SUSTech Southern University of Science and Technology

南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

地球与空间科学系 DEPARTMENT OF EARTH AND SPACE SCIENCES

GGC5039 / ESS419

Academic Communication

Section 3-2: Writing and Publishing (Figures and Tables)

Instructor: Dikun Yang

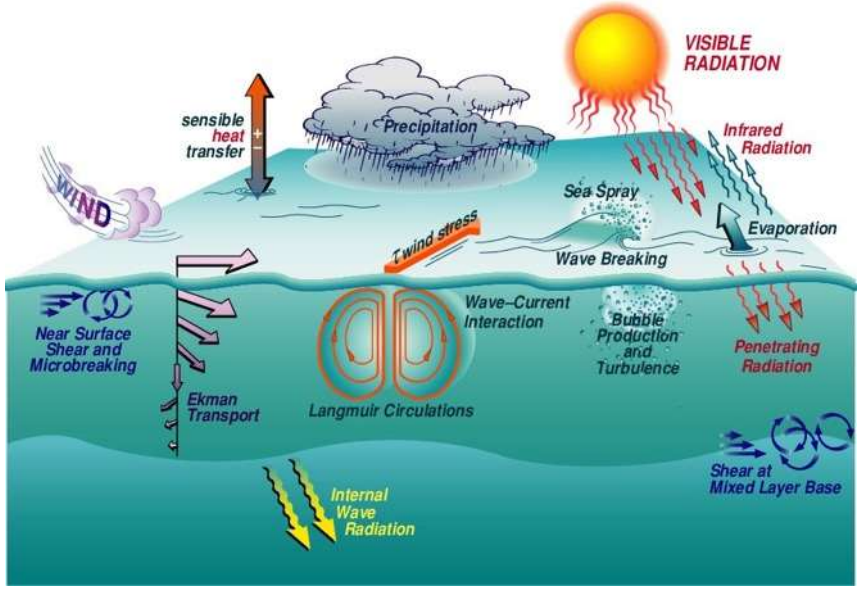
Term: Fall 2020-2021

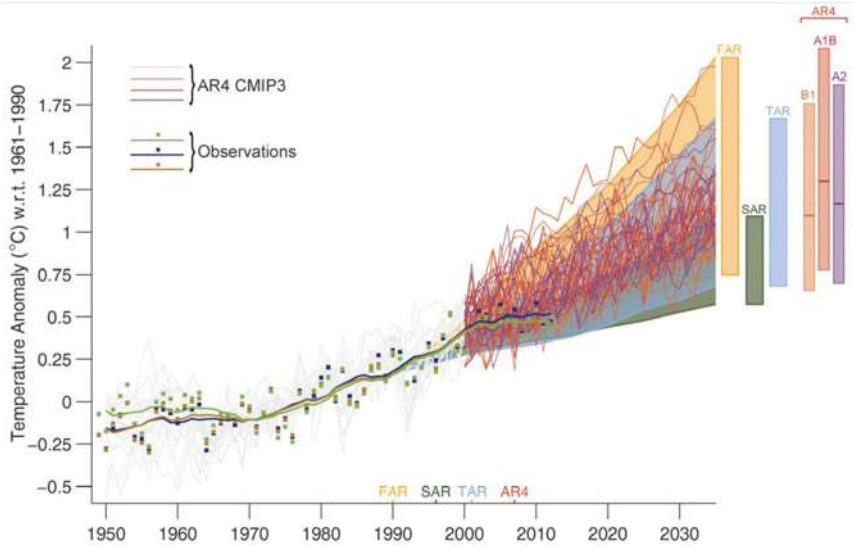
Outline

- Section 1: **Introduction** (2 hr)
- Section 2: **International communications** (2 hr)
- Section 3: **Writing and publishing** (8 hr) – Assignment 15%
- Section 4: **Presentations at conferences** (6 hr) – Assignment 15%
- Section 5: **Writing proposals and applications** (6 hr) – Assignment 15%
- Section 6: **Interviews** (4 hr) – Assignment 15%
- Section 7: **New media** (2 hr) – Assignment 15%
- Section 8: **Integrated practice** (2 hr) – Final defense/participation 25%

Figures

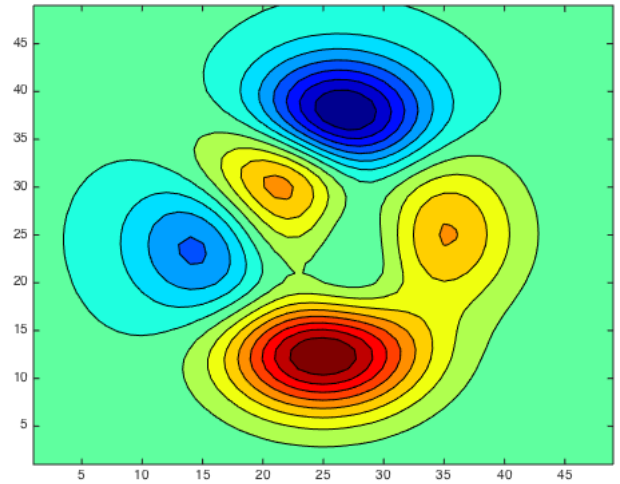
- Purposes
  - Representation of abstract info
  - Convey ideas quickly
  - Support results and claims
  - Attract attentions: Readers, funders, public
- A good figure
  - Clean: No clutter
  - Contrast: Color, symbol, line style/thickness
  - Straightforward: Protocols
  - Legible: Font and size
  - Visual aid: Ticks, labels, colors scale
  - Caption: Informative

