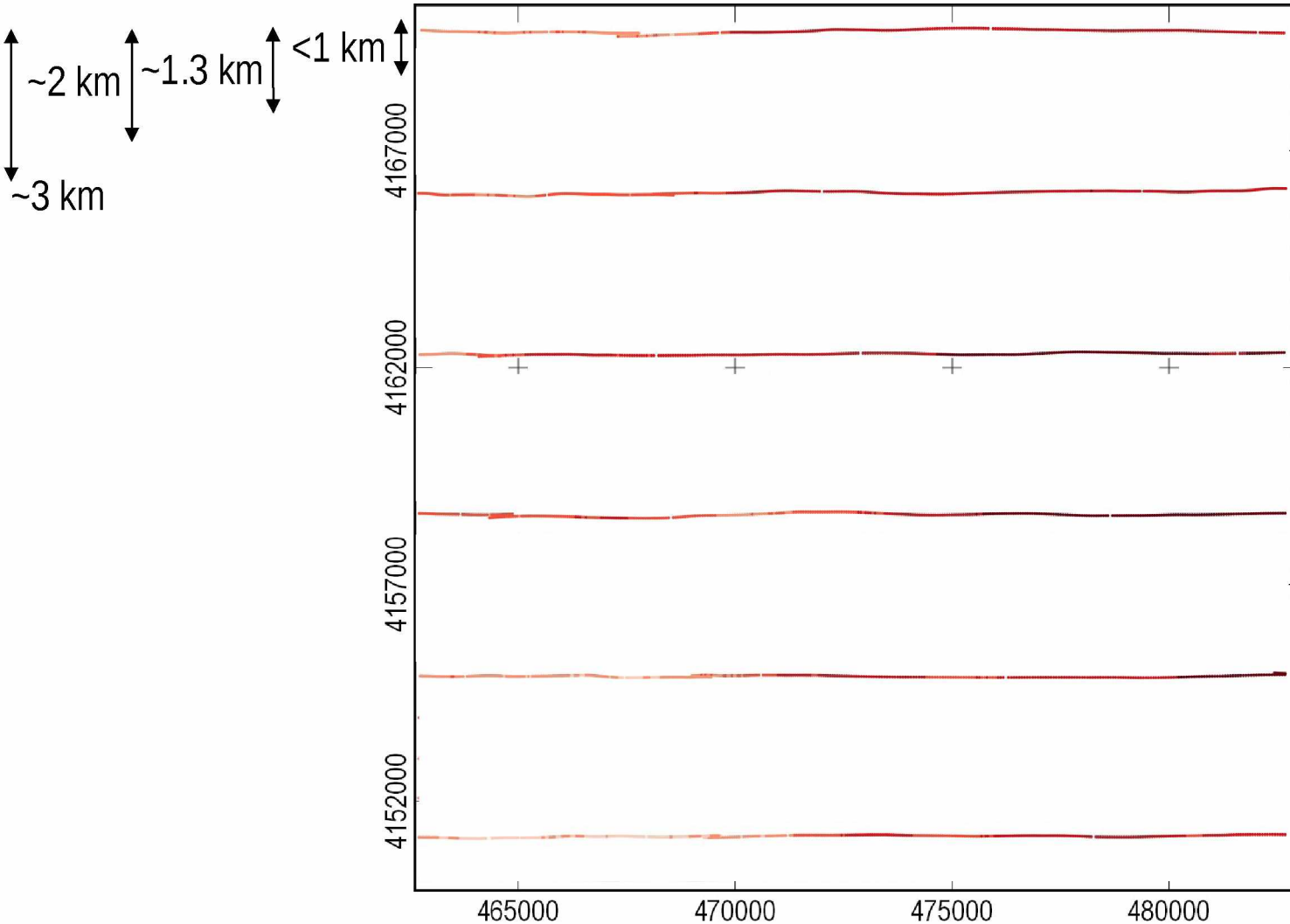
Flight-line selections



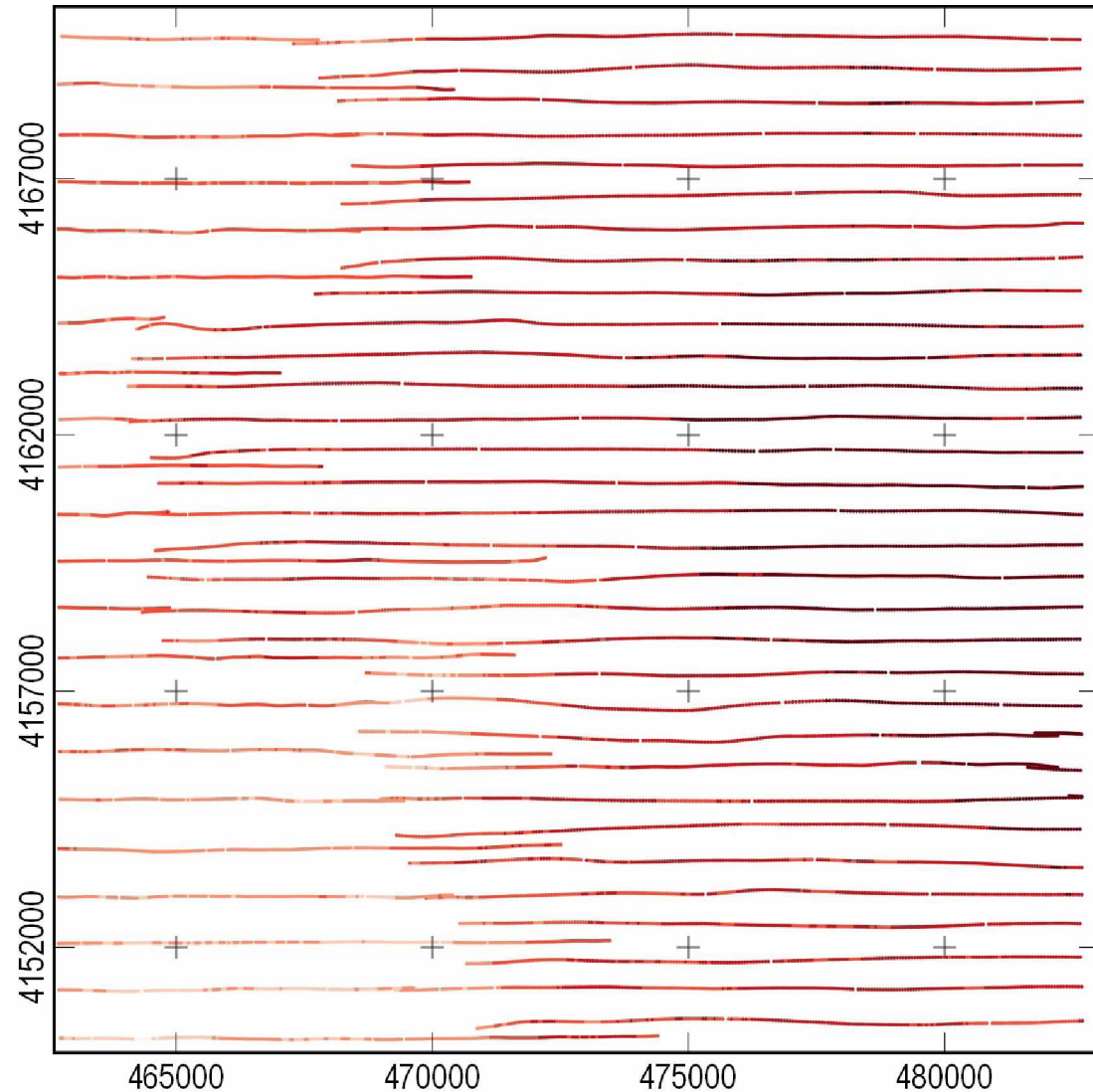
