KMS Technologies – KJT Enterprises Inc.

Presentation

Bühnemann, J., Henke, C., Zerilli, A., Strack, K.-M., Müller, C., Krieger, M.

2002

Bringing Complex Salt Structures into Focus
A Novel Integrated Approach

Society of Exploration Geophysicists, Annual Meeting, Salt Lake City, Expanded Abstracts

TERRASYS GEOPHYSICS

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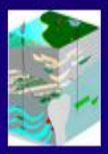

Bringing Complex Salt Structures Into Focus

A Novel Integrated Approach

Jan Bühnemann, Christian Henke
RWE Dea AG, Hamburg, Germany

Andrea Zerilli, Kurt Strack
KMS Technologies, Houston, TX, USA

Christina Müller, Markus Krieger
TERRASYS Geophysics, Hamburg, Germany

Outline

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TERRASYS GEOPHYSICS

- Data Base & Independent Results: Seismic, Gravity & Magnetotellurics
- Integrated Interpretation
- Conclusions

Location

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3-D Seismic Data Base

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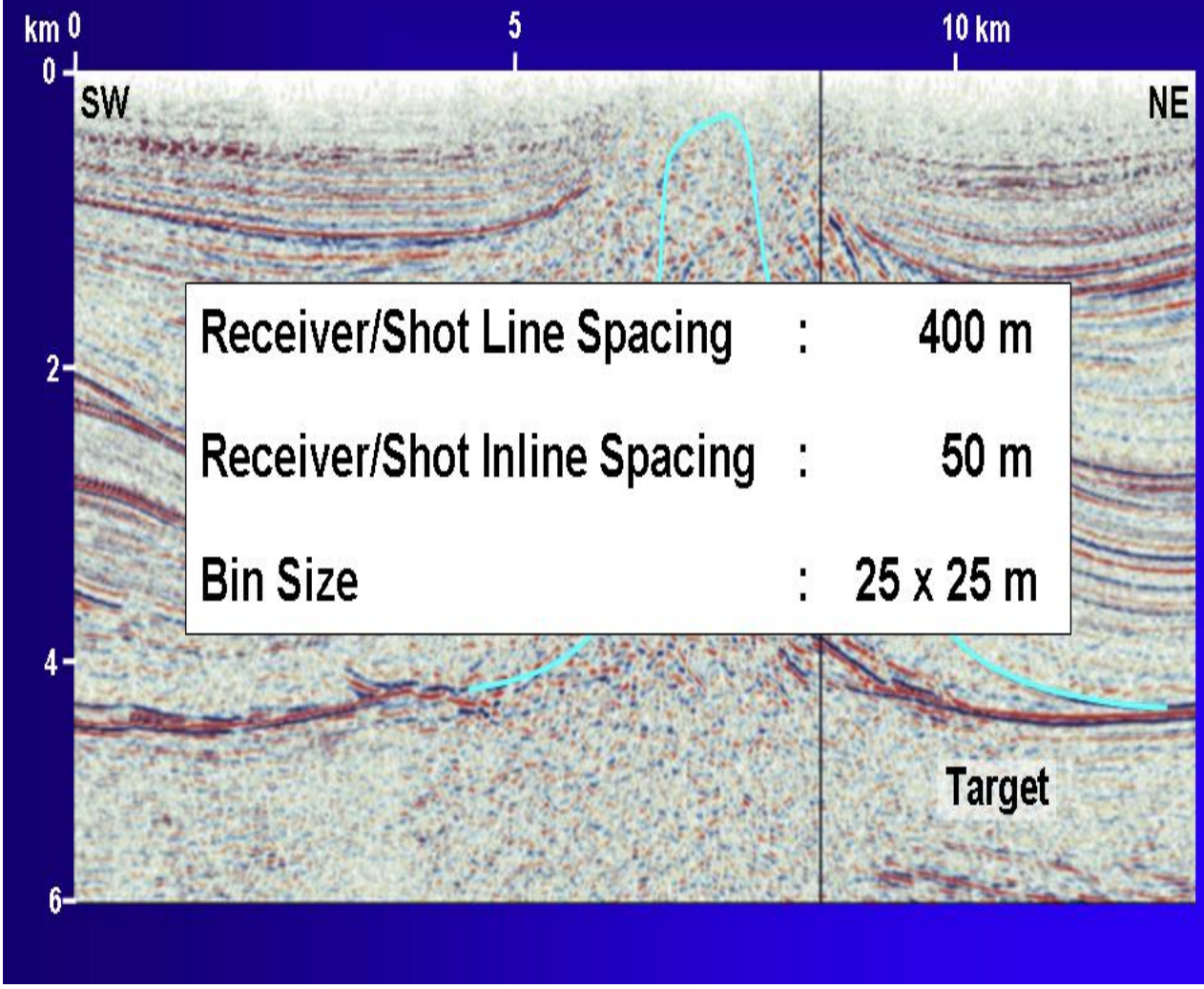

Receiver/Shot Line Spacing	:	400 m
Receiver/Shot Inline Spacing	:	50 m
Bin Size	:	25 x 25 m

Shallow Seismic Results

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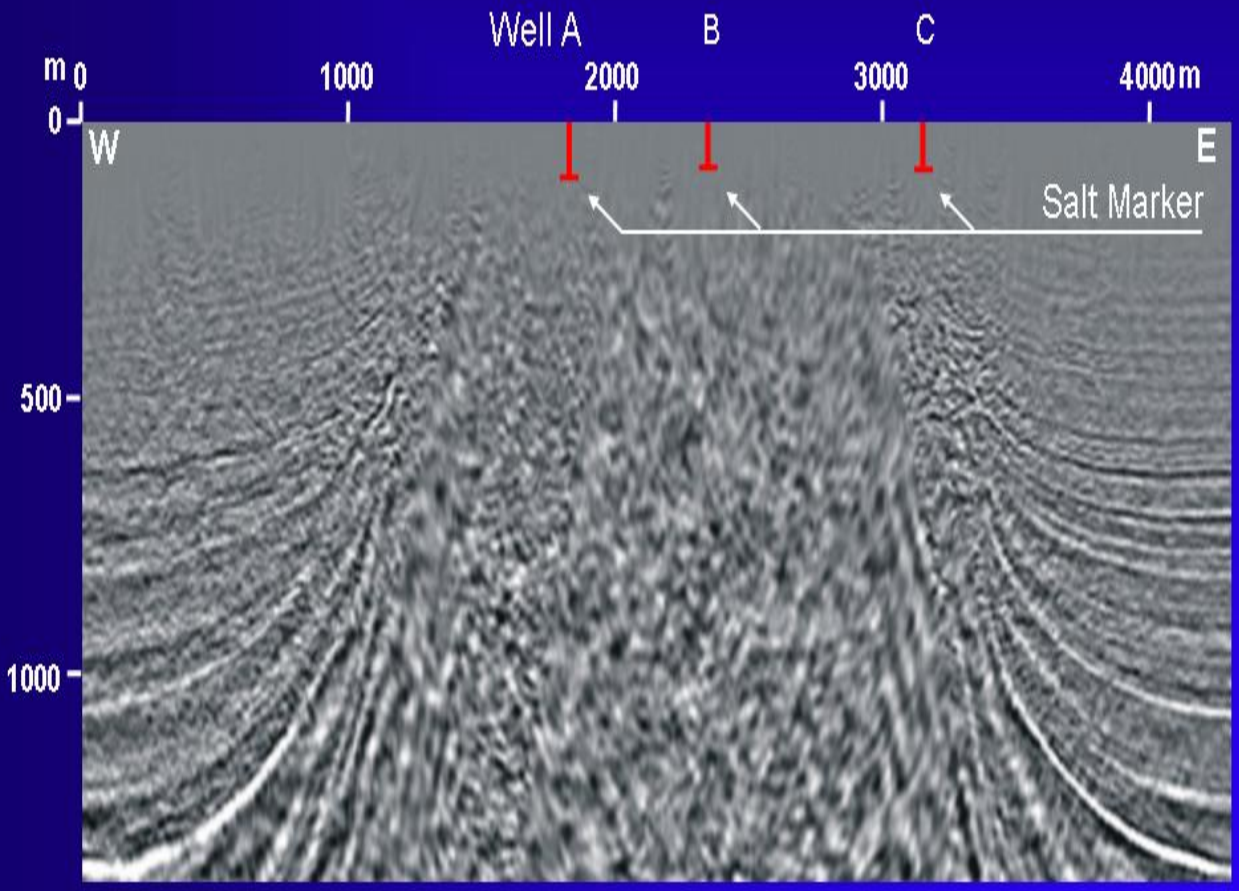