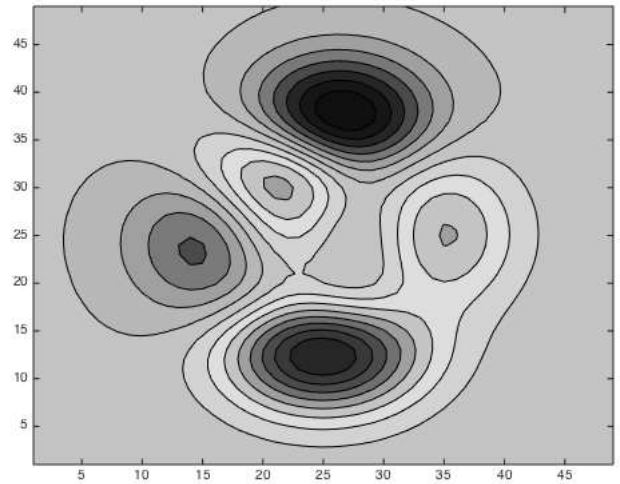




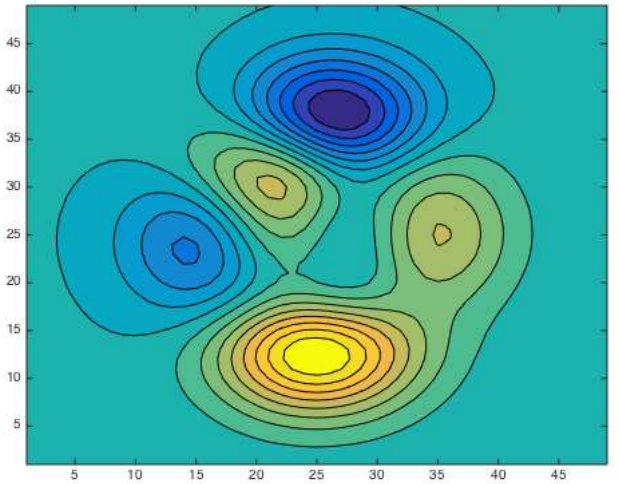
Color Map

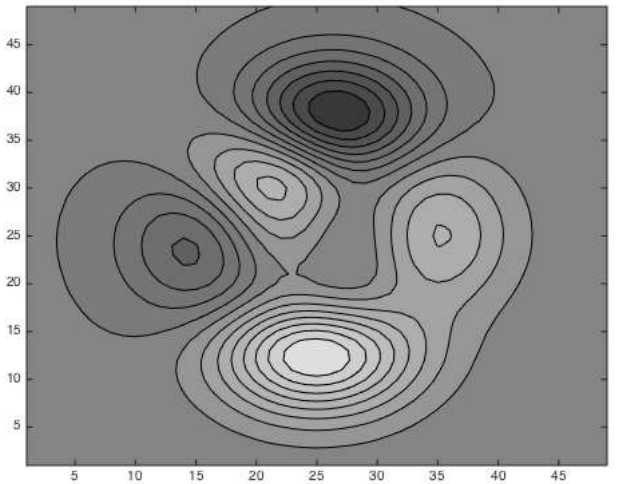
Jet



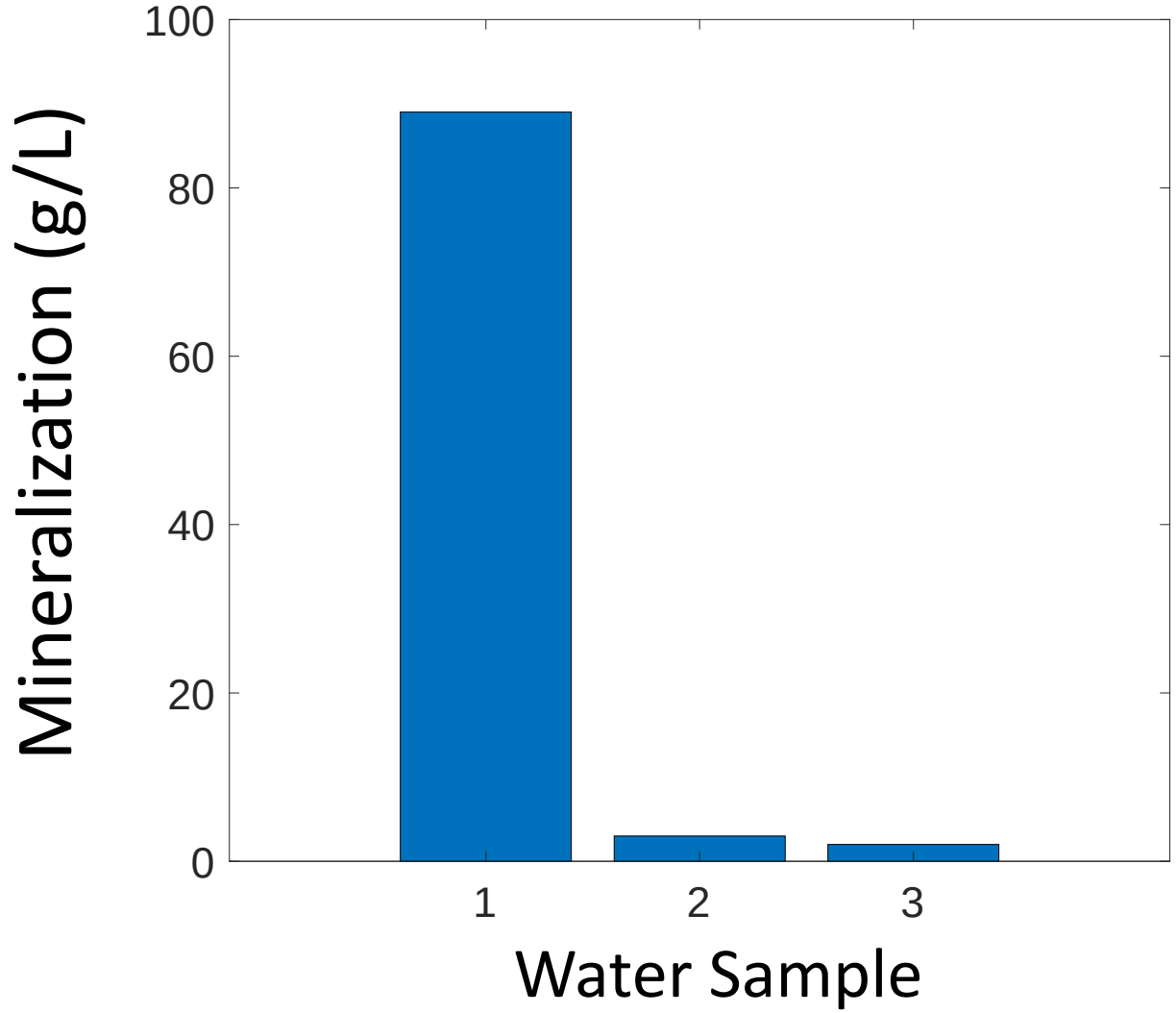


Parula