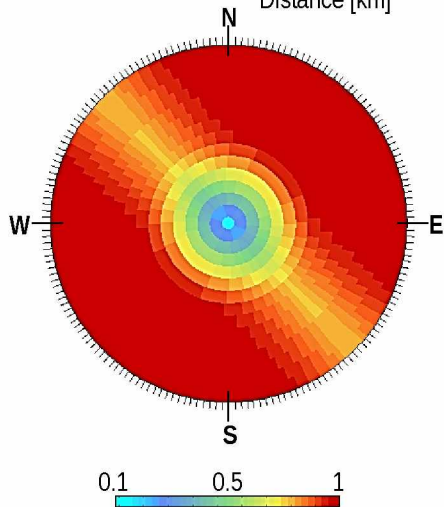
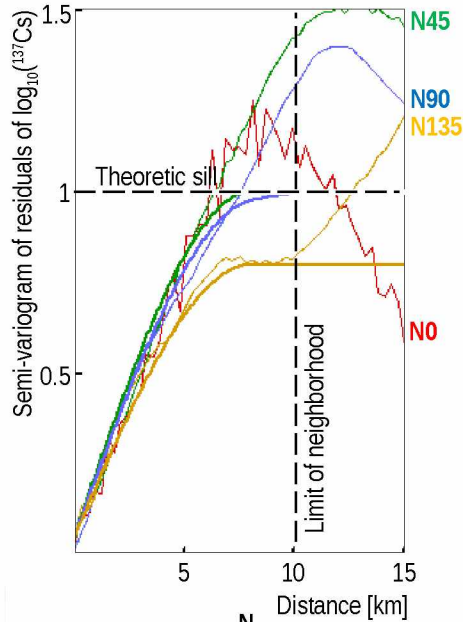
Flight-line selections