Gravity – Analysis

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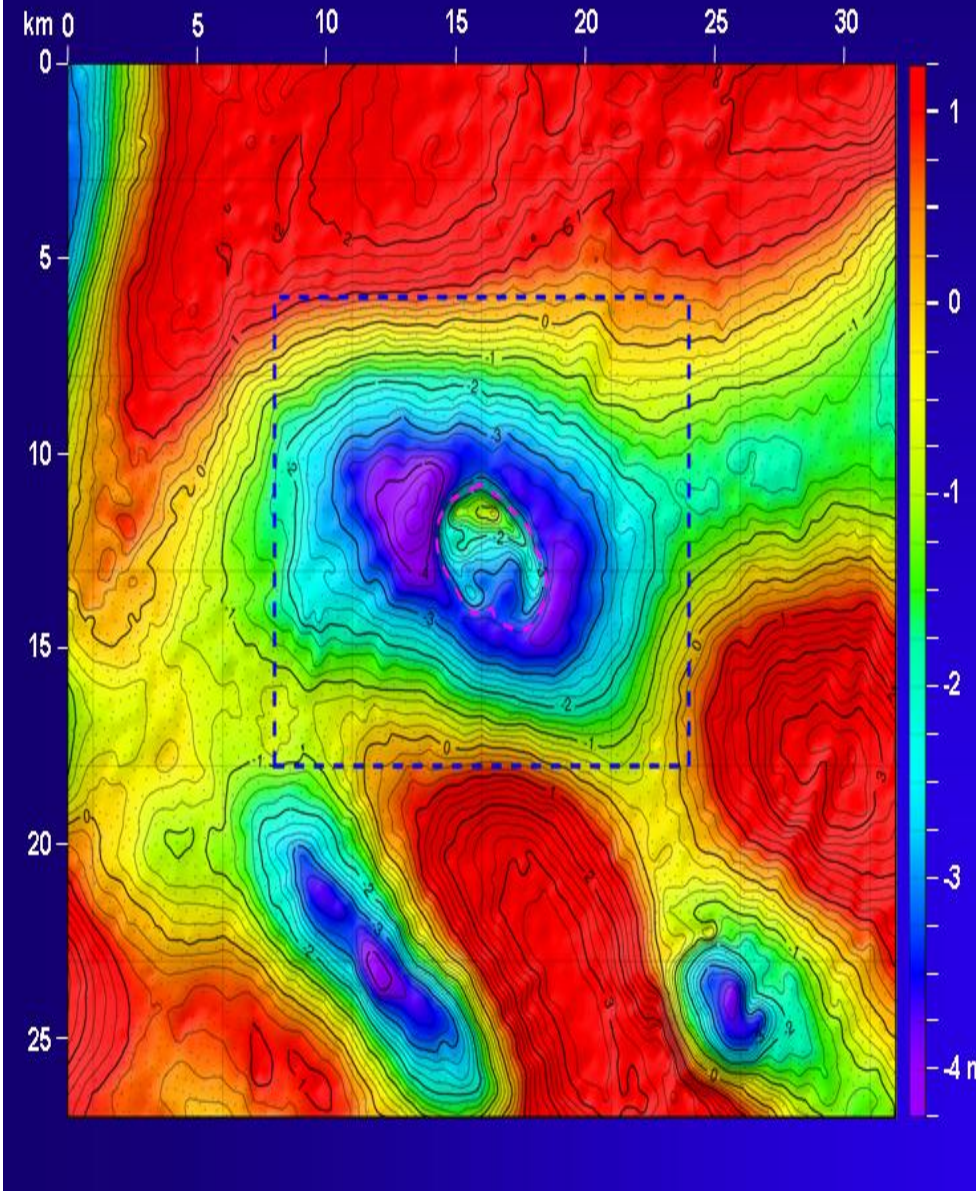
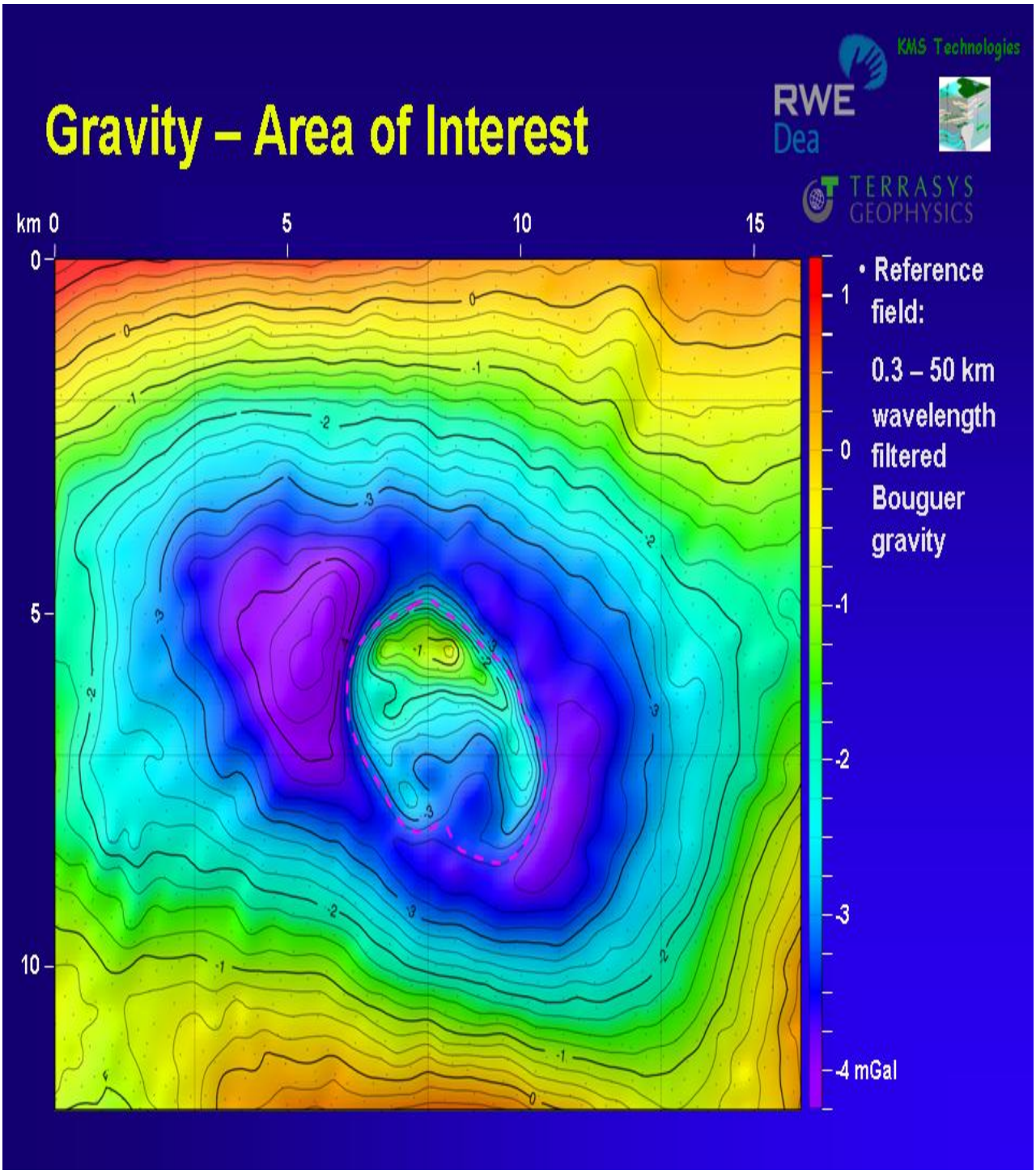