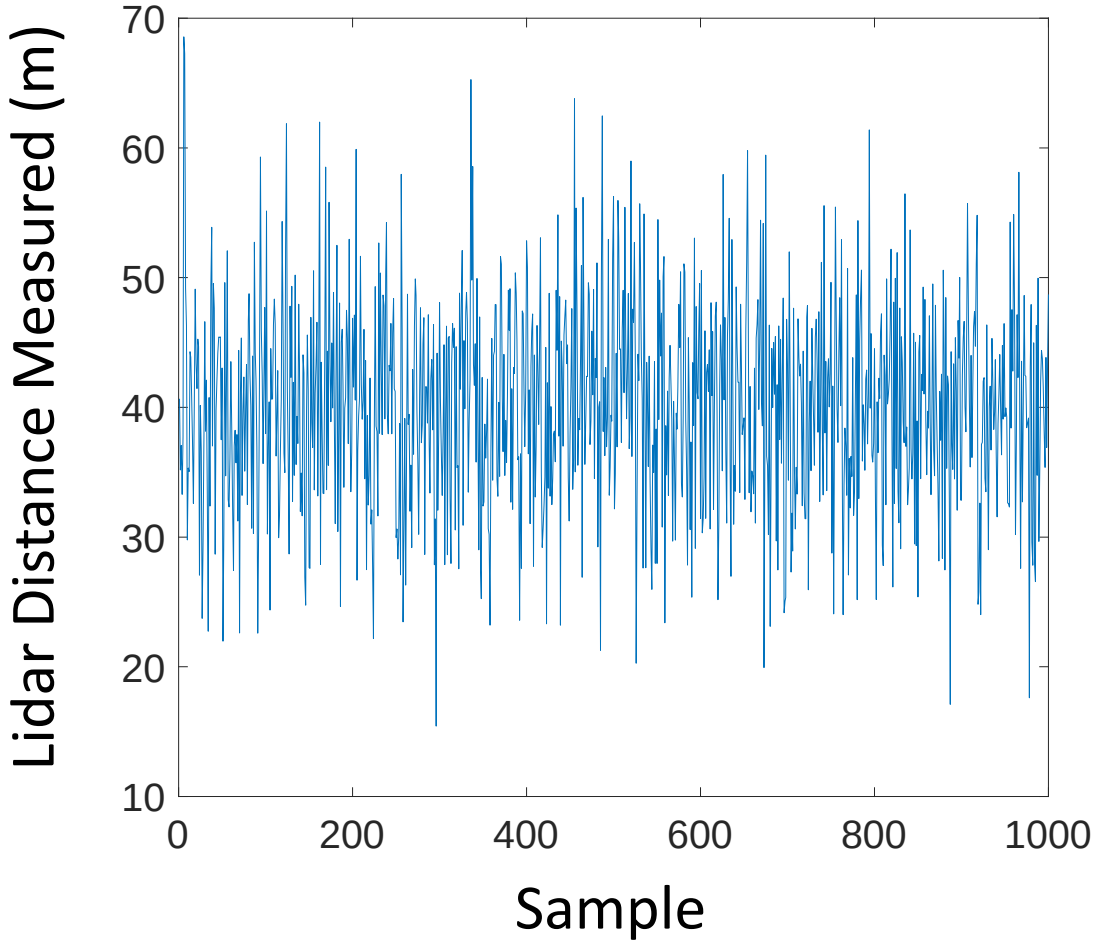


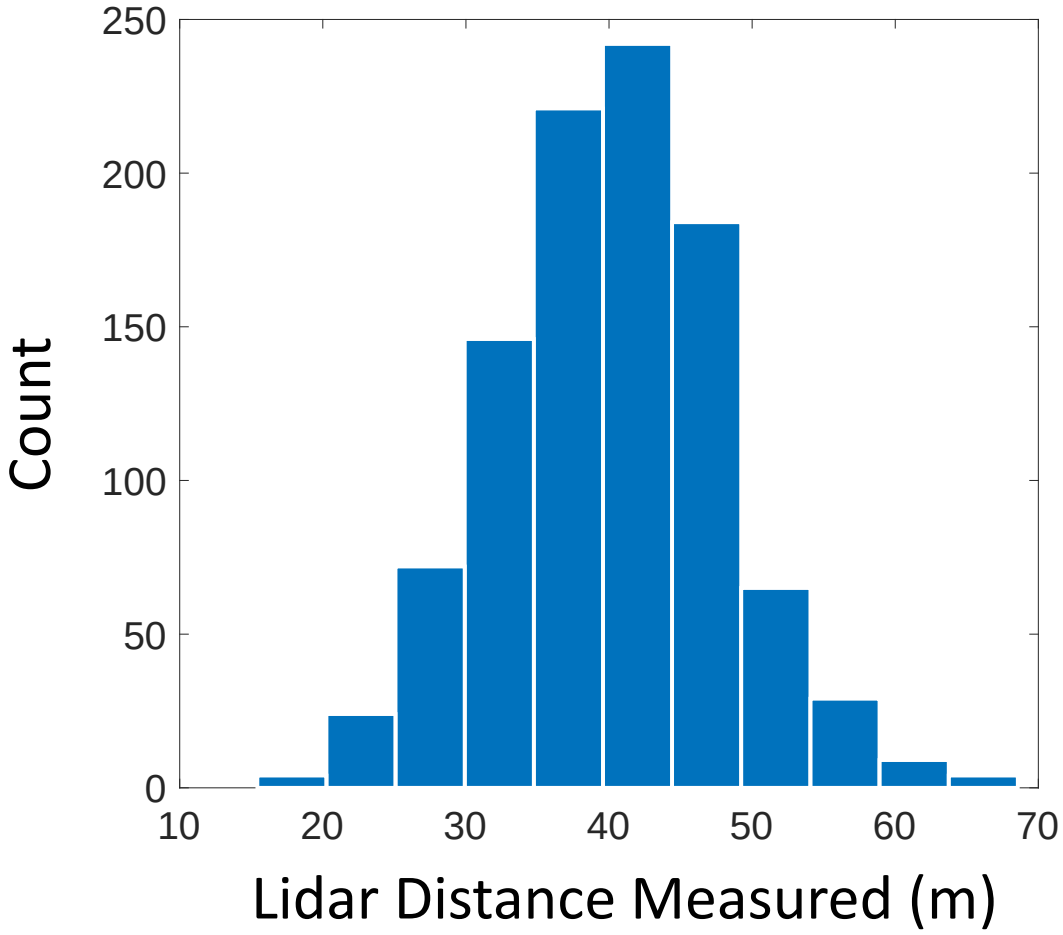


Necessary?

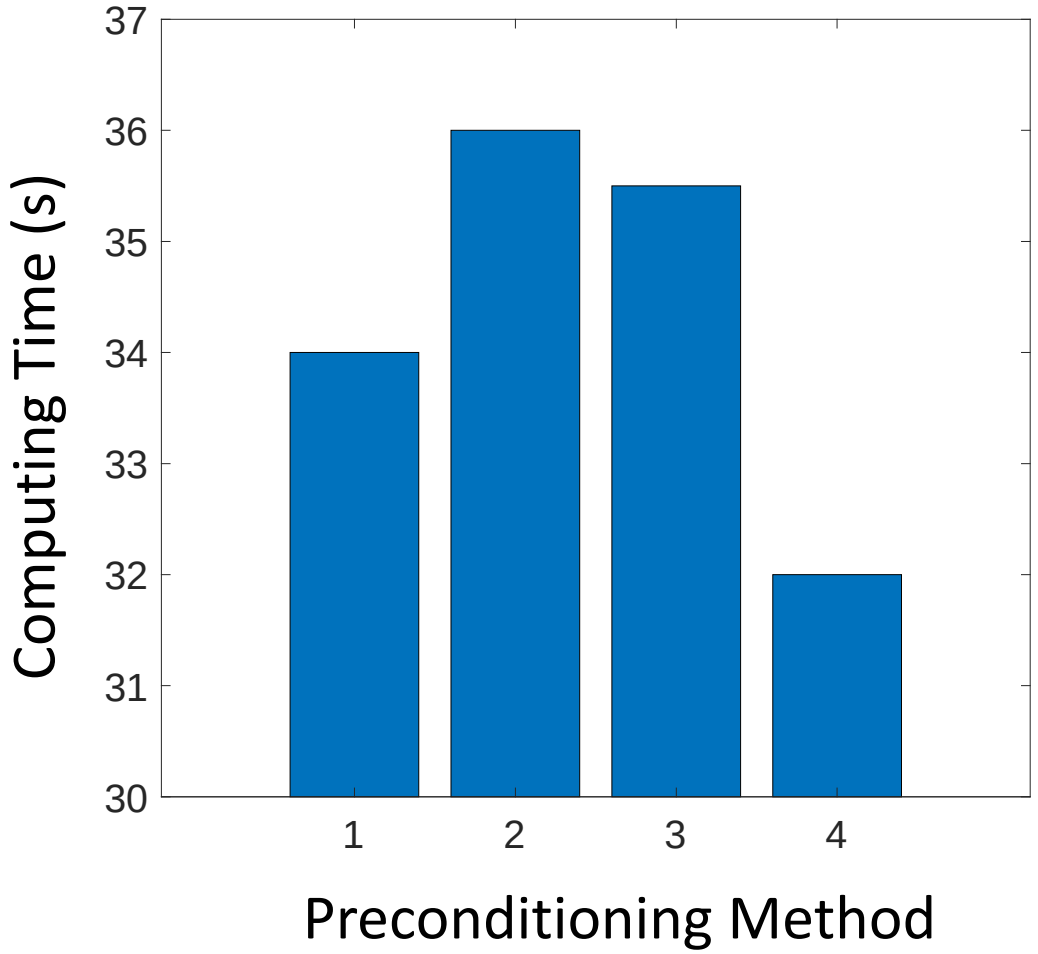


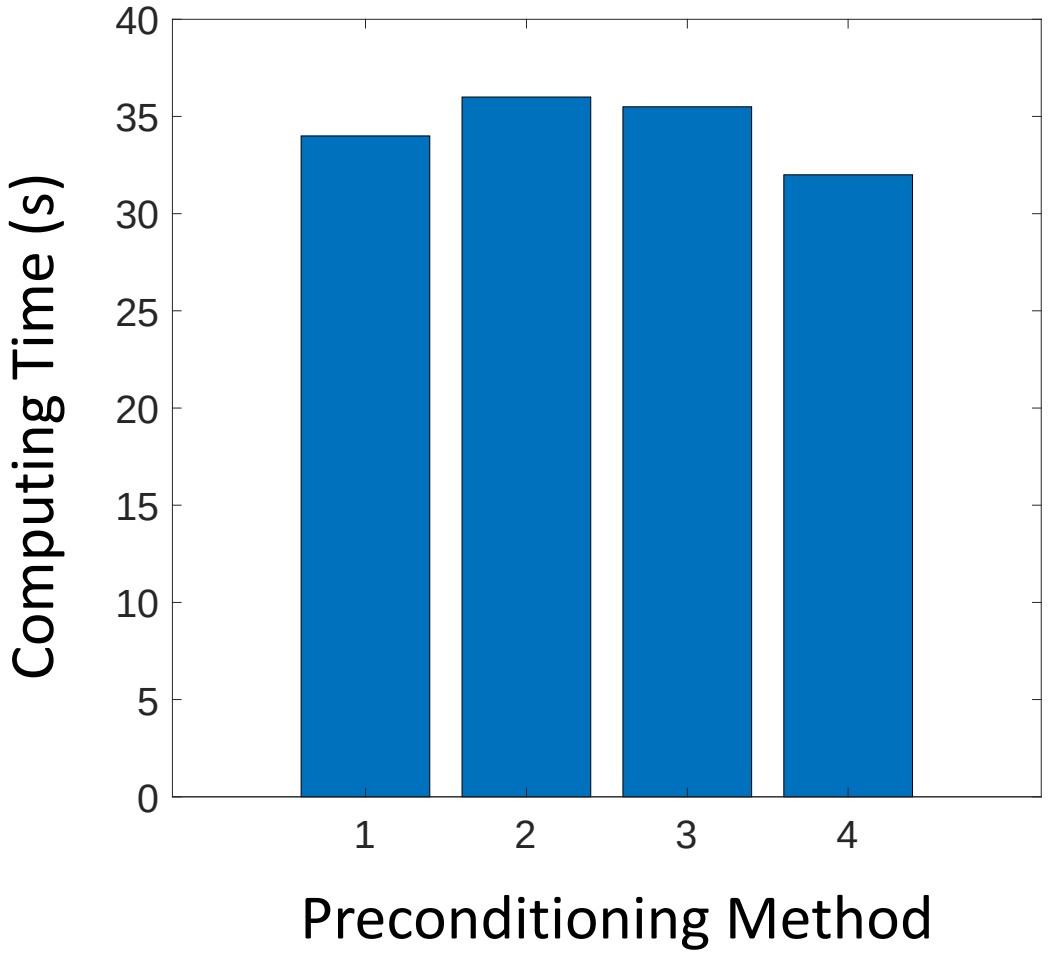
Better Presentations?