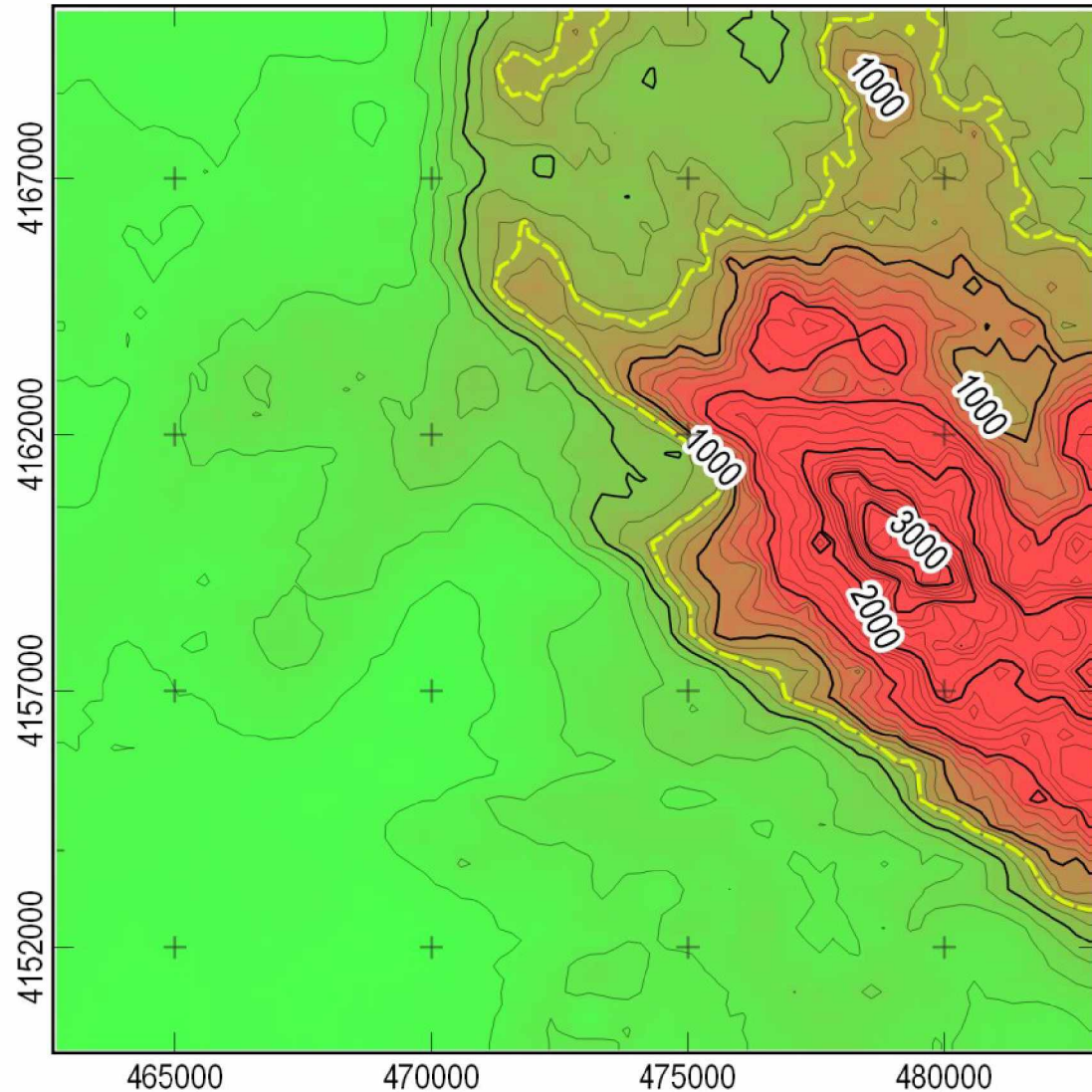
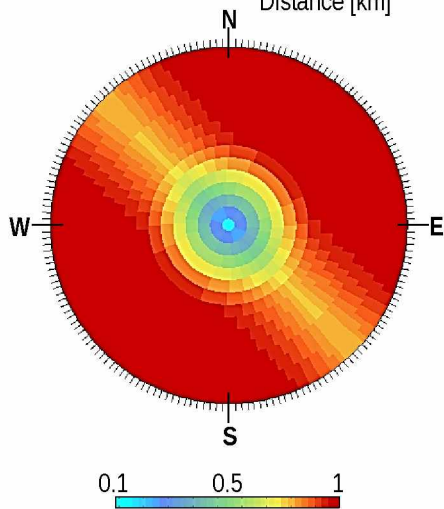
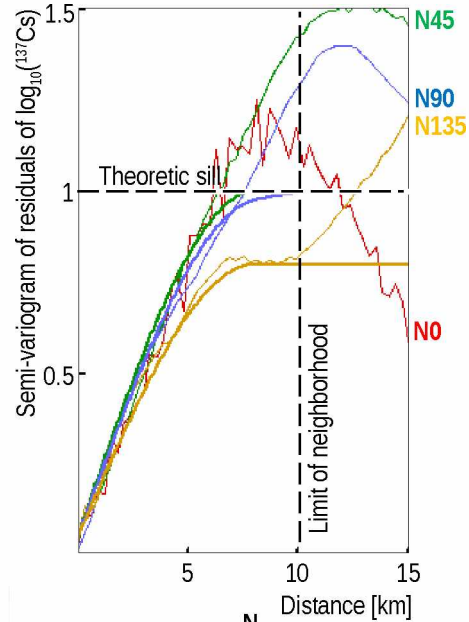
Flight-line selections