- Reference field:

  0.3 – 50 km wavelength filtered Bouguer gravity

- Dense coverage:

  7-8 stn./km²


Gravity – Area of Interest
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TERRASYS GEOPHYSICS
km 0
5
10
15
0
5
10
• Reference field:
0.3 – 50 km wavelength filtered Bouguer gravity
1
0
-1
-2
-3
-4 mGal
Slide8.JPG

Gravity – Previous Model

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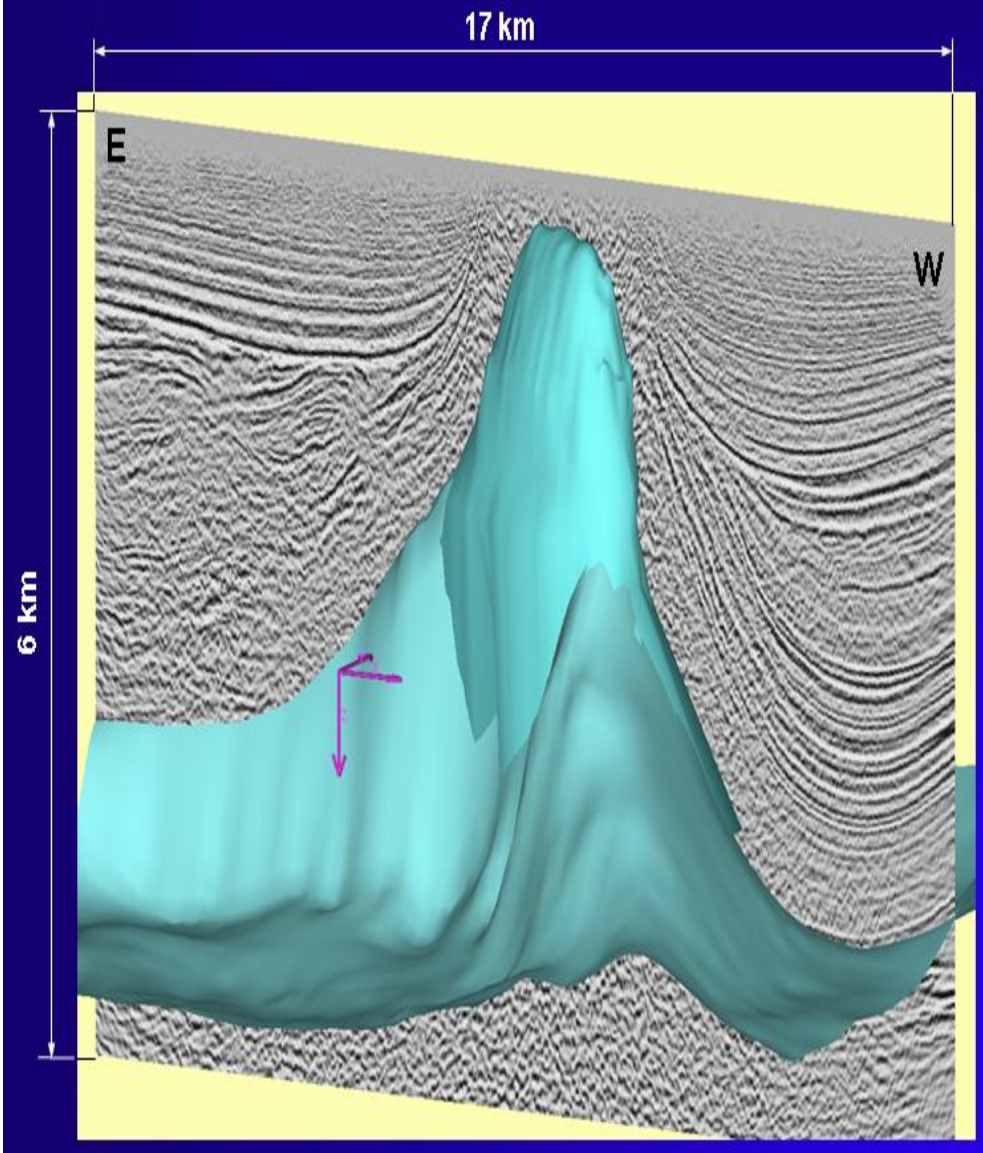

- Top salt: 400 m
- Shallow wells not available
- Poorly constrained

High Resolution MT Acquisition

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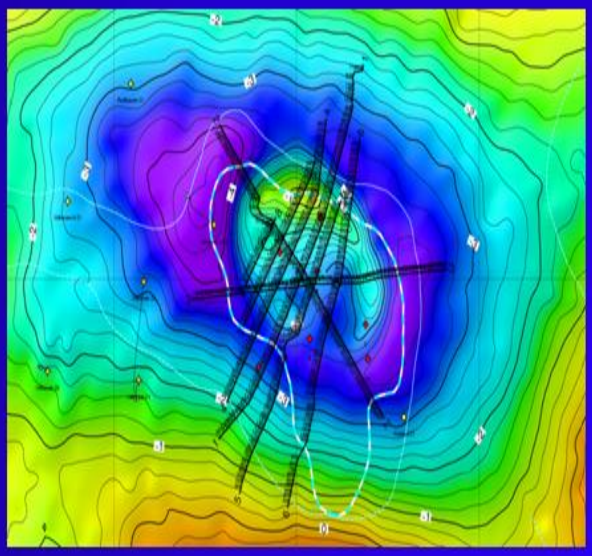
- Frequency range : 6 bands 25Hz - 48 kHz
- Remote reference : 150 km away
- Total lines / sites : 8 / 400
- Inline site spacing : 100 m