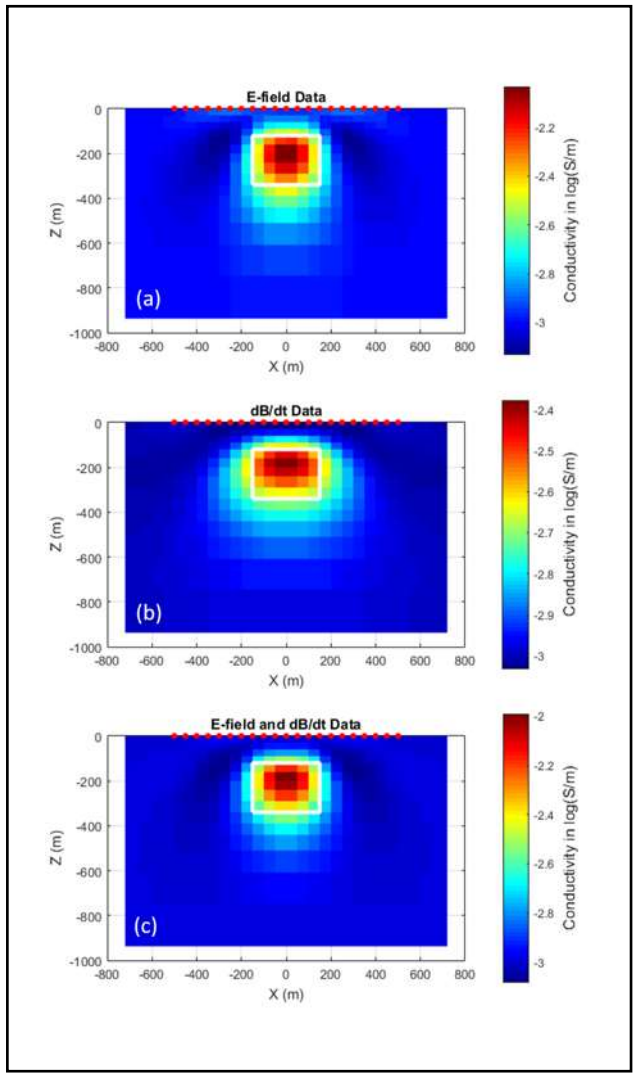


Fooling?

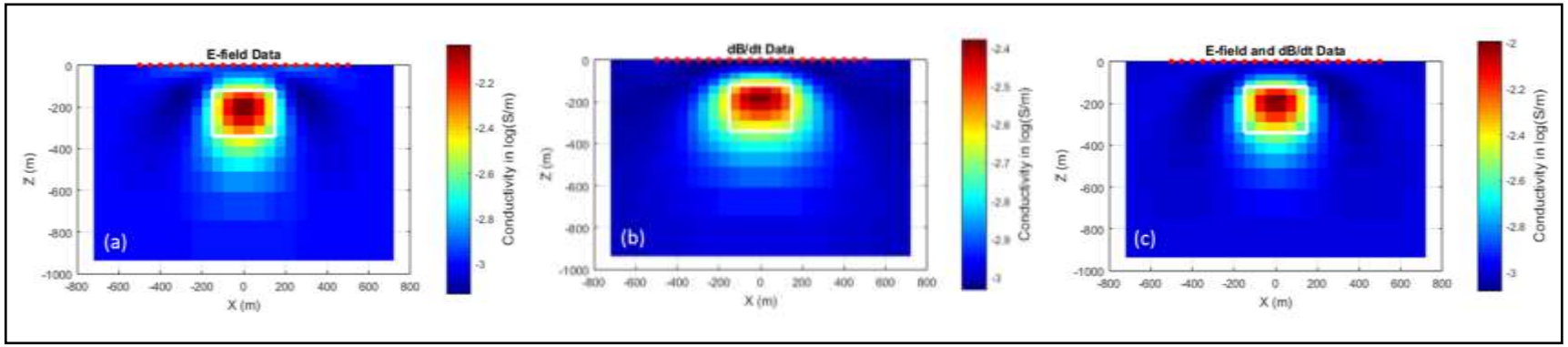

Computing Time (s)
37
36
35
34
33
32
31
30
1
2
3
4
Preconditioning Method


Computing Time (s)
40
35
30
25
20
15
10
5
0
1
2
3
4
Preconditioning Method

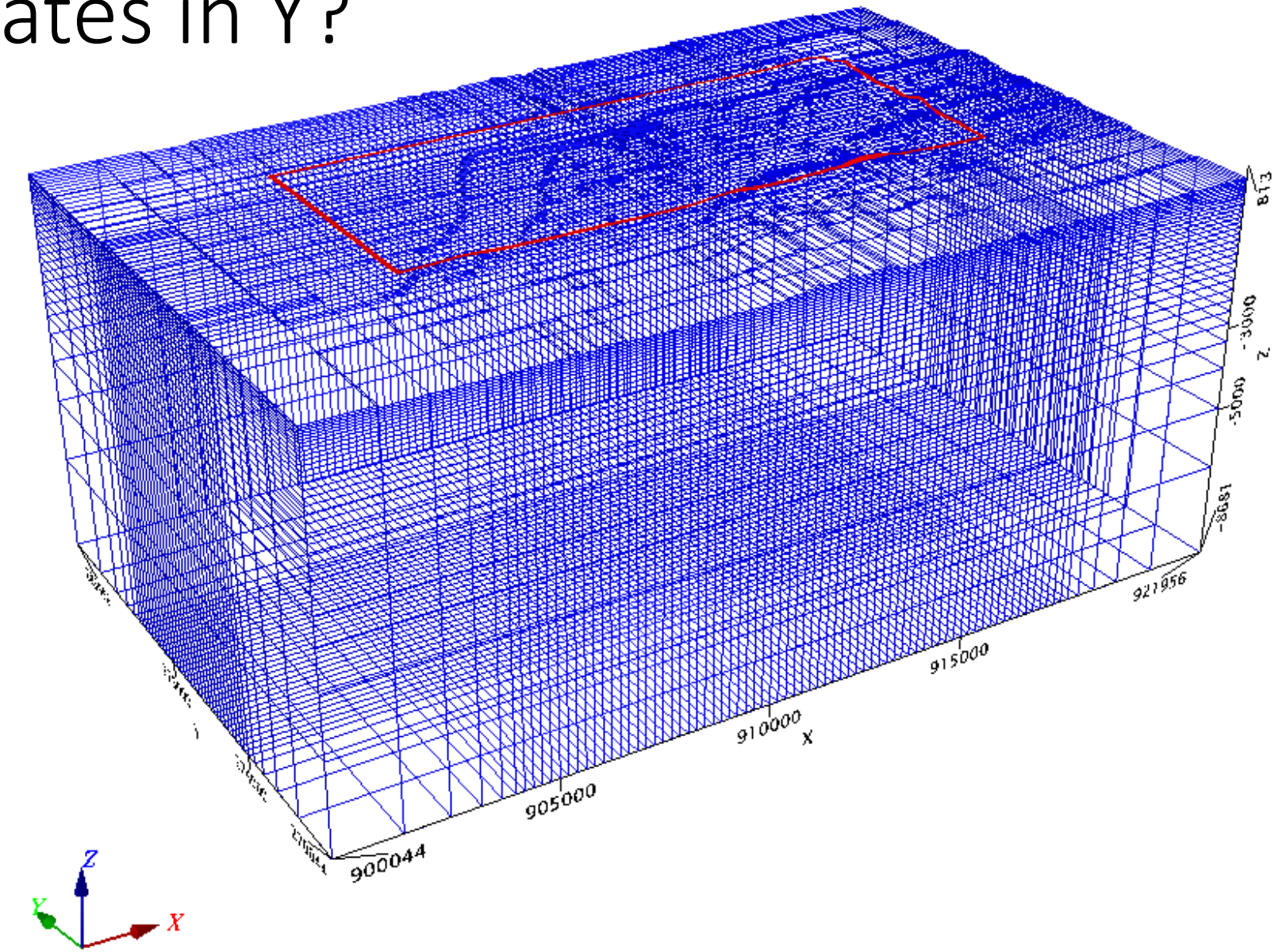
Layout


E-field Data
dB/dt Data
E-field and dB/dt Data
(a)
(b)
(c)
Z (m)
X (m)
Conductivity in log(S/m)

vs.


E-field Data
dB/dt Data
E-field and dB/dt Data
(a)
(b)
(c)
Z (m)
X (m)
Conductivity in log(S/m)

Coordinates in Y?