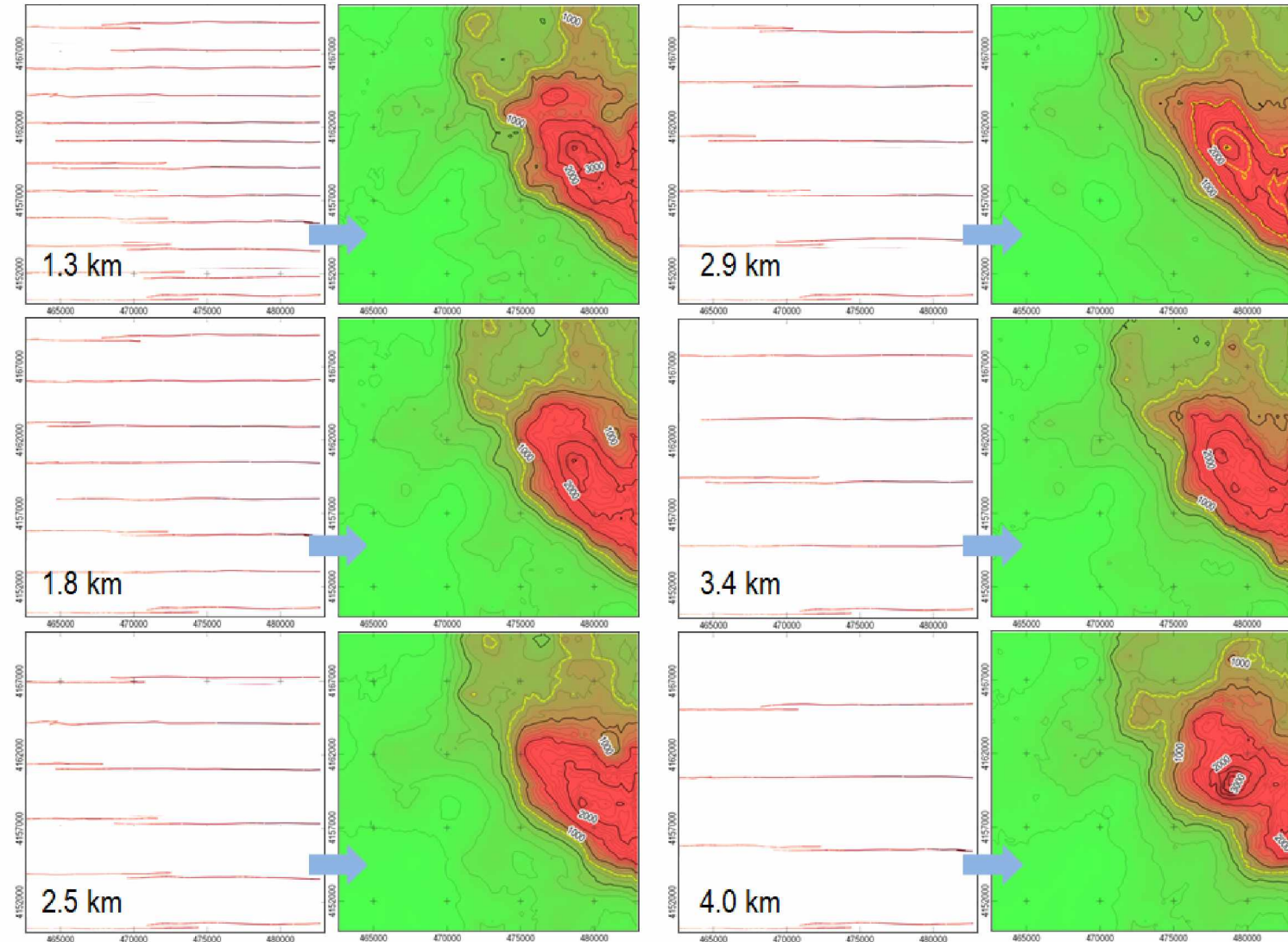
Ordinary block kriging, Tile#1

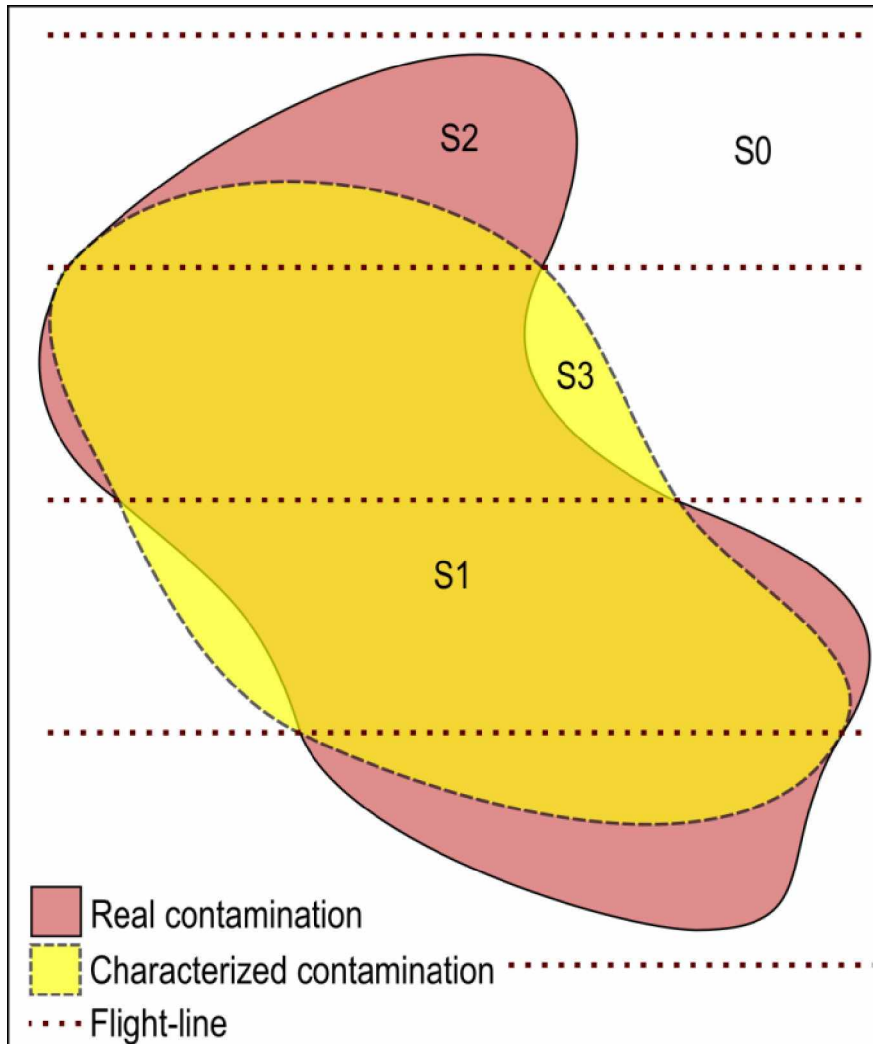