High Res MT Acquisition Setup

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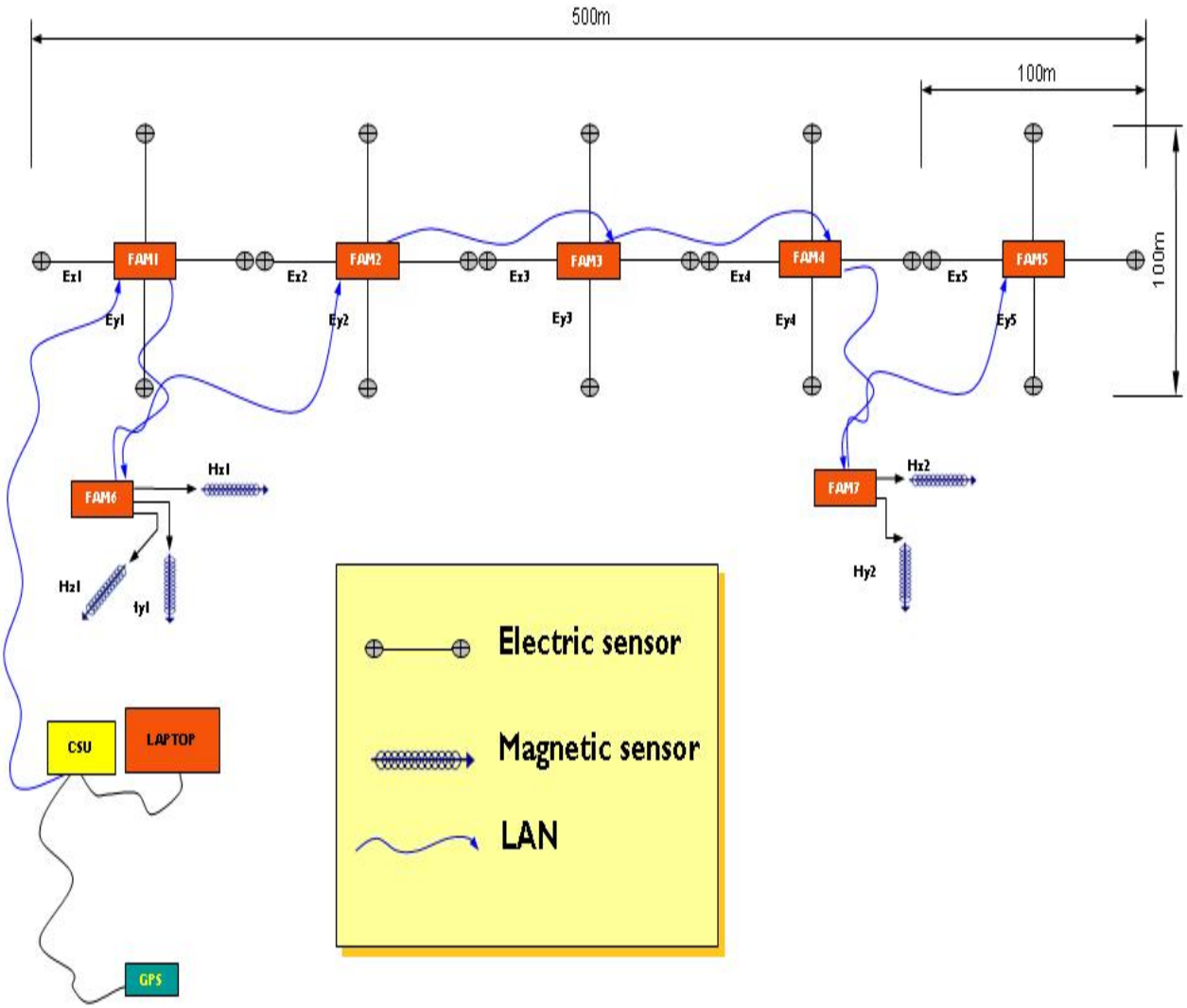

High Res MT Workflow

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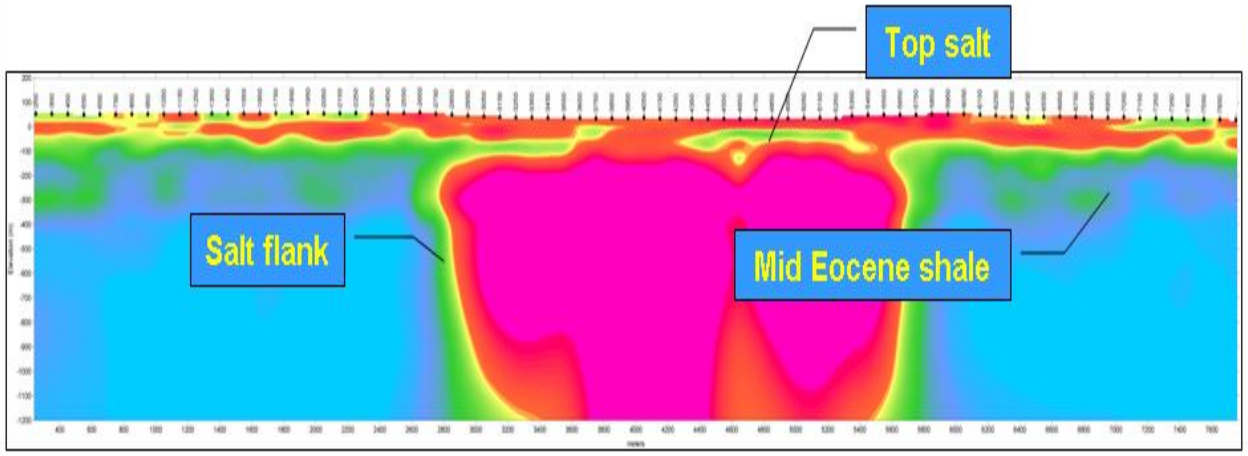
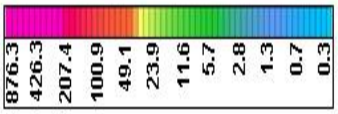
Depth Imaging





Outline

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TERRASYS GEOPHYSICS

- Data Base and Independent Results: Seismic, Gravity and Magnetotellurics
- Integrated Interpretation
- Conclusions

Integrated Interpretation

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- 1st step: Generation of initial model
- 2nd step: Refinement of salt geometry by HRMT
- 3rd step: Gravity modelling of deep salt with upper salt geometry constrained

Generation of Initial Model

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- Sediment interpretation from seismic
- Formation densities from initial data base
- Shallow water wells
- First pass HRMT depth imaging outlines new top salt geometry

High Res MT Data Analysis

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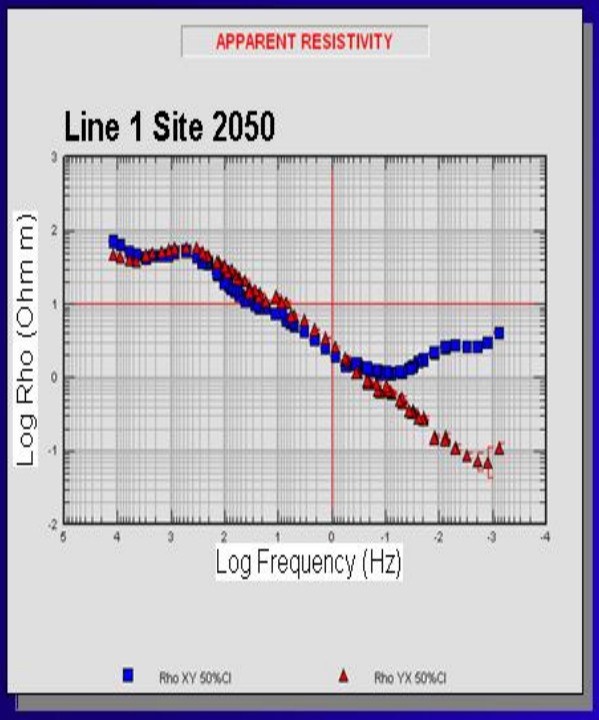