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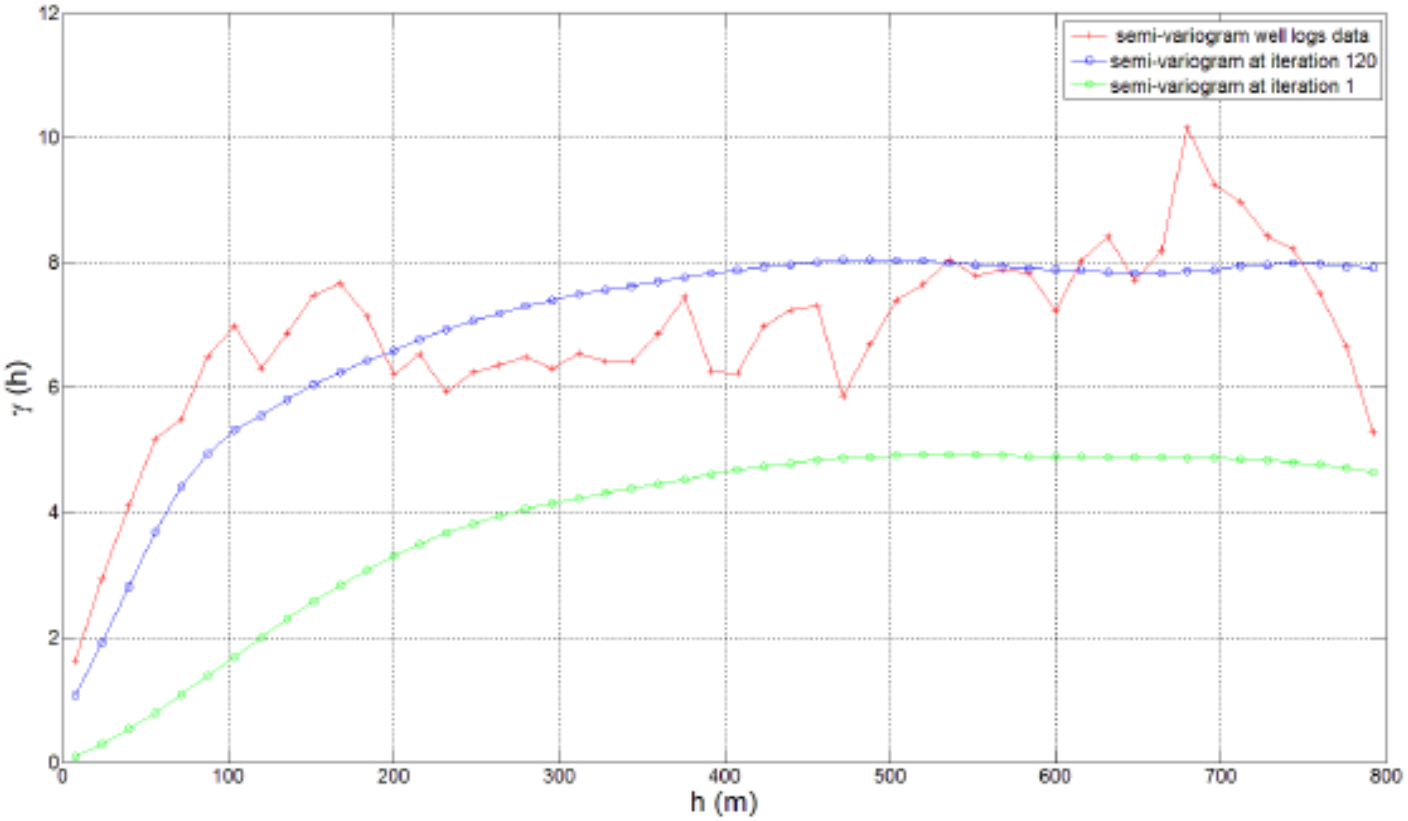
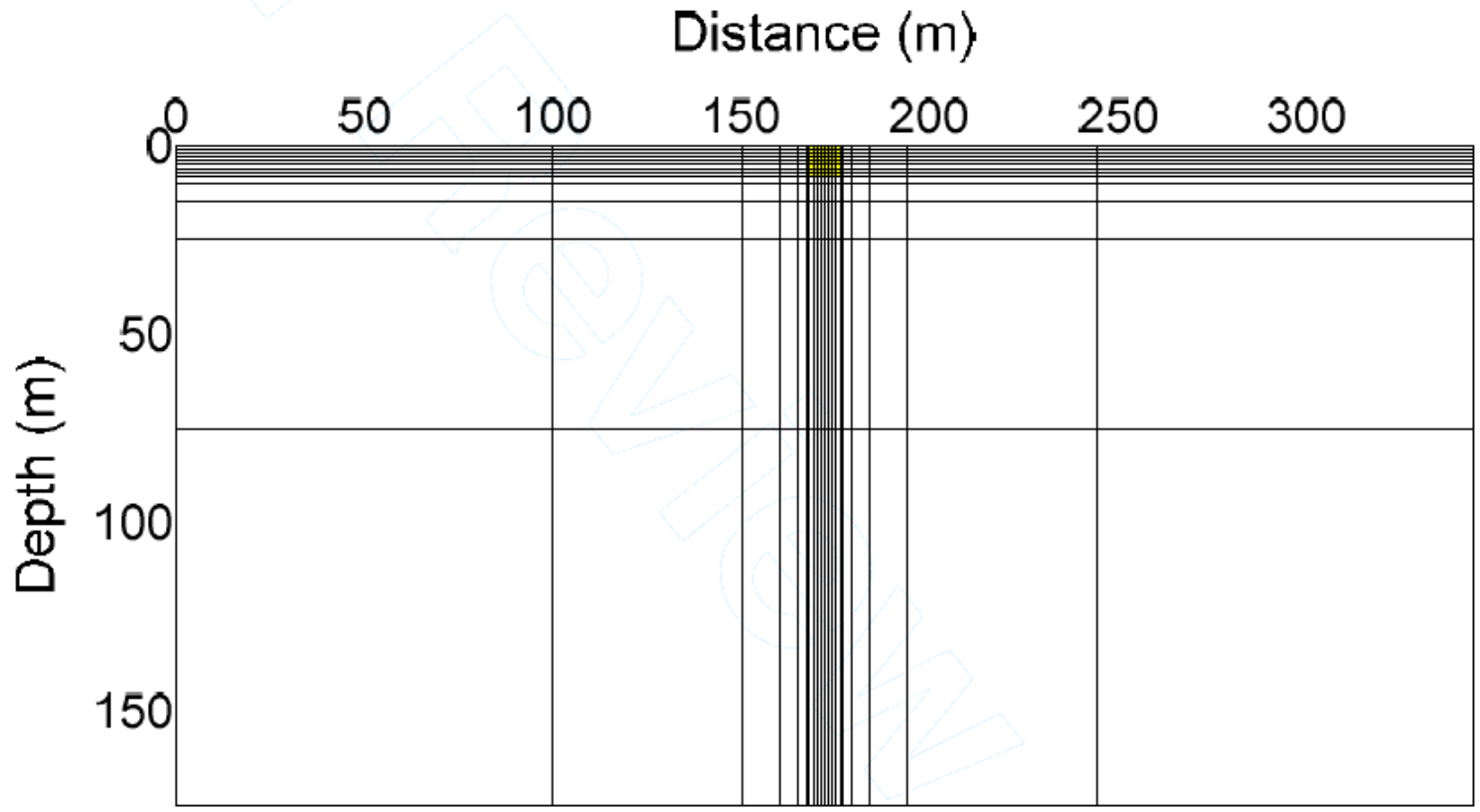
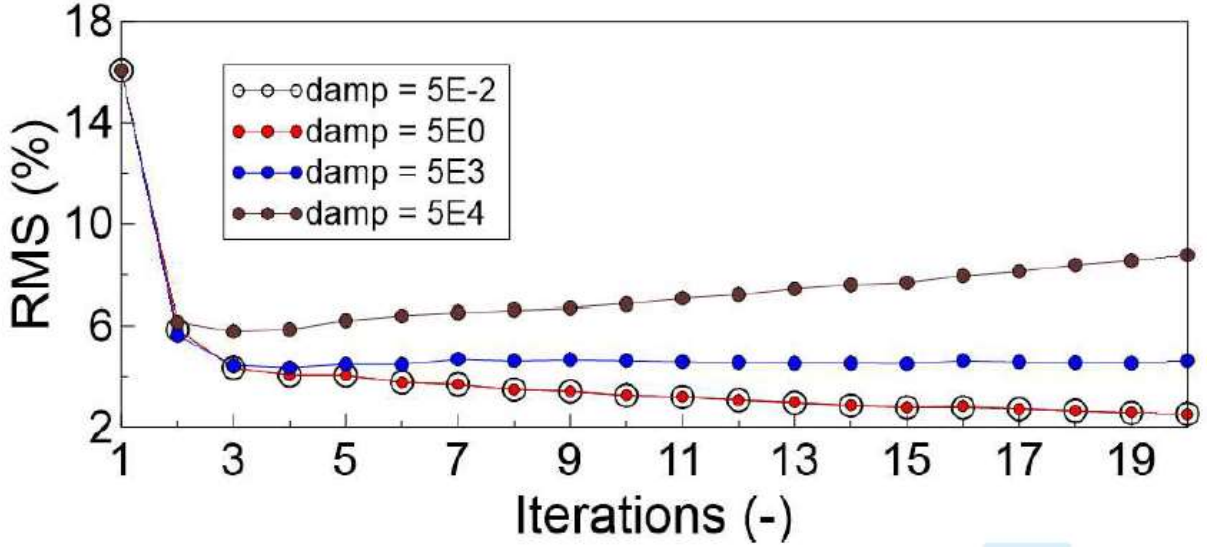
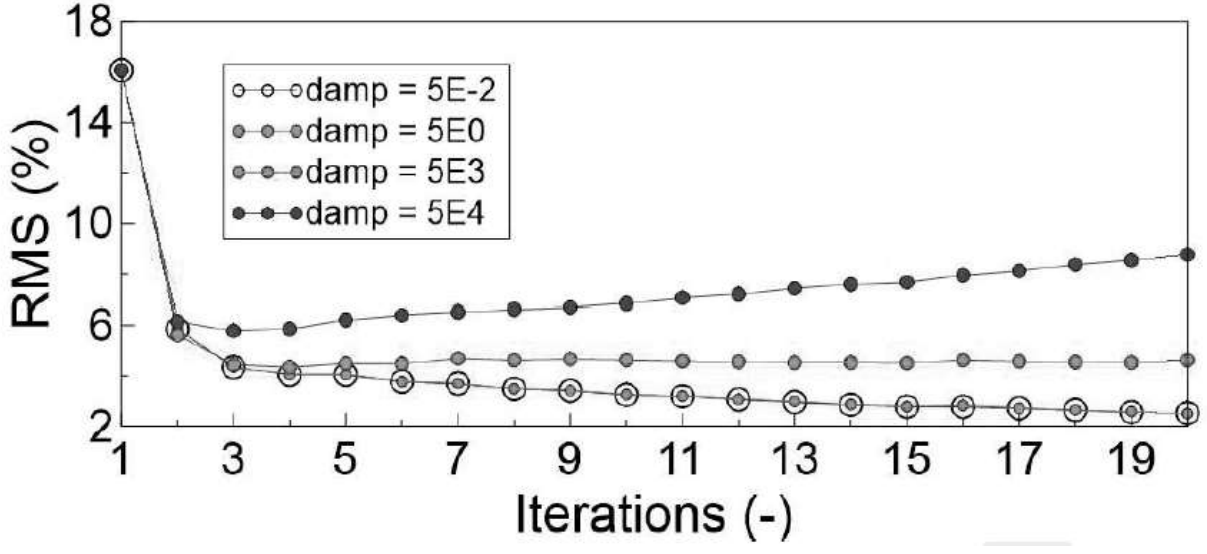


What Are We Supposed to Look at?

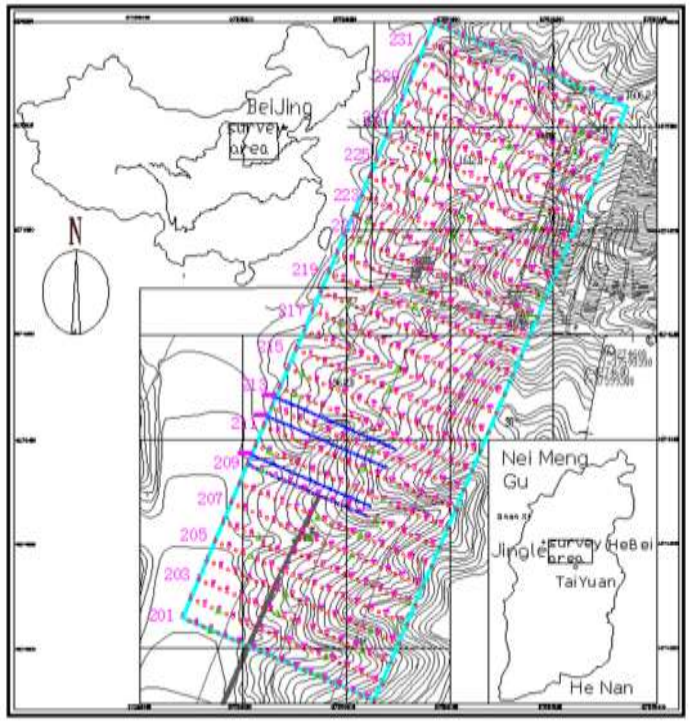


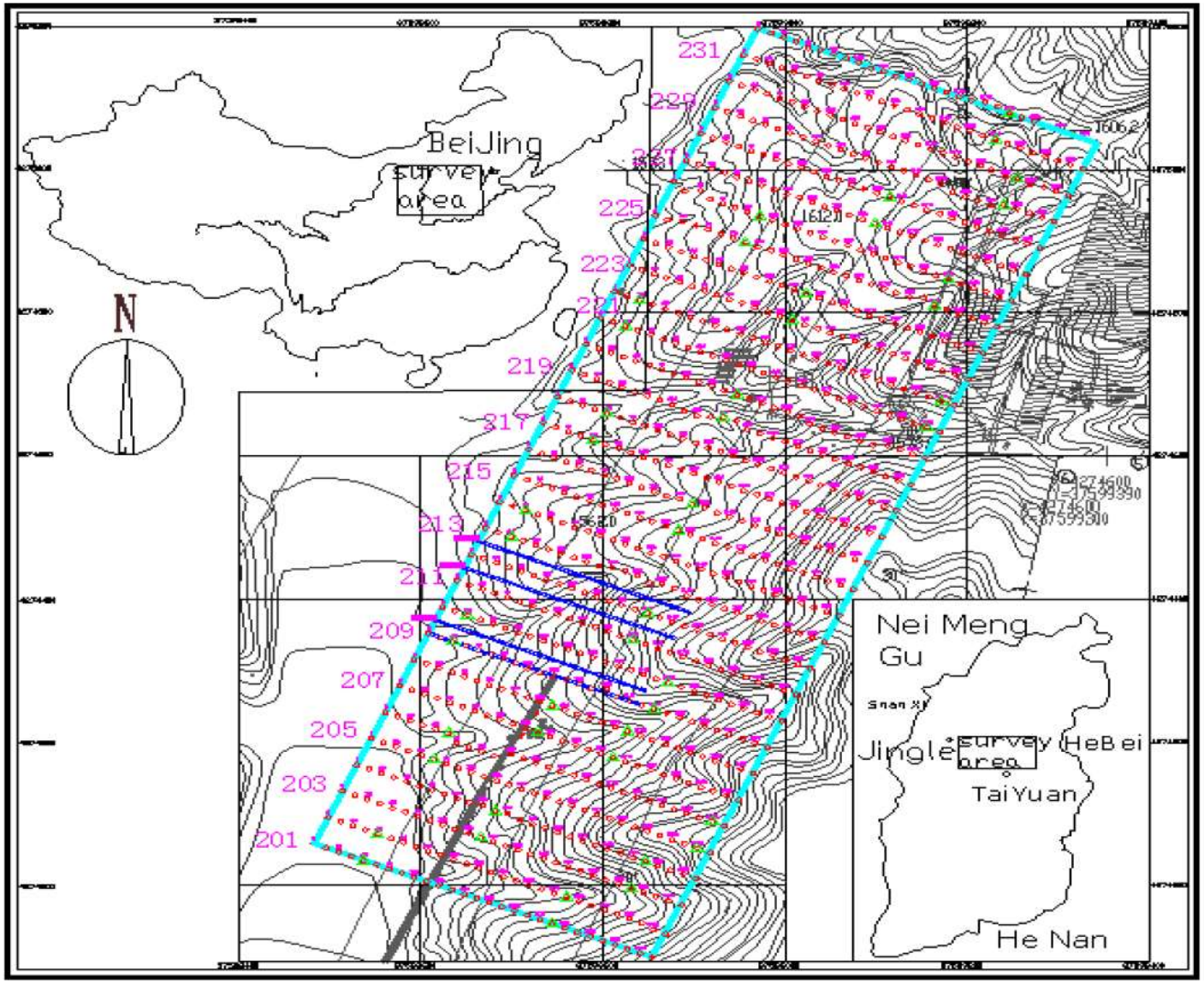
If I Print B/W


damp = 5E-2
damp = 5E0
damp = 5E3
damp = 5E4
RMS (%)
Iterations (-)