Ordinary block kriging, Tile#1



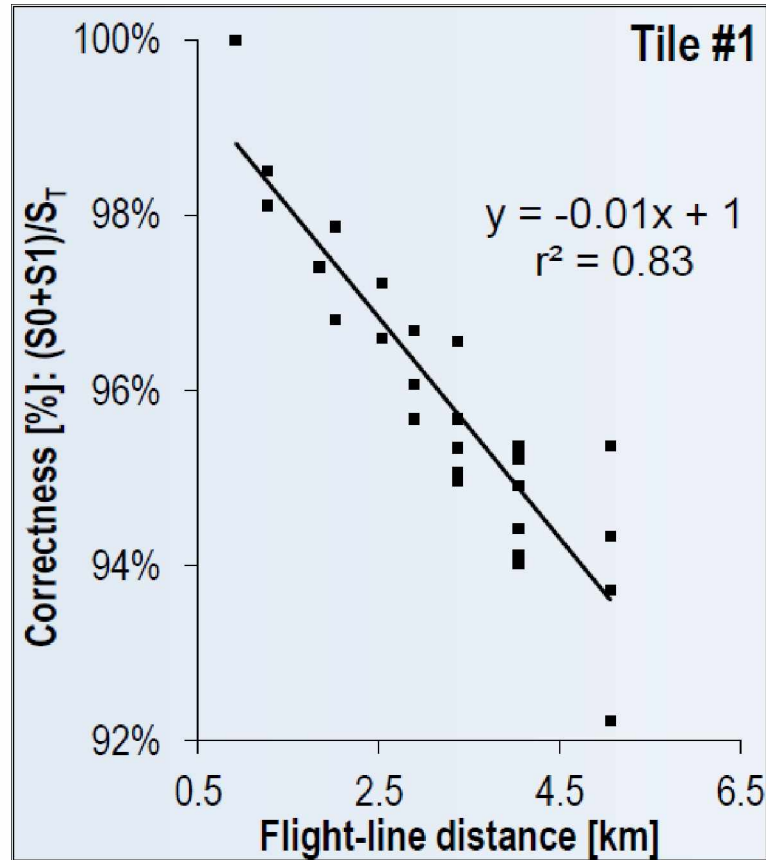
Ordinary block kriging, Tile#1





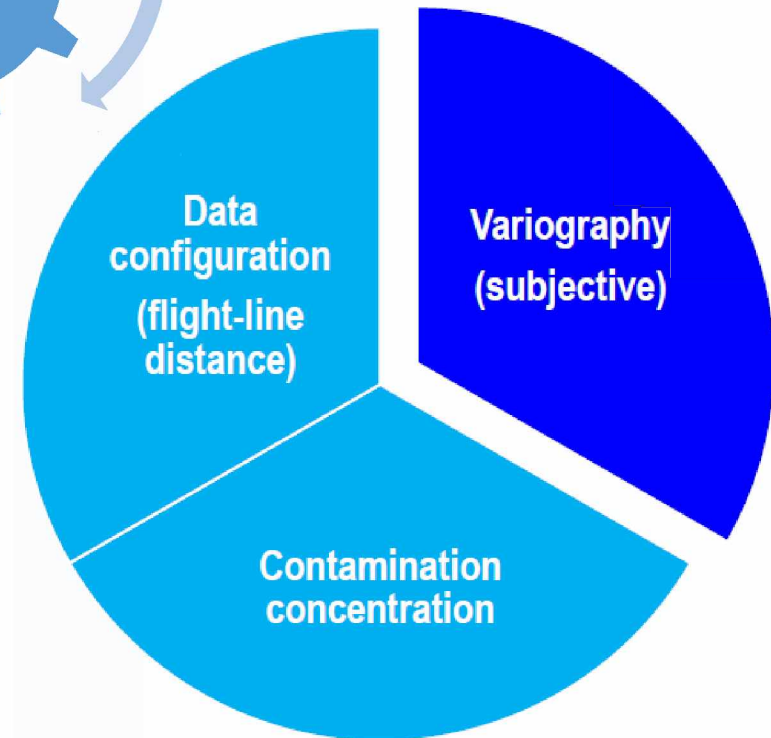