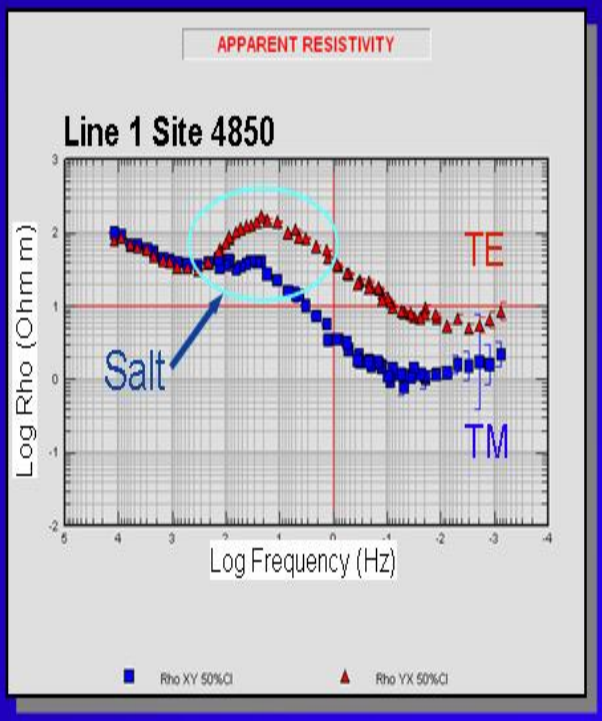

High frequency – shallow

Low frequency – deep

Top Salt – Lateral Extension

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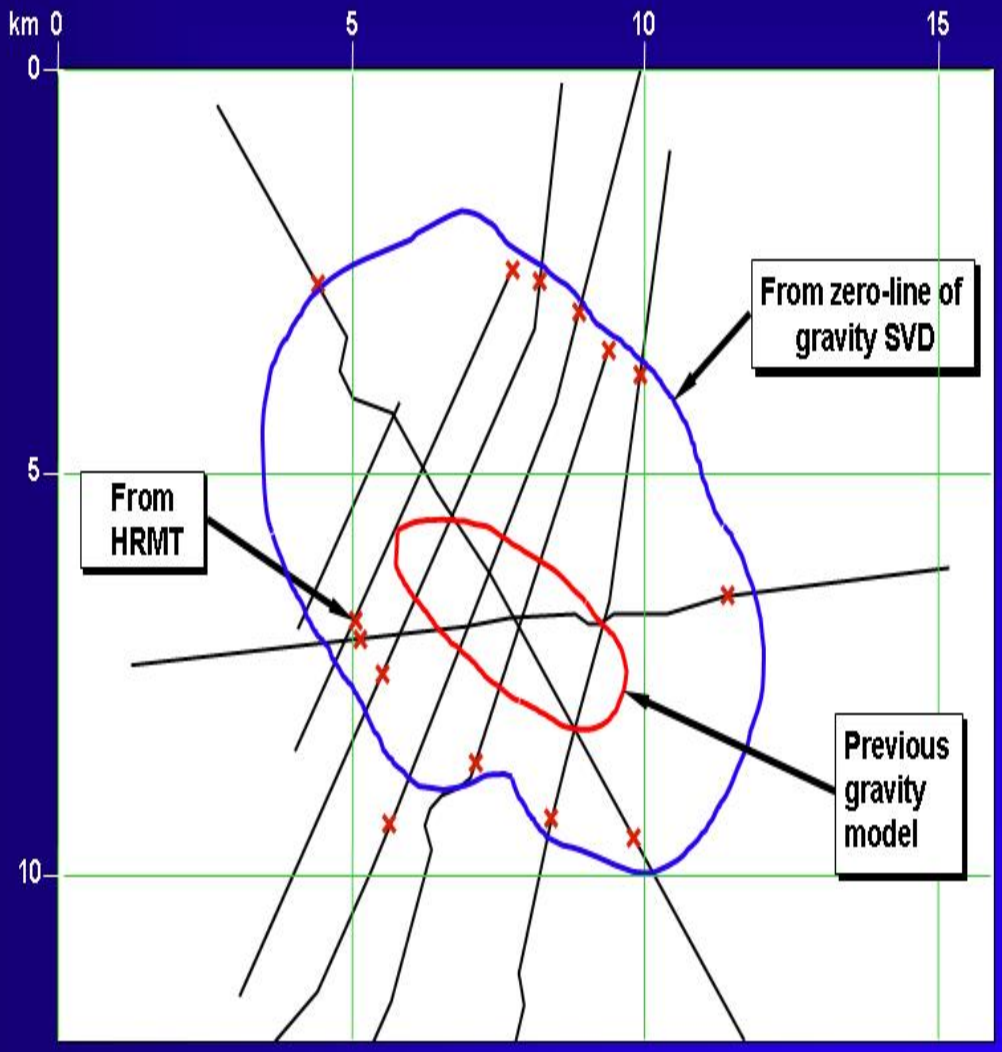