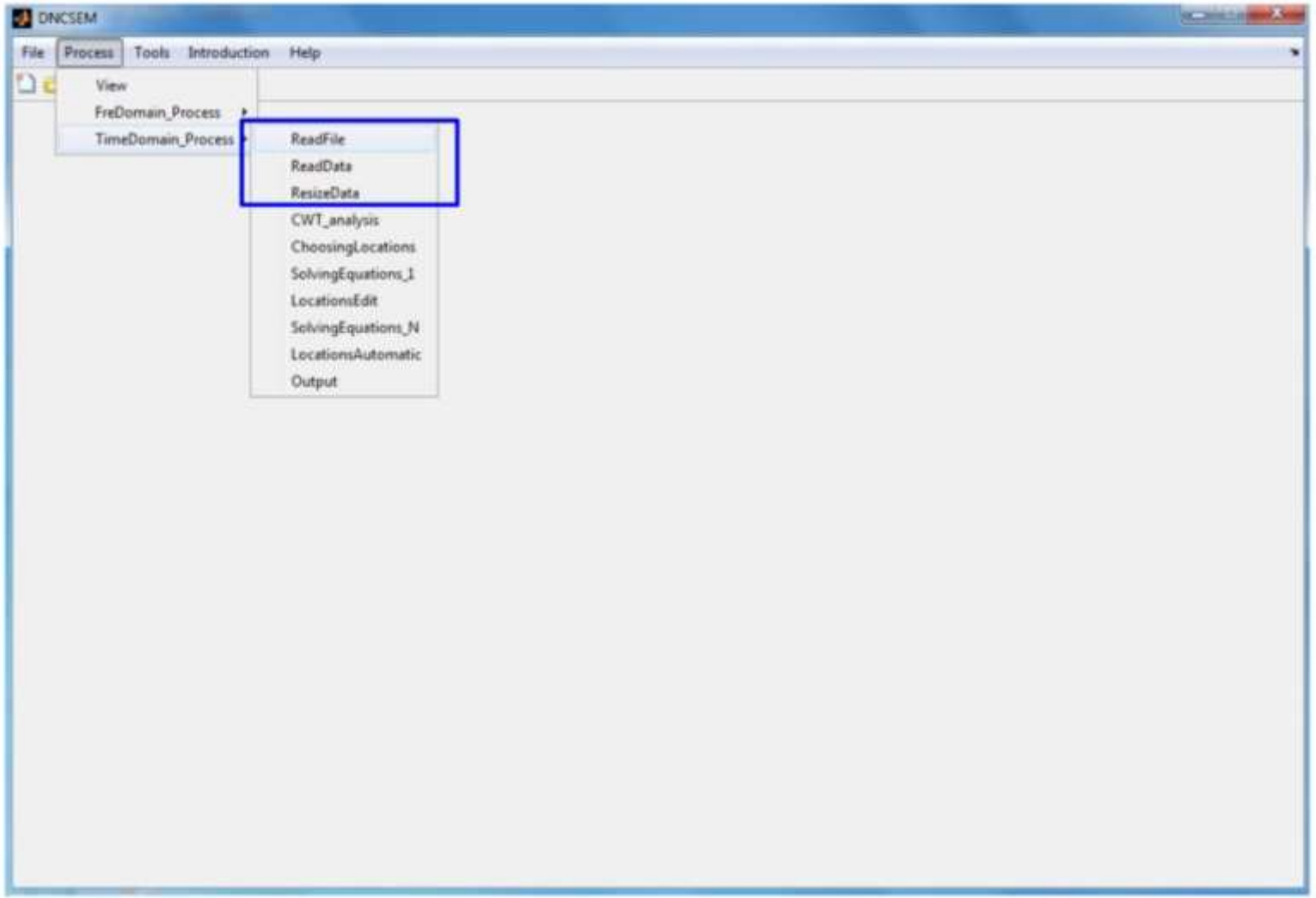

damp = 5E-2
damp = 5E0
damp = 5E3
damp = 5E4
RMS (%)
Iterations (-)

Vision Obstacles





Wastey Completeness



Which One Are you Referring to?

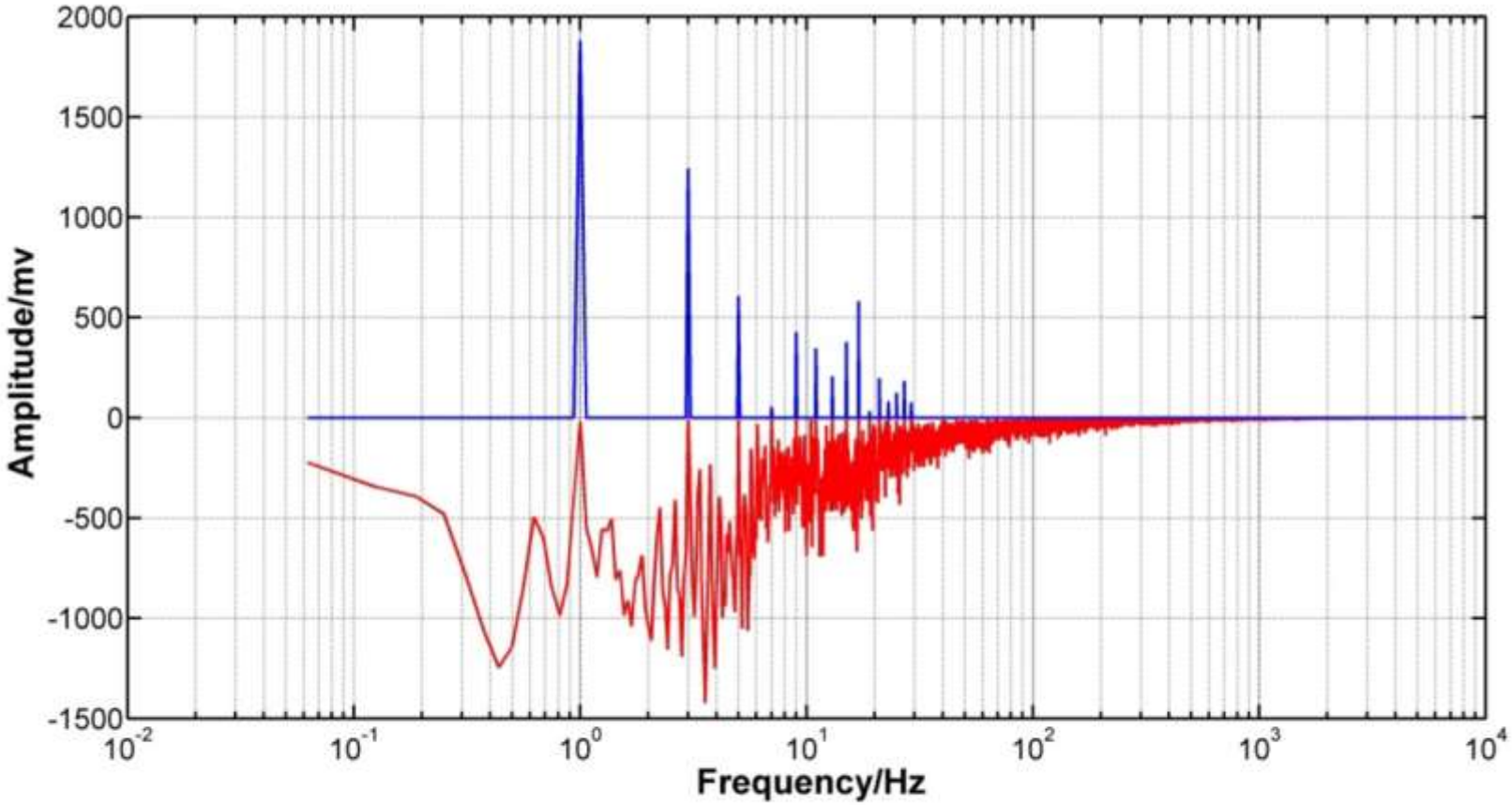
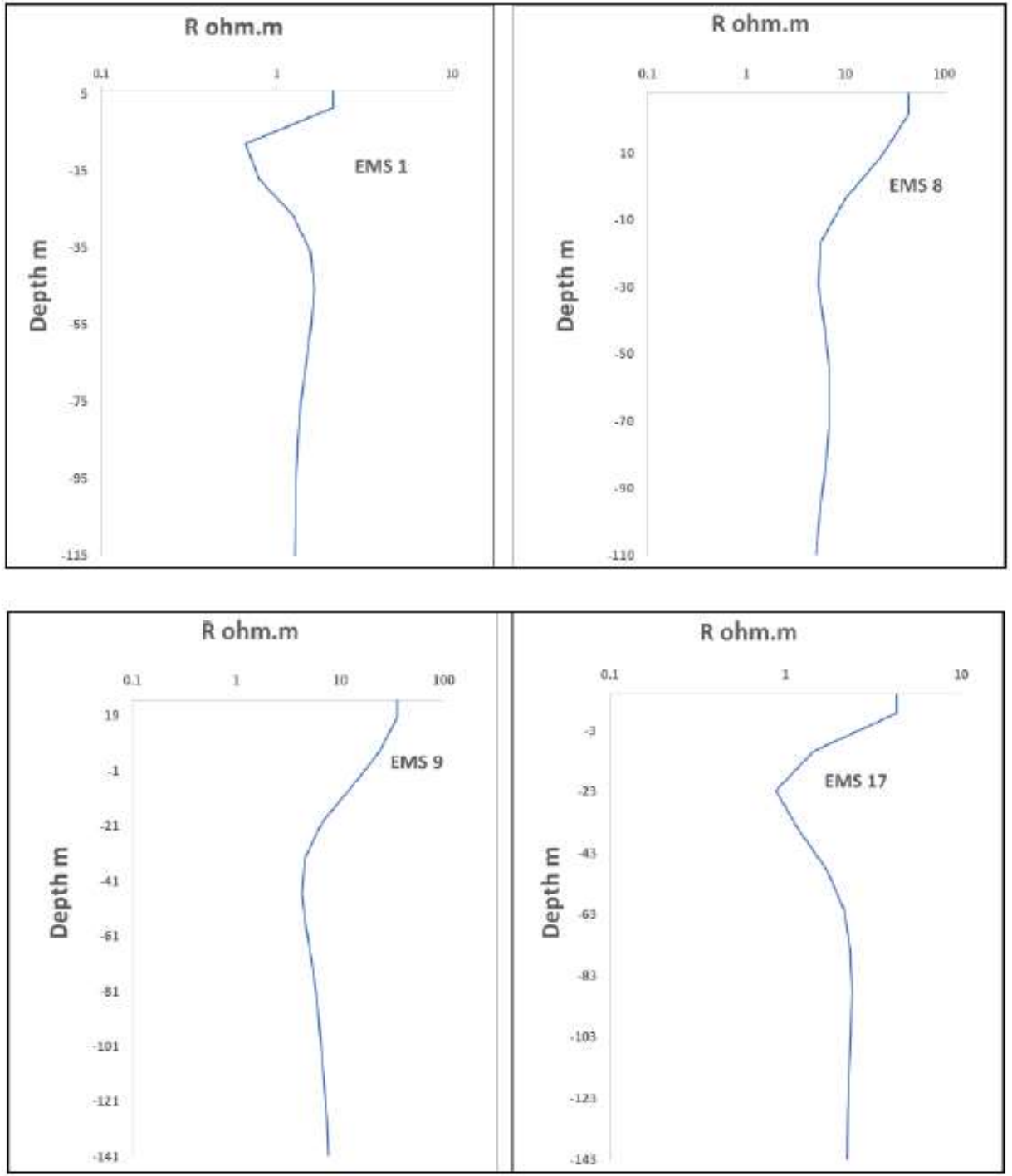
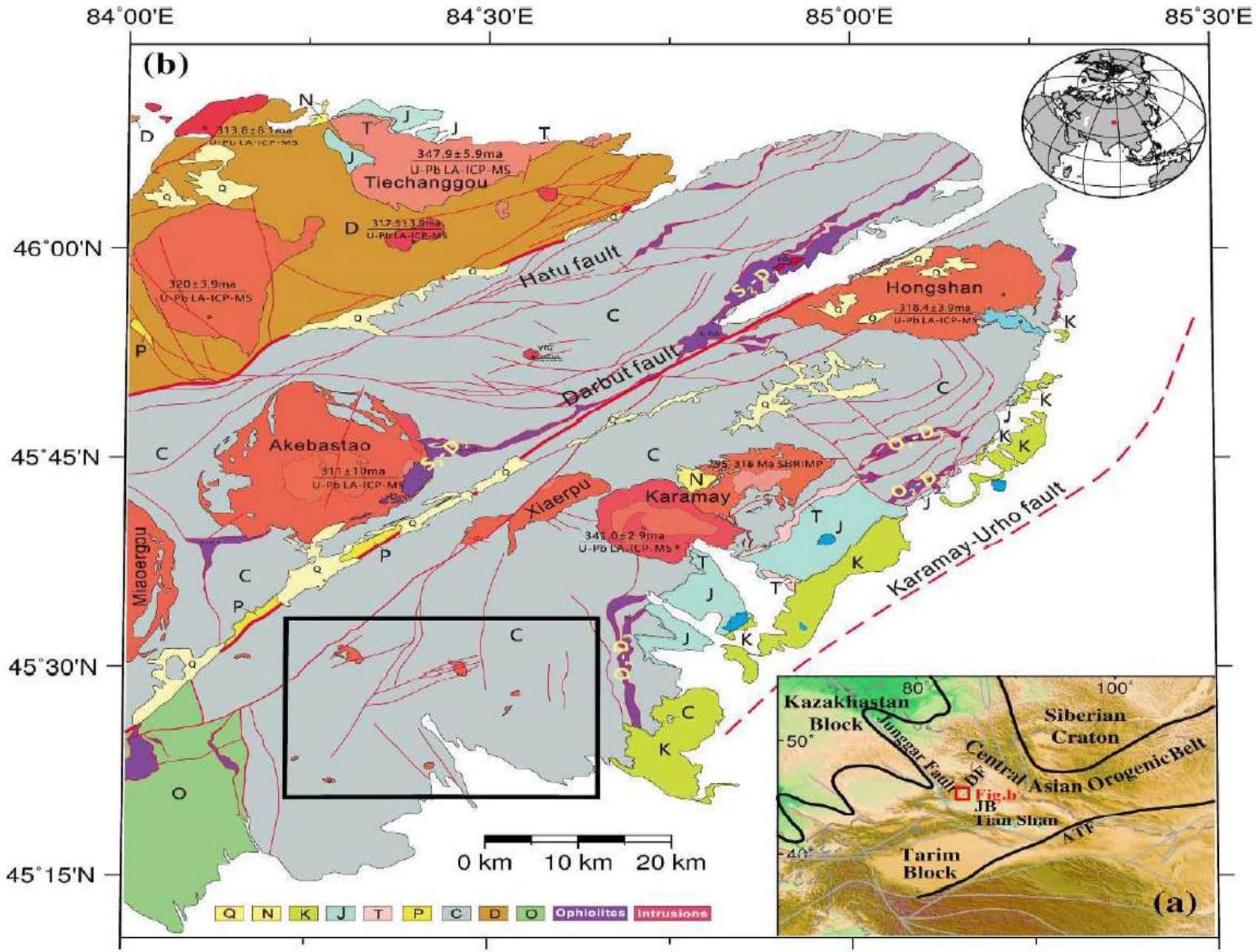