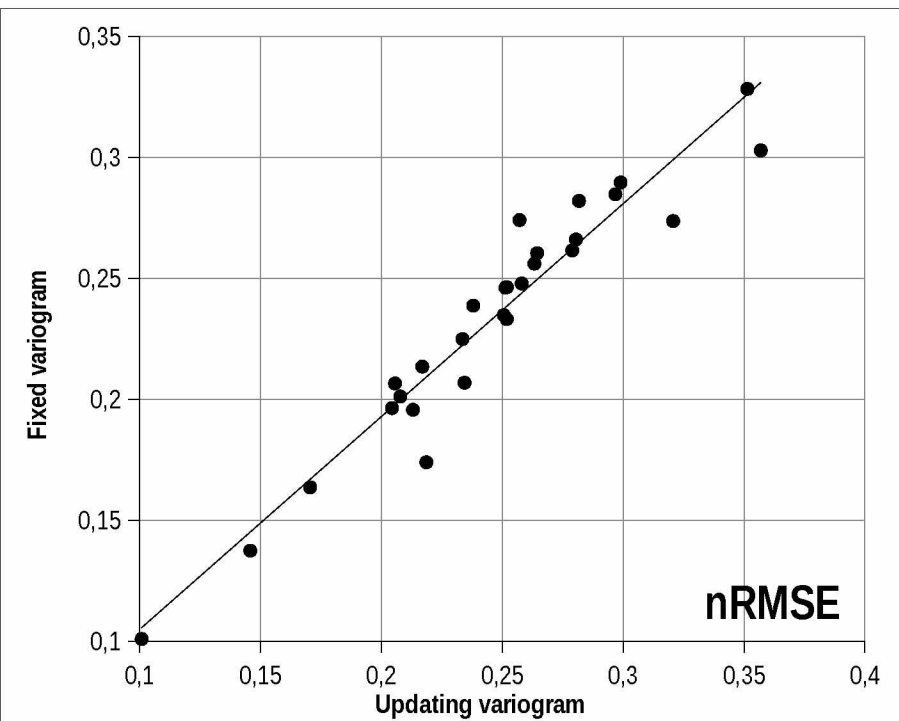
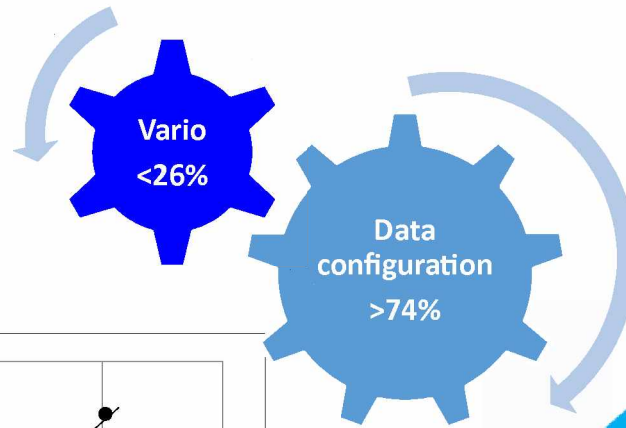
$$C = \frac{S0 + S1}{S0 + S1 + S2 + S3}$$