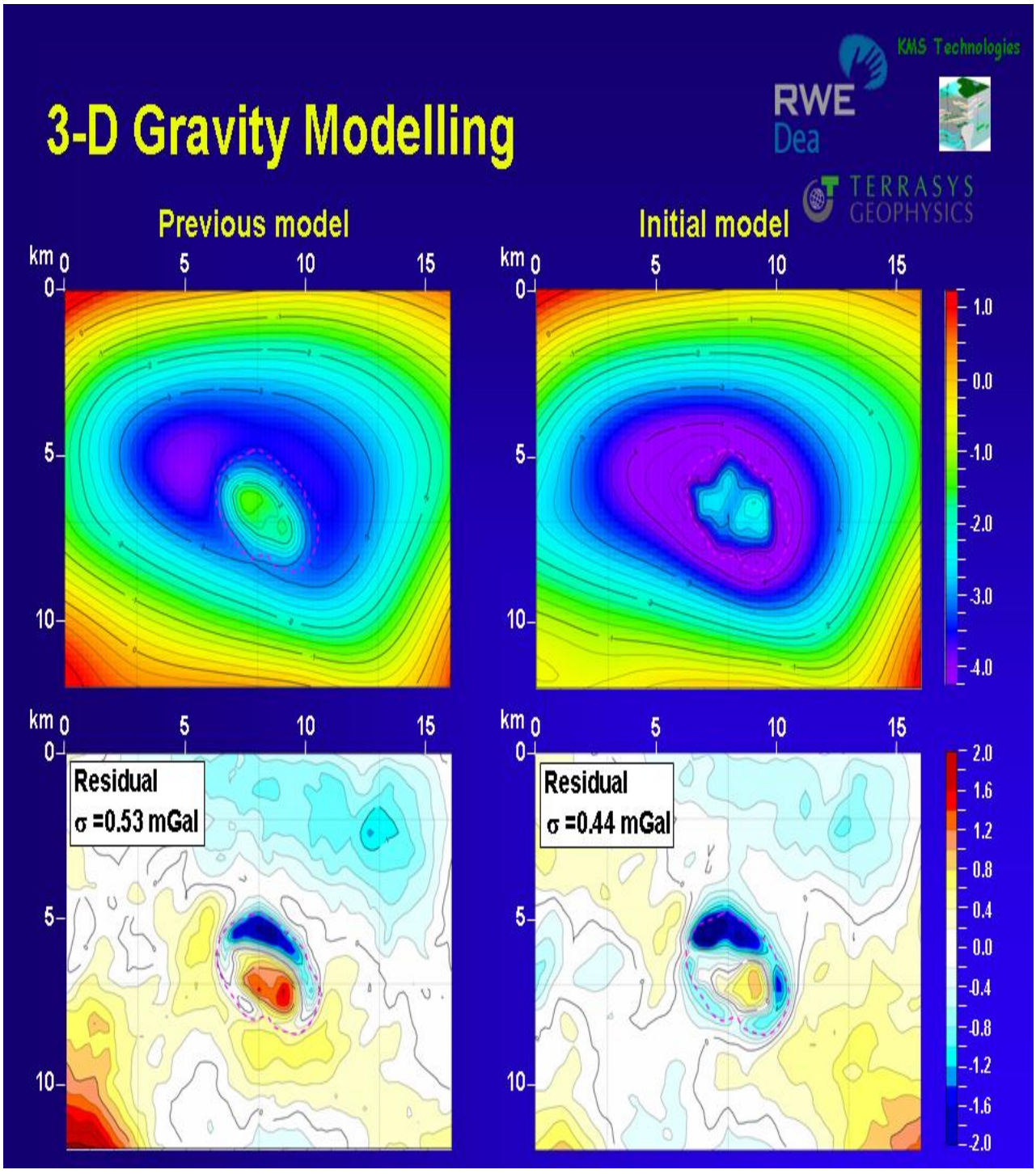
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3-D Gravity Modelling
Previous model
Initial model
km
0
5
10
15
1.0
0.0
-1.0
-2.0
-3.0
-4.0
Residual
σ =0.53 mGal
Residual
σ =0.44 mGal
2.0
1.6
1.2
0.8
0.4
0.0
-0.4
-0.8
-1.2
-1.6
-2.0

3-D Gravity Modelling

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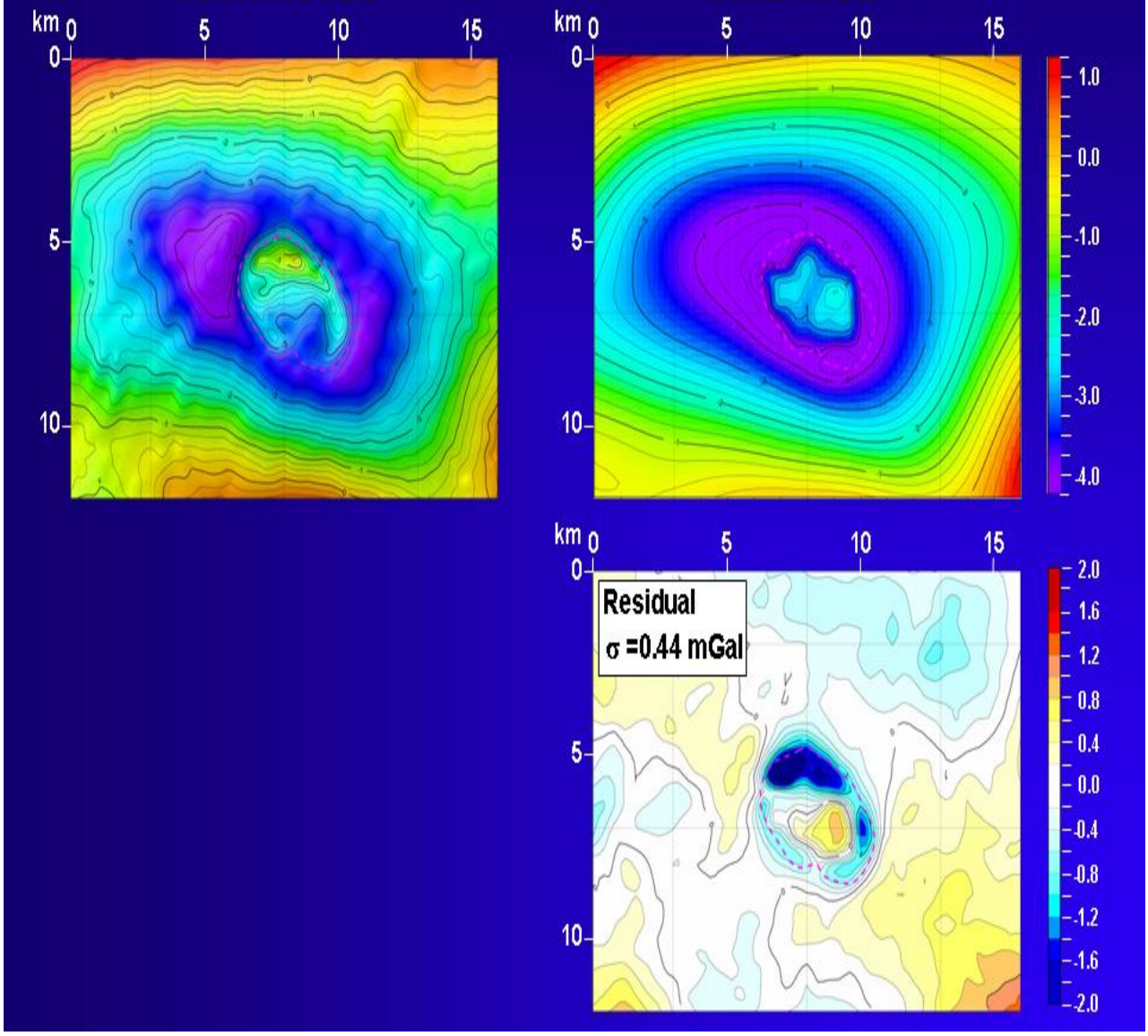
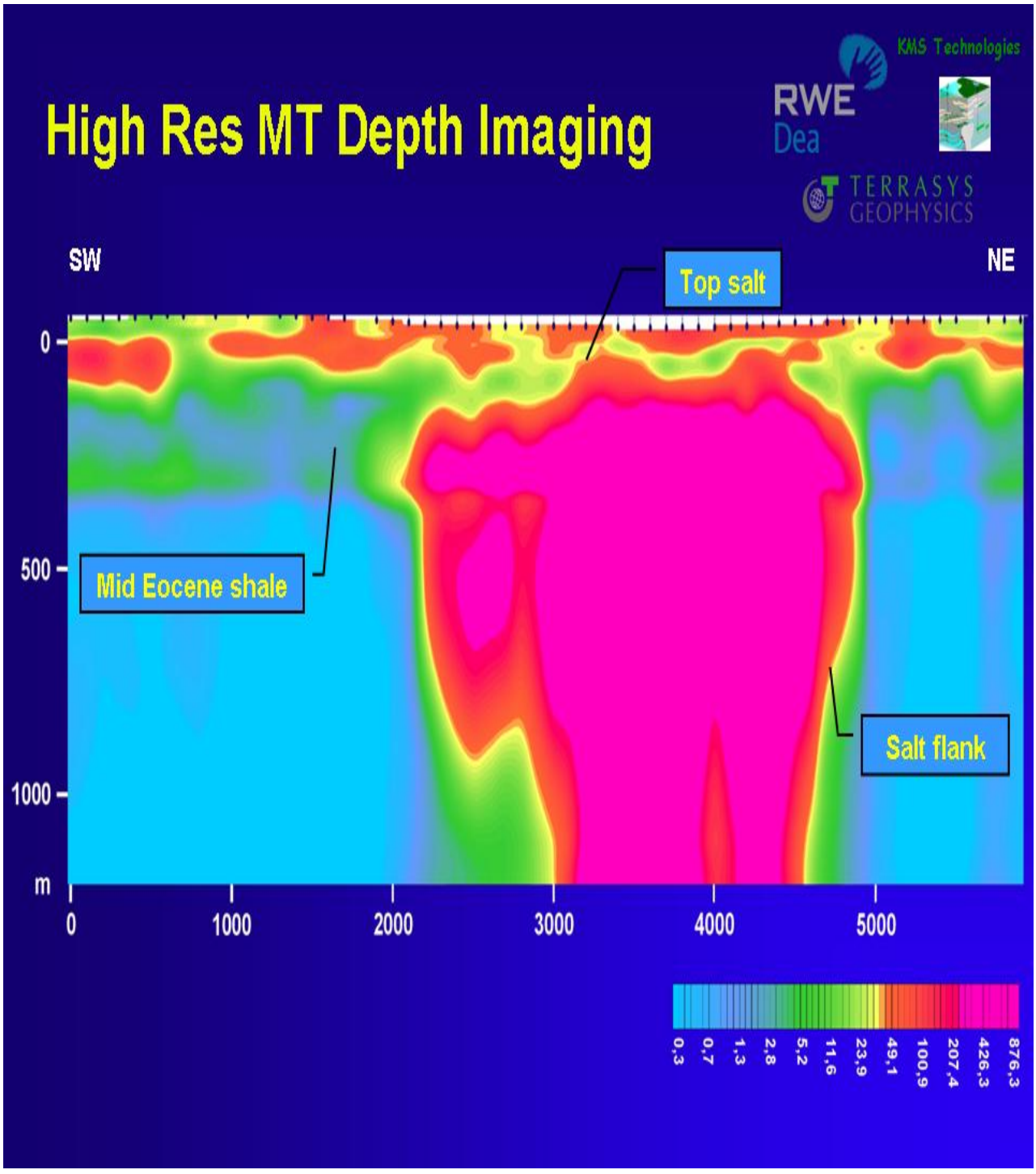
TERRASYS GEOPHYSICS