Fig. 14. First calculation result and the spectrum of the corresponding RRNPC.

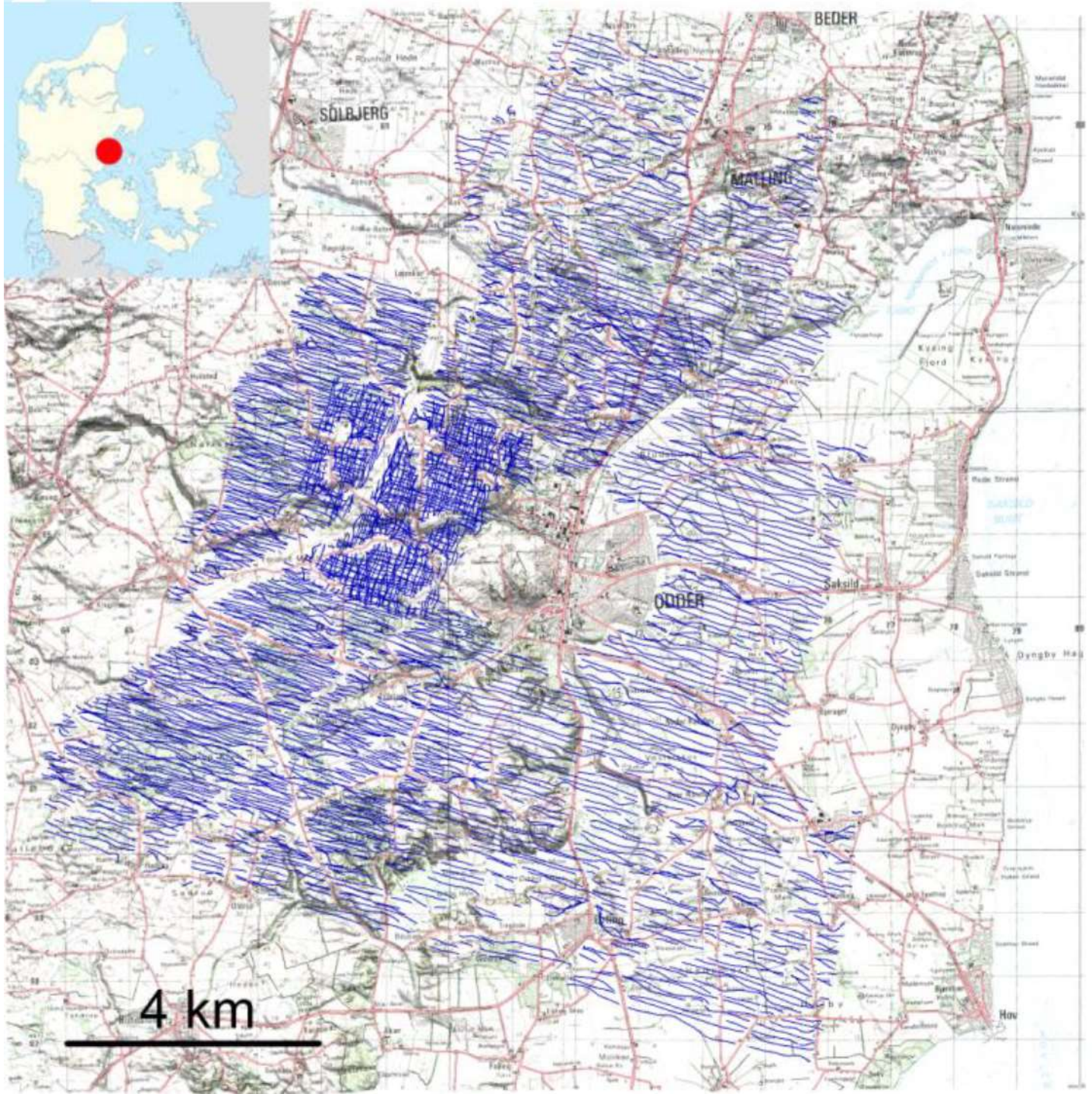
Mergeable Subplots



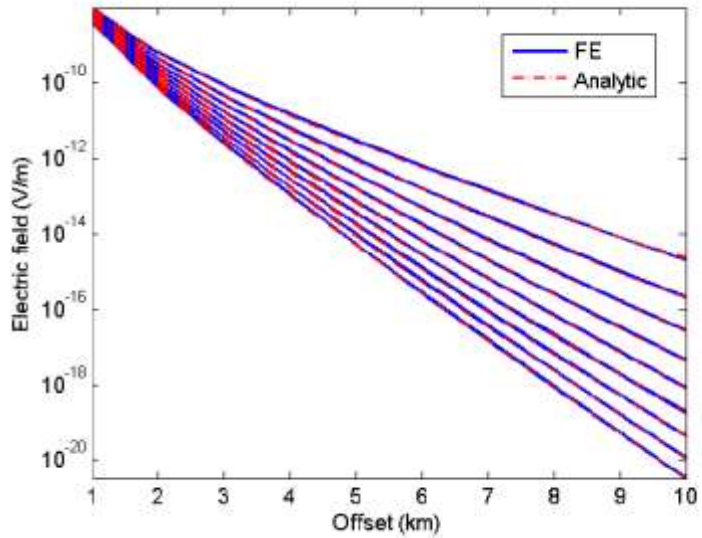
Concealed Geology

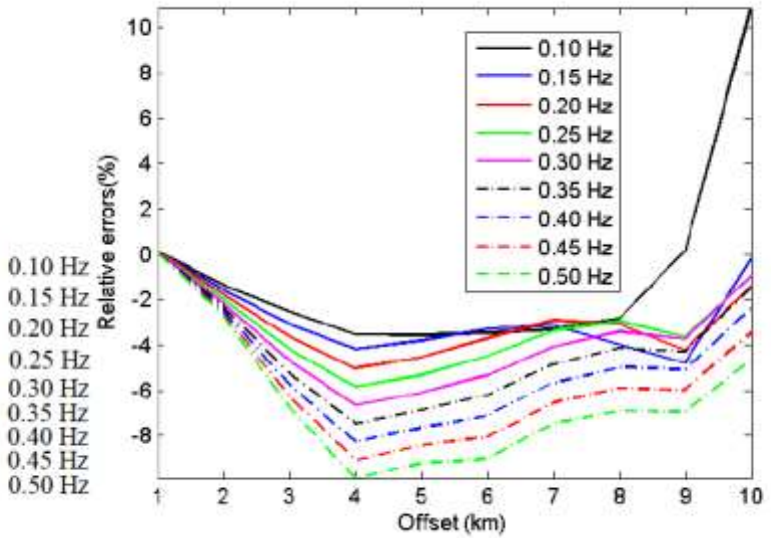


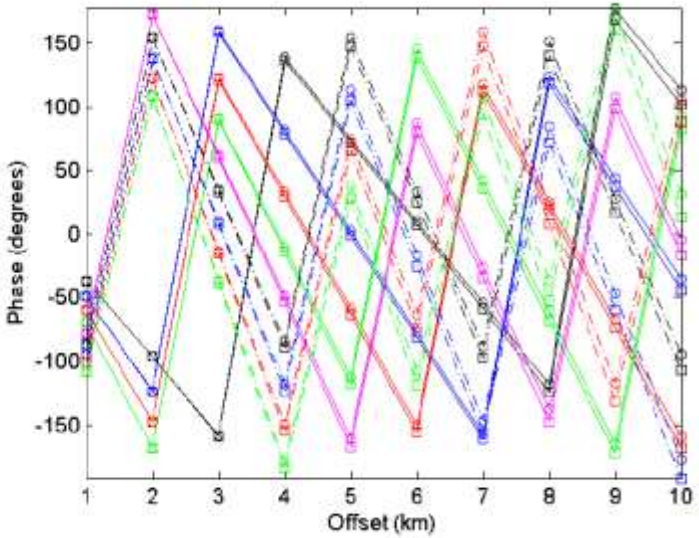
Unclear Map

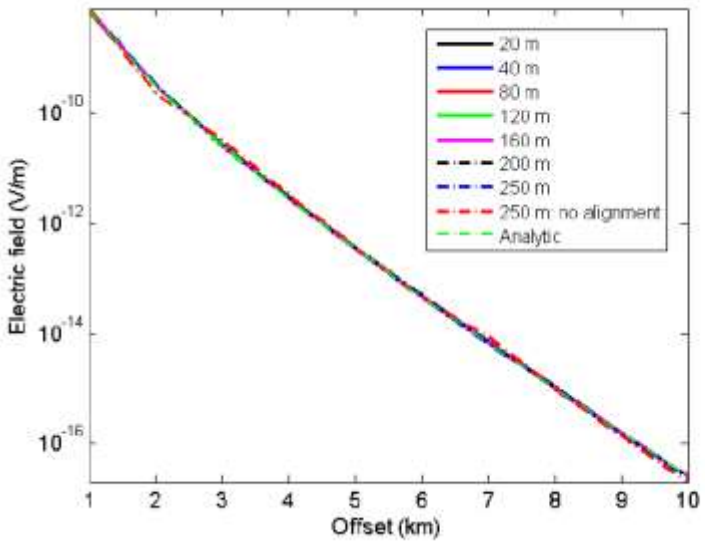


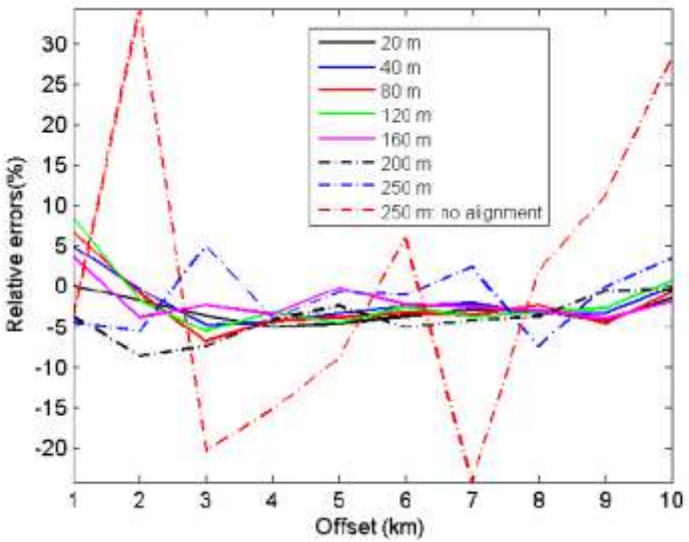
Busy Lines

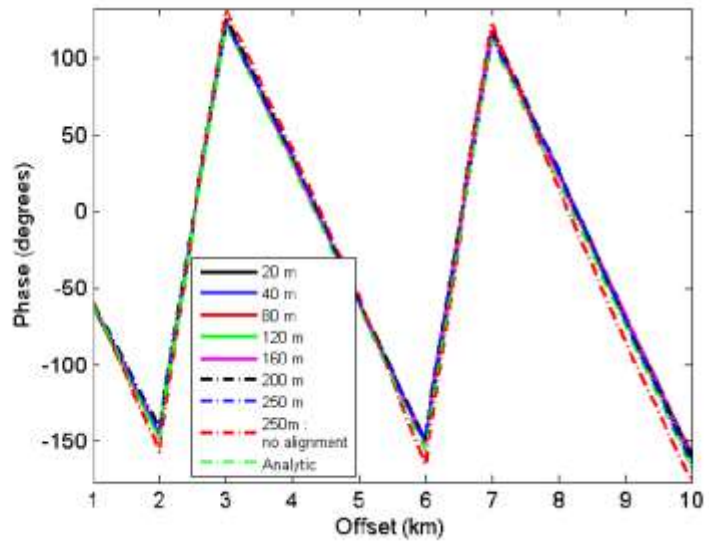

FE
Analytic
Electric field (V/m)
Offset (km)


0.10 Hz
0.15 Hz
0.20 Hz
0.25 Hz
0.30 Hz
0.35 Hz
0.40 Hz
0.45 Hz
0.50 Hz
Relative errors(%)
Offset (km)


Phase (degrees)
Offset (km)

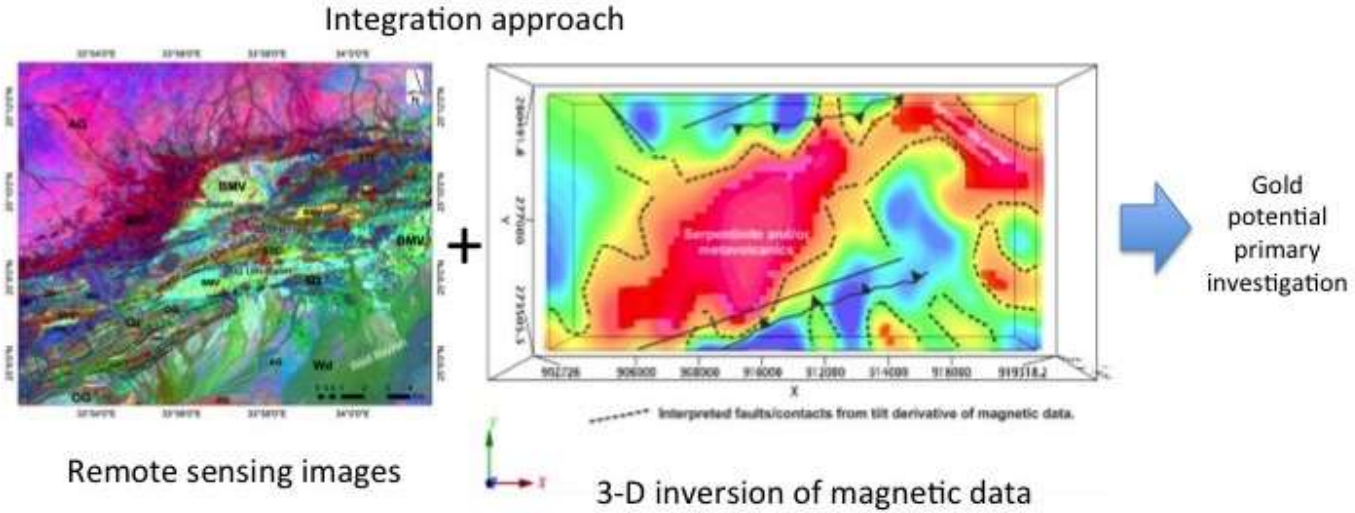

20 m
40 m
80 m
120 m
160 m
200 m
250 m
250 m: no alignment
Analytic
Electric field (V/m)
Offset (km)


20 m
40 m
80 m
120 m
160 m
200 m
250 m
250 m: no alignment
Relative errors(%)
Offset (km)

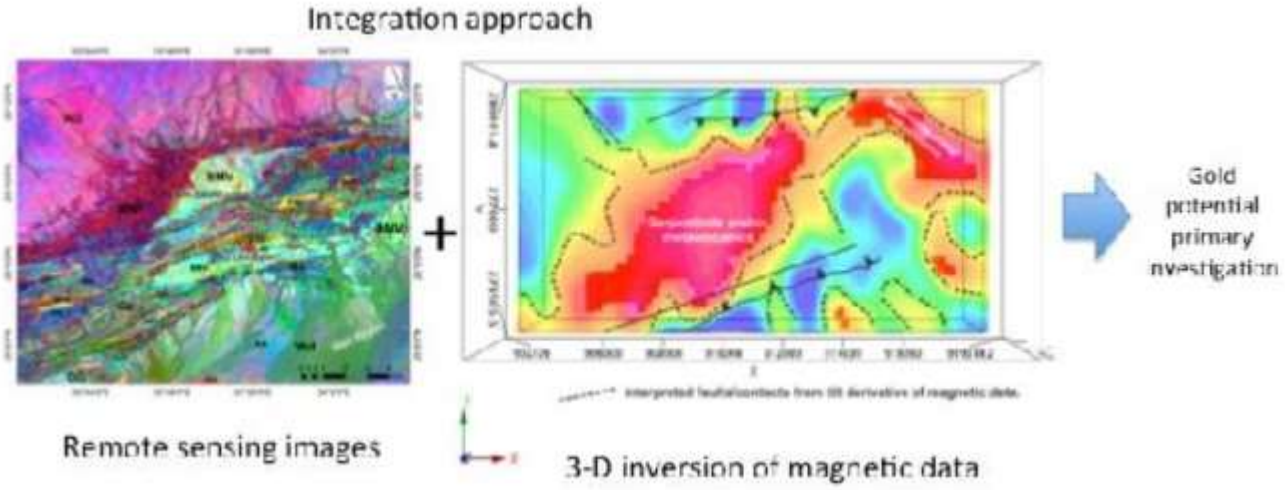

20 m
40 m
80 m
120 m
160 m
200 m
250 m
250m :
no alignment
Analytic
Phase (degrees)
Offset (km)