Correctness, Tile#1

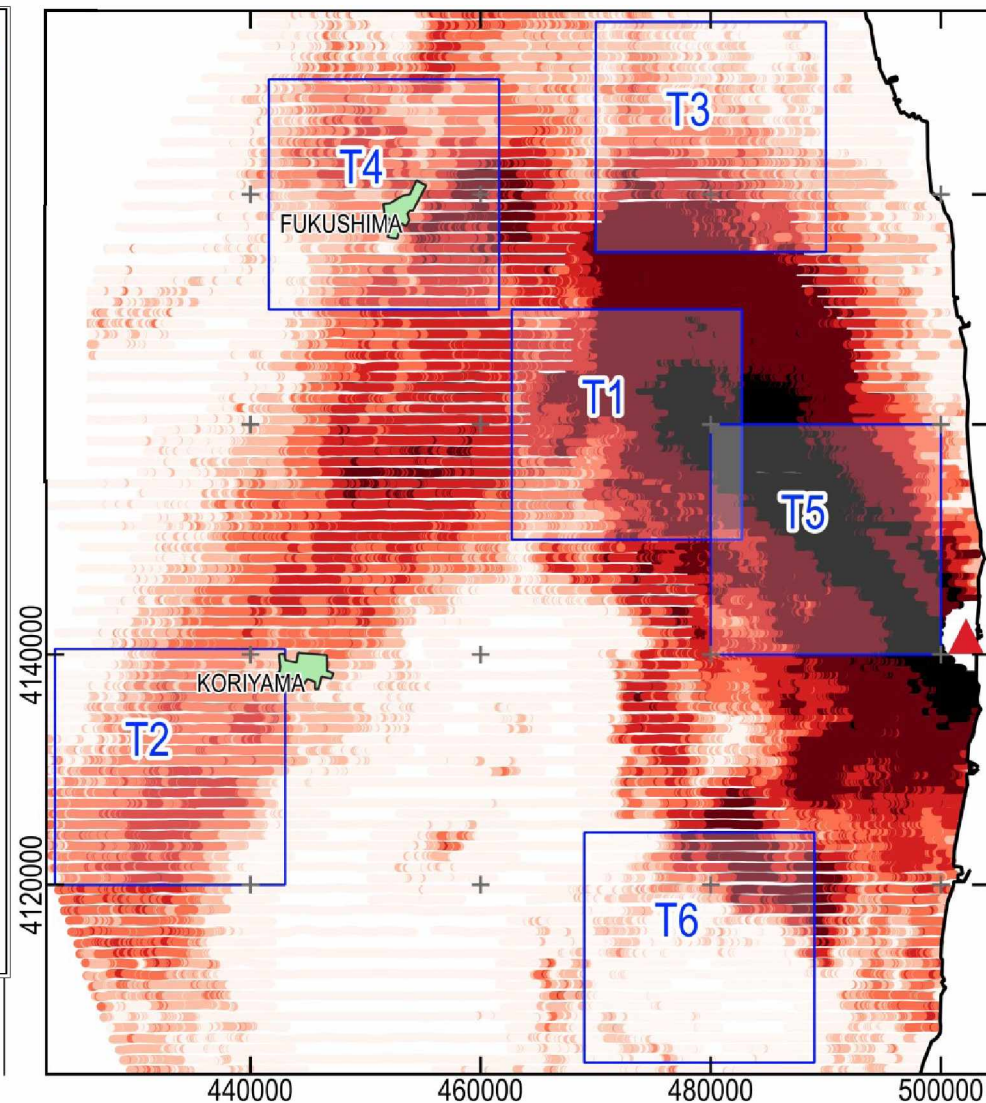
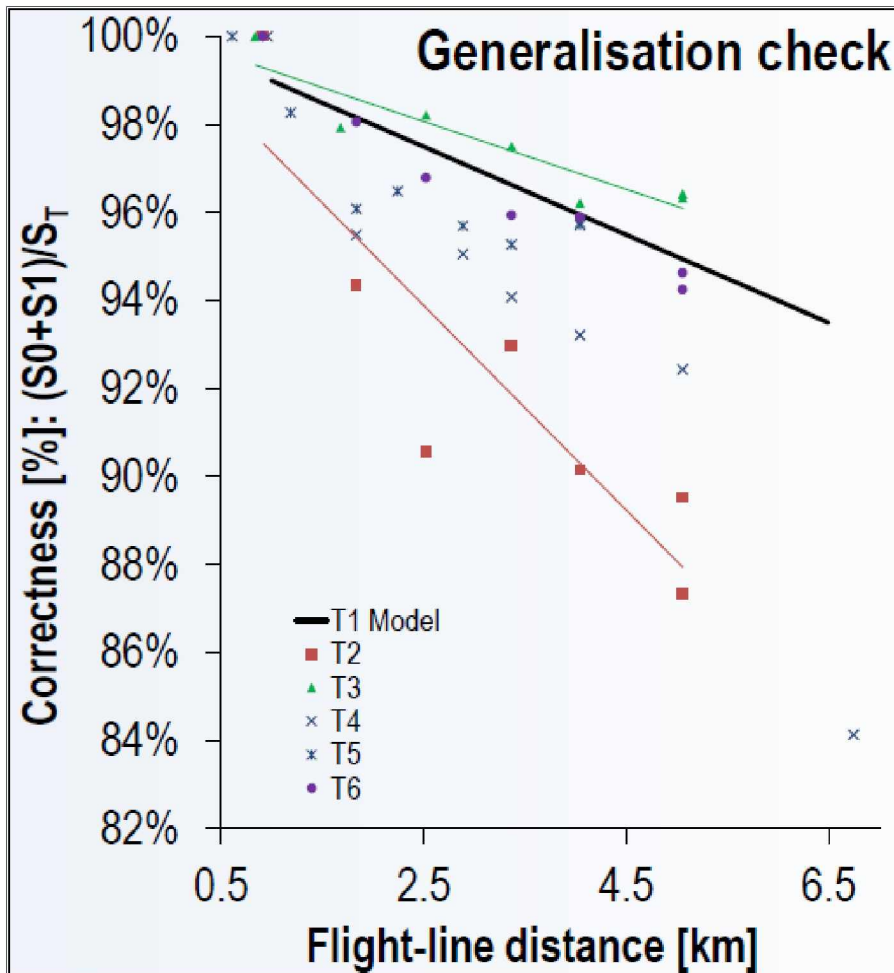


Every **1 km** increase of flight-line distance:
1 % reduction of correctness

Sensitivity analysis of variography, Tile#1



Generalization ability



- A robust correlation ($r^2=0.83$) exists between **correctness** and the **flight-line distance**.
- Correctness model **could be generalized** to **tiles #3 to #6** (uncertainty of $<4\%$).
- **Correctness of radiological map decreases 1 % by every one kilometer increase of flight-line distance.**

Thank you

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