High Res MT Depth Imaging
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SW
NE
Top salt
Mid Eocene shale
Salt flank
0
500
1000
m
0
1000
2000
3000
4000
5000
0,3
0,7
1,3
2,8
5,2
11,6
23,9
49,1
100,9
207,4
426,3
876,3

High Res MT Salt Geometry

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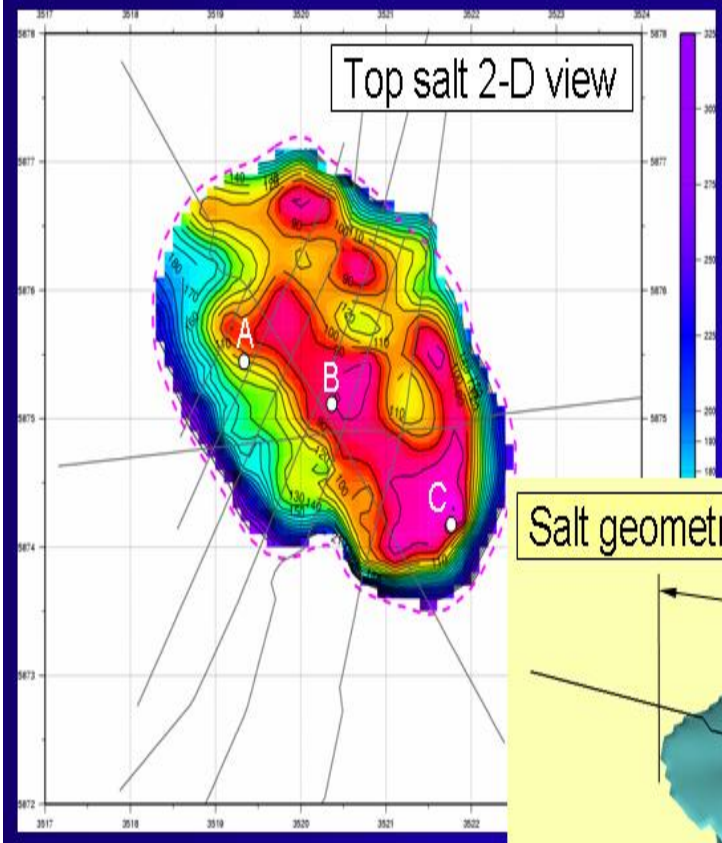
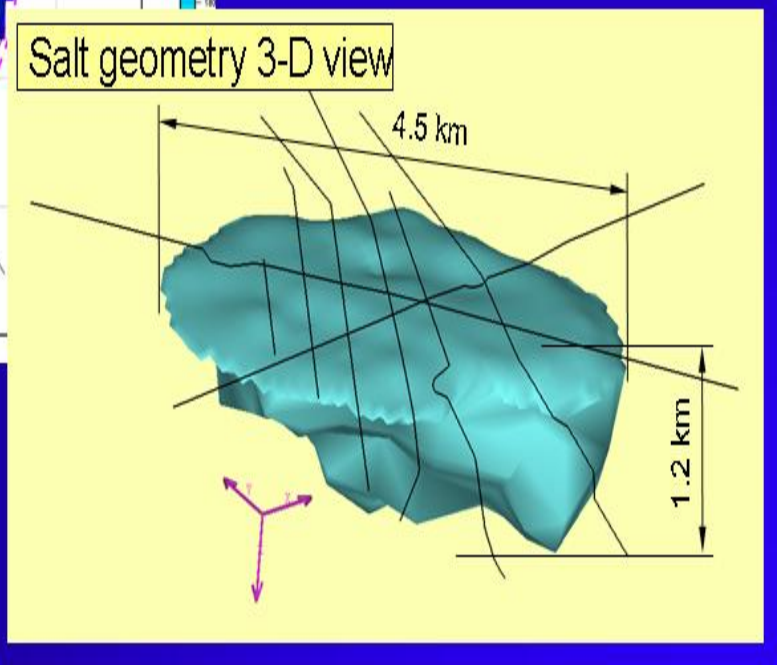