Compressed in PDF

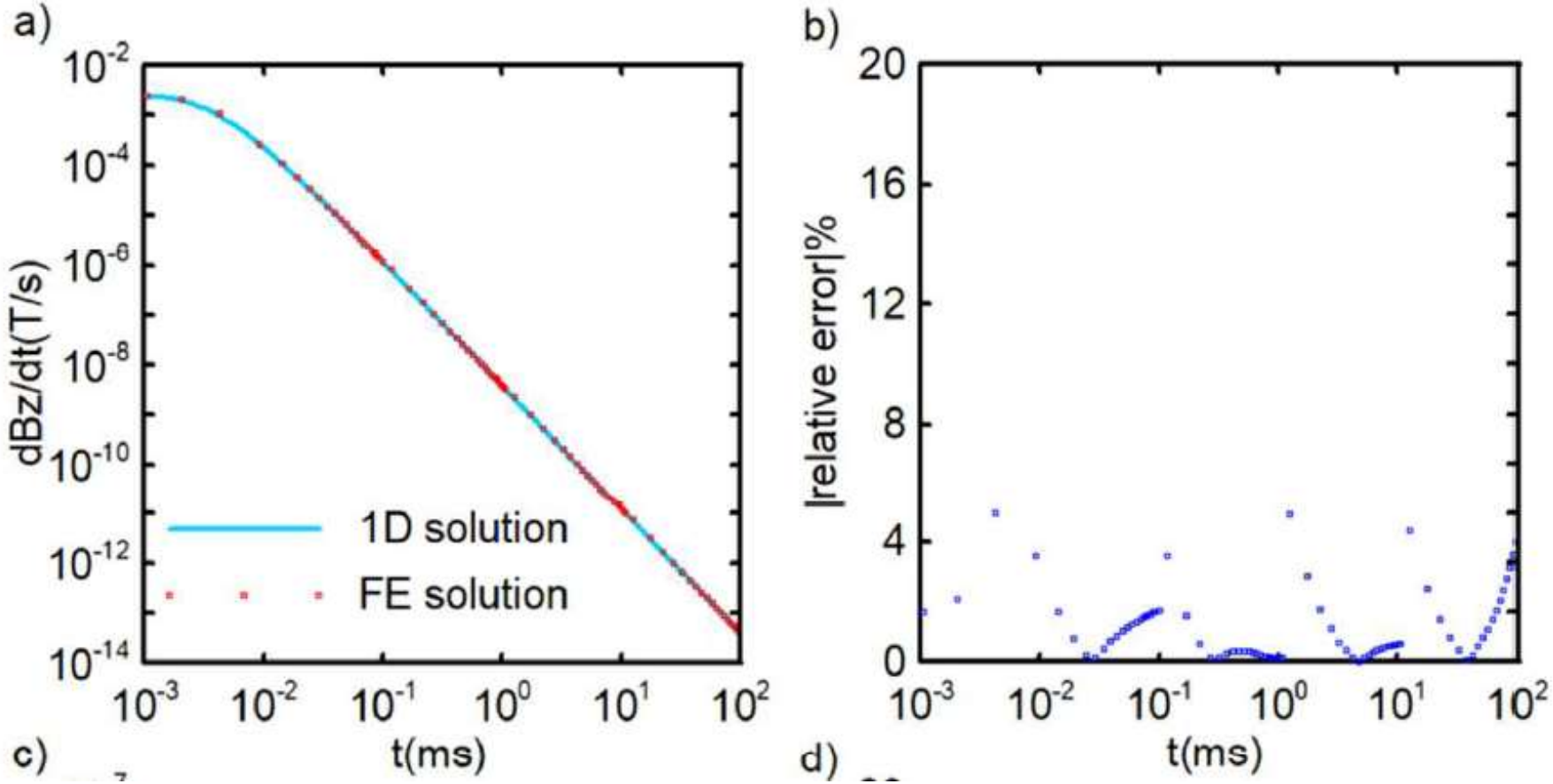
Original



View in PDF



Unused Space



Strange Symbols

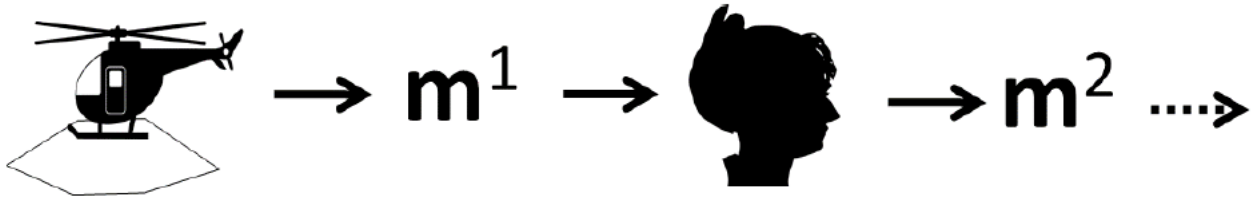


Figure 1. A sequential workflow

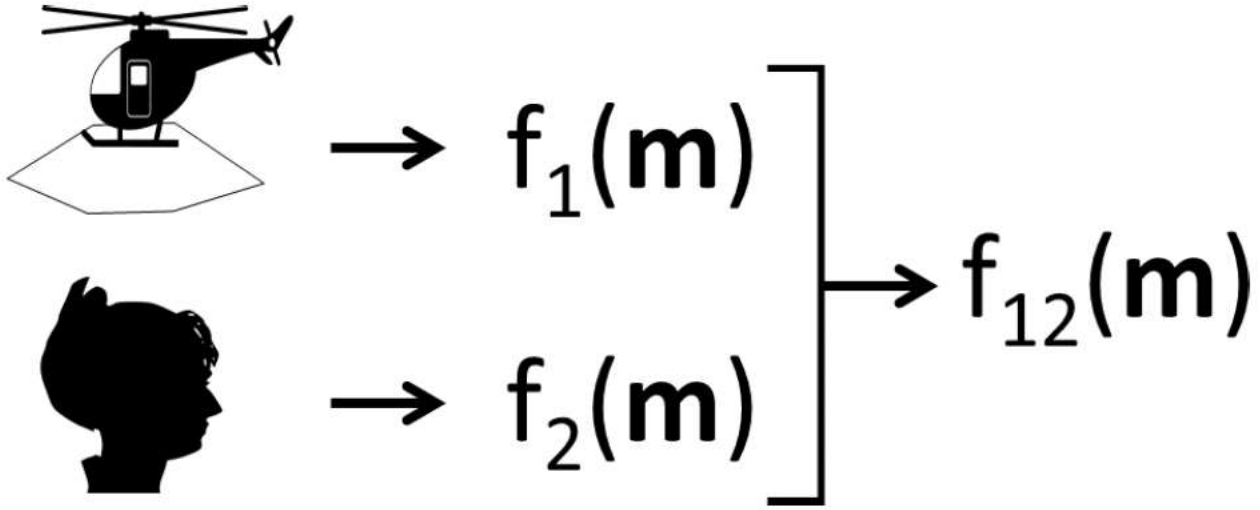


Figure 2. A probabilistic workflow

The Simple Model

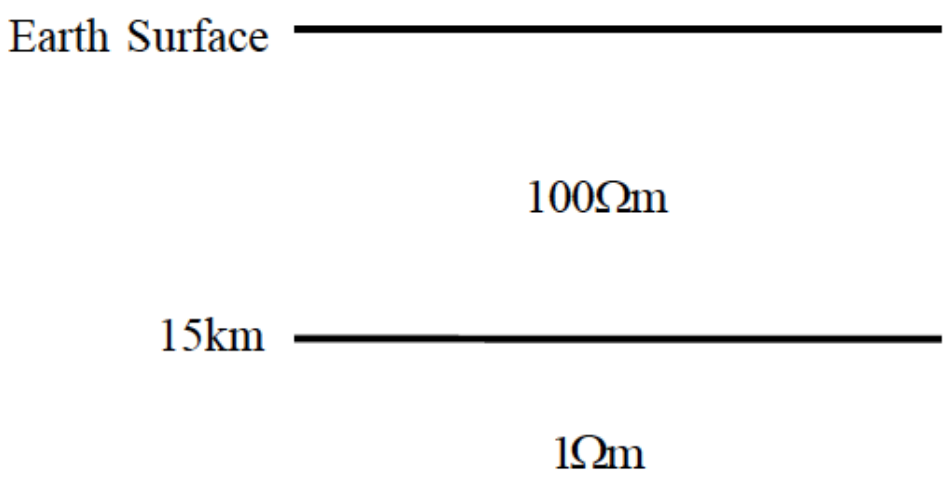


Figure 3. The 1D model with two layers.

Orientation

Figure 9 the schematic of the receivers. (a) Calibrating all the receivers used in this survey (b) the acquisition mode for the single receiver

Tables

- Purposes
  - Repeated measurements/data
  - Large amount of (necessary) data
  - Be precise (compare with figures)
  - Easy comparison
- A good table
  - Horizontal rules
  - Long, not wide
  - Well identified variables
  - Concise headings and captions

Table 4. Population variation in hatch success (mean percent) of unfertilized eggs for females from populations sampled in1997. N = number of females tested. <--Table legend

Population	mean (%)	Standard deviation	Range	N
Beaver Creek [T]	7.31	13.95	0-53.16	15
Honey Creek [T]	4.33	7.83	0-25.47	11
Rock Bridge Gans Creek [T]	5.66	13.93	0-77.86	38
Cedar Creek [P]	6.56	9.64	0-46.52	64
Grindstone Creek [P]	8.56	14.77	0-57.32	19
Jacks Fork River [P]	5.28	8.28	0-30.96	28
Meramec River [P]	5.49	10.25	0-45.76	45
Little Dixie Lake [L]	7.96	14.54	0-67.66	71
Little Prairie Lake [L]	6.86	7.84	0-32.40	36
Rocky Forks Lake [L]	3.31	4.12	0-16.14	43
Winegar Lake [L]	10.73	17.58	0-41.64	5
Whetstone Lake [L]	7.36	12.93	0-63.38	57

<--Column titles

<--Table body (data)

<--Lines demarcating the different parts of the table

[T] = temporary stream, [P] = permanent streams, [L] = lakes. <--footnotes

Numerical Table

Table 1. Summary of three synthetic inversions using different numbers of soundings. All inversions are carried out on 3 nodes of computer cluster, with 6 Intel Xeon E5410 CPUs and 96GB RAM available.

Inversion	Number of transmitter	Sounding spacing (inline and crossline)	Number of β iterations	CPU time of factorization	CPU time of a forward modeling	Total CPU time of inversion
Synthetic I	16 (4×4)	400 m, 400 m	4	0:04:15	0:03:50	4:50:06
Synthetic II	49 (7×7)	200 m, 200 m	5	0:04:15	0:13:00	18:28:13
Synthetic III	91 (7×13)	100 m, 200 m	5	0:04:15	0:22:00	32:31:33

Non-numerical Table

Table 2. List of geophysical electromagnetic surveys at Lalor since 2000 (in chronological order).

System	Type	Source	Receiver	Year(s) of survey
PULSE EM	Surface time-domain	Large loops on surface	Small coils roaming on surface	2002, 2003, 2005
PULSE EM*	Surface-borehole time-domain	Large loops on surface	Small coils in boreholes	2007–2010
VTEM	Airborne time-domain	Small loop towed by helicopter	Small coil towed by helicopter	2007
ZTEM*	Airborne frequency-domain	Natural source	Small coil towed by helicopter with coils at the base station on surface	2009
DC resistivity and induced polarization (DCIP)	Surface time-domain	Grounded electrode arrays on surface	Grounded electrode arrays on surface	2009
Magnetotelluric (MT)	Surface frequency-domain	Natural source	Small coils and electrodes roaming on surface	2009
JESSY HTS SQUID*	Surface time-domain	Large loops on surface	Small SQUID magnetometers roaming on surface	2009
DigiAtlantis	Surface-borehole time-domain	Large loops on surface	Small fluxgate magnetometers in boreholes	2010
PULSE EM	Surface-borehole time-domain	Large loops on surface	Small fluxgate magnetometers in boreholes	2010
Extremely Low Frequency (ELF) EM	Surface frequency-domain	Natural source	Small coils roaming on surface	2010
Boliden EM3–2001	Surface frequency-domain	Large loop on surface	Small coils roaming on surface	2010
UTEM3	Surface time-domain	Large loops on surface	Small coils roaming on surface	2011
VTEM^{MAX}	Airborne time-domain	Small loop towed by helicopter	Small coil towed by helicopter	2012
HELITEM*	Airborne time-domain	Small loop towed by helicopter	Small coil towed by helicopter	2012
Audio Magnetotelluric (AMT)	Surface frequency-domain	Natural source	Small coils and electrodes roaming on surface	2014
UTEM5	Surface time-domain	Large loops on surface	Small coils roaming on surface	2014
Volterra (EM)	Surface and surface-borehole time-domain	Large loops on surface	Small coils and fluxgate magnetometers roaming on surface and in boreholes	2014
Volterra (IP)	Surface time-domain	Grounded electrode arrays on surface	Grounded electrode arrays on surface	2014
HeliSAM	Surface-airborne time-domain	Large loop on surface	Total-field magnetometer towed by helicopter	2014

*Datasets presented in this paper.

Table or Text?

Table 1 Computational costs of COMSOL and MoM for the model tested in this study

	Number of unknowns	Memory cost	CPU time
COMSOL	3041992	11 GB	606 s
MoM	345	3.2 MB	96 s

A Verbose Table

Table 6: Specifications of grids

Grids		Parameters
Type a	Number of cells (Nn×Ne×Nz)	37×39×28 = 40 404
	Min/max cell size	25m, 50m
Type b	Number of cells (Nn×Ne×Nz)	44×42×43 = 79 464
	Min/max cell size	10m, 50m
Type c	Number of cells (Nn×Ne×Nz)	45×57×52 = 133 380
	Min/max cell size	10m, 50m

Caption Too Brief

f (Hz)	δ (m)	λ (m)
0.10	873.0	5484.9
0.15	712.8	4478.4
0.20	617.3	3878.4
0.25	552.1	3469.0
0.30	504.0	3166.7
0.35	466.6	2931.8
0.40	436.5	2742.5
0.45	411.5	2585.6
0.50	390.4	2452.9

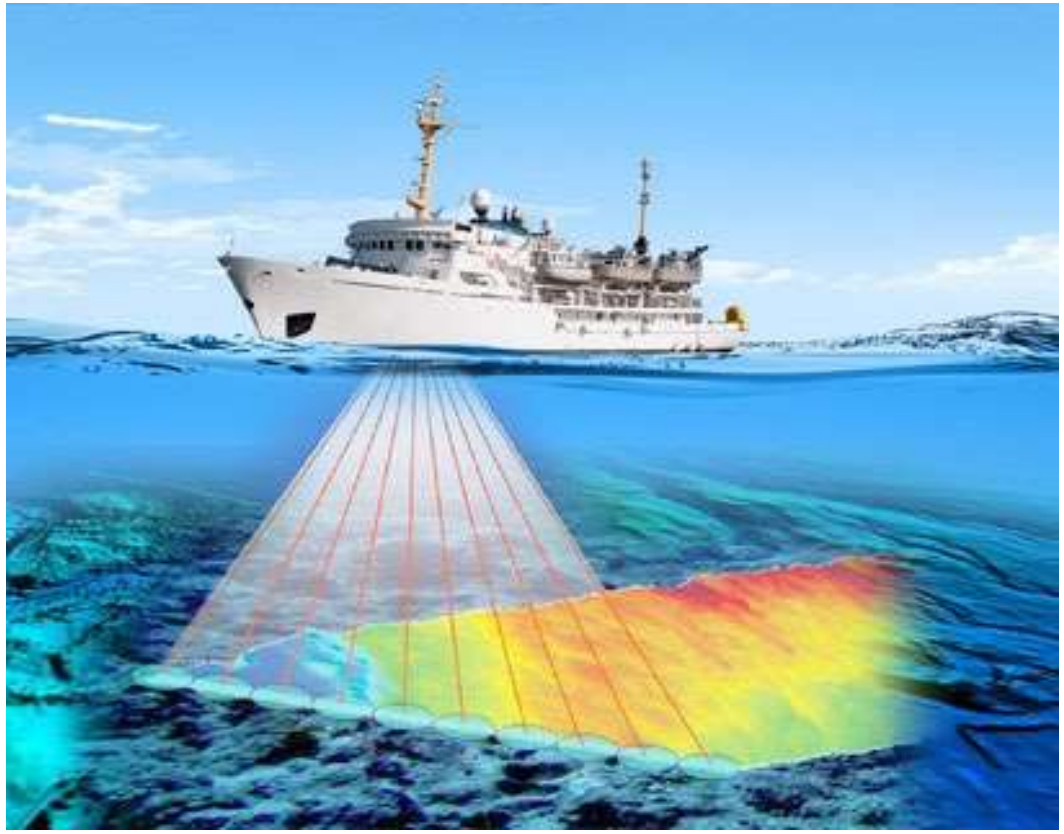
Table 1. δ and λ in the seawater.

Arrangement of Columns

ρ_{min}	ρ_{max}	ρ_{avg}	h_{min}	h_{max}	h_{avg}	h_{true}	(QC-47)
4.0	4.5	4.2	1.0	1.1	1.0	1	Top soil
16.8	18.8	17.7	13	17.2	15.0	12	Marl
4.9	7.6	6.4	32.9	49.2	41.2	46	Marl to clayey marl
4.1	7.2	5.2	19.9	27.5	23.1	23	Bituminous marl (Oil shale)
6.3	7.9	6.9	21	28	24.5	33	Bituminous, phosphatic marl, chert
							(QC-46)
5.5	7.3	6.2	0.8	1.16	1.0	1	Top soil
18.6	20	19.5	16.7	30.1	22.6	24	Marl
10.9	13.1	12.1	35	56.2	46.4	50	Marl to clayey marl
4.6	7.0	5.4	18.5	29.3	23.8	23	Bituminous marl (Oil shale)
6.3	20	9.7	19.3	46.4	31.9	21	Bituminous, phosphatic marl, chert

Discussion – Bathymetry Data

- Water depth data at 100,000 locations in a lake were measured. What would be the best way of presenting them?
    1. In a study testing the consistency of the instruments
    2. In an exploration survey that requires topographical correction of data
    3. Investigation of lakebed sediments
    4. Correlation between water depth and heavy metal contamination



Assignment

- Make up some data in your assignment
- Choose to use figures or tables to serve your purpose