Water wells	Map error
A	1.5 m
B	0.5 m
C	8 m



Final 3-D Gravity Modelling

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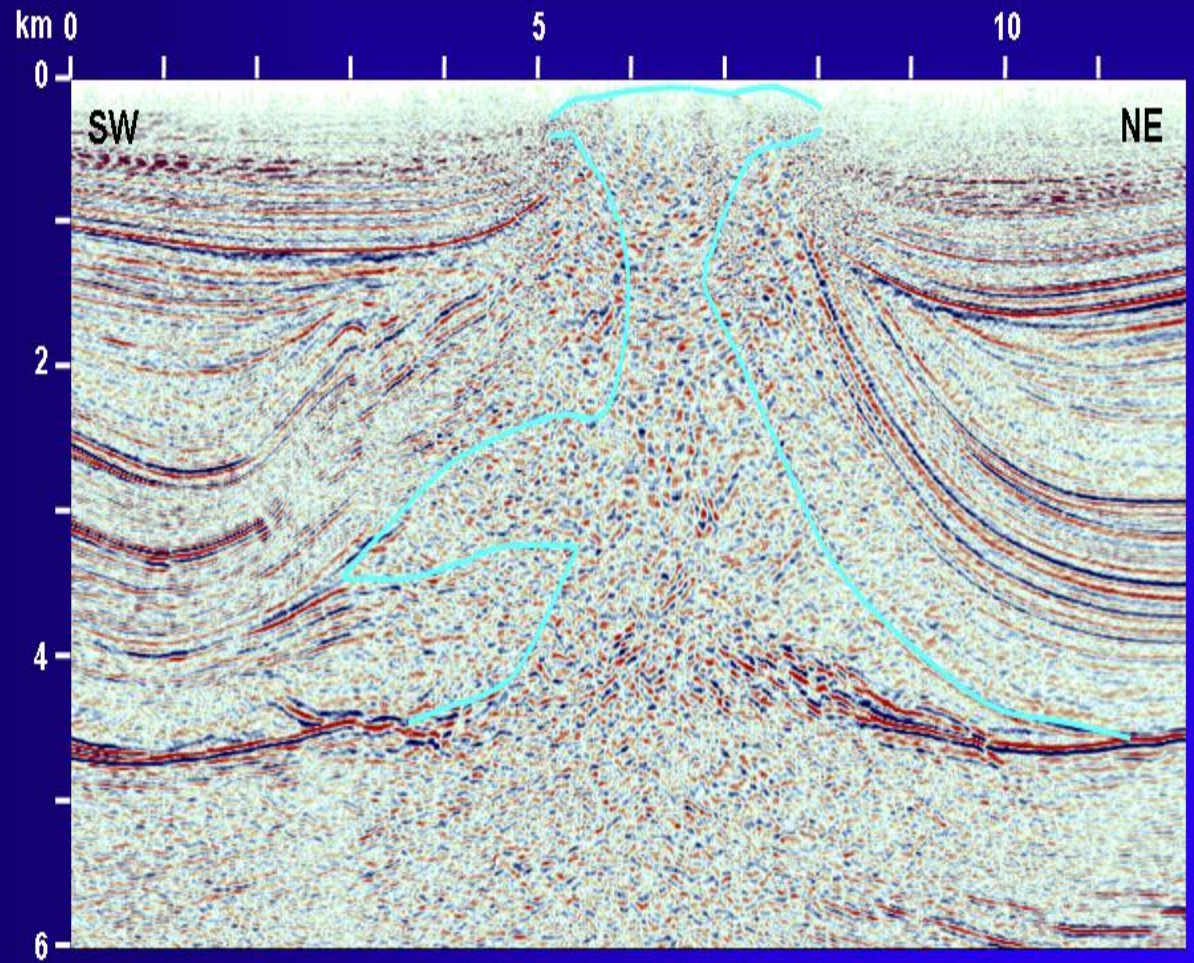

Final 3-D Gravity Modelling

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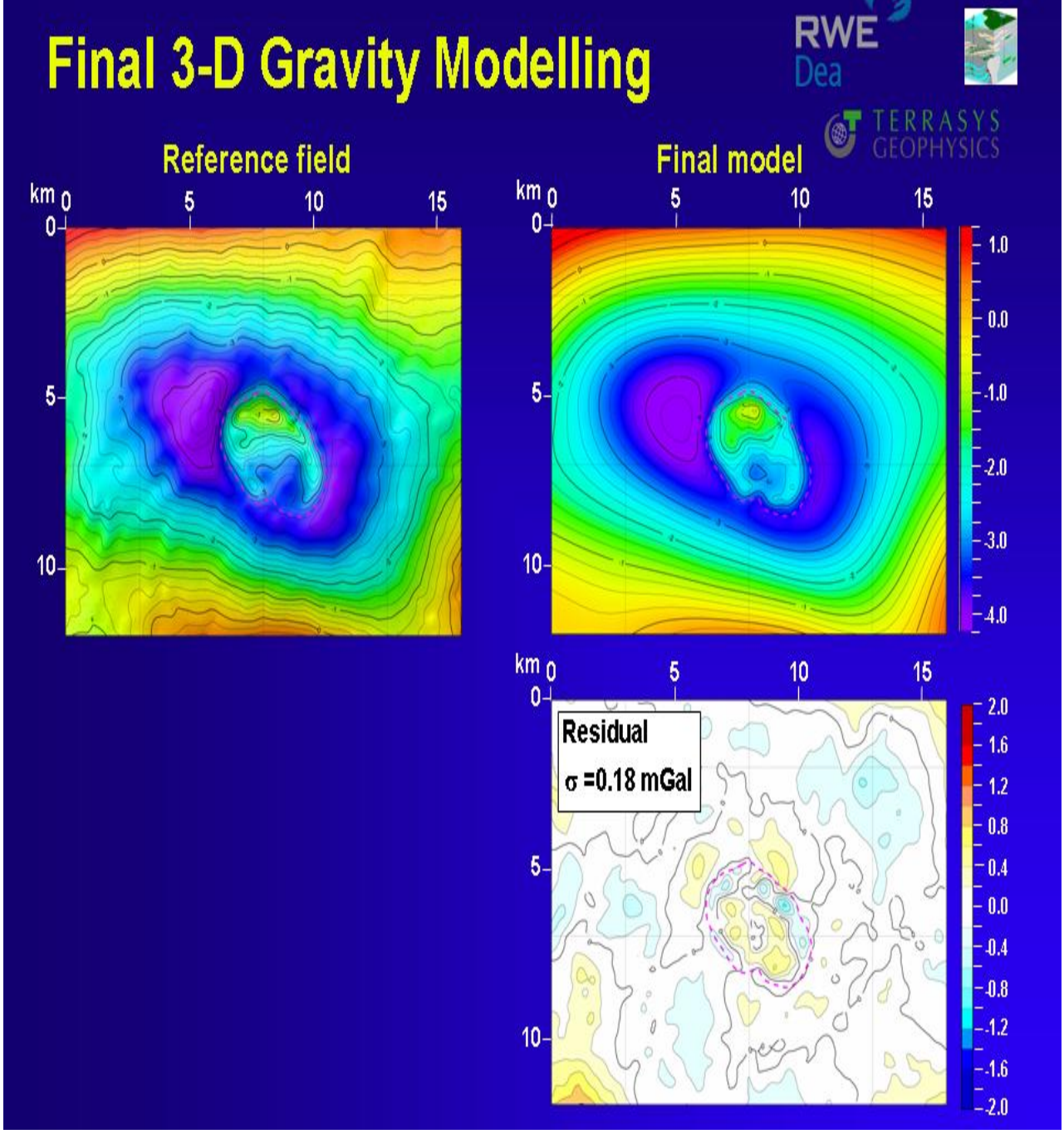

New Integrated Model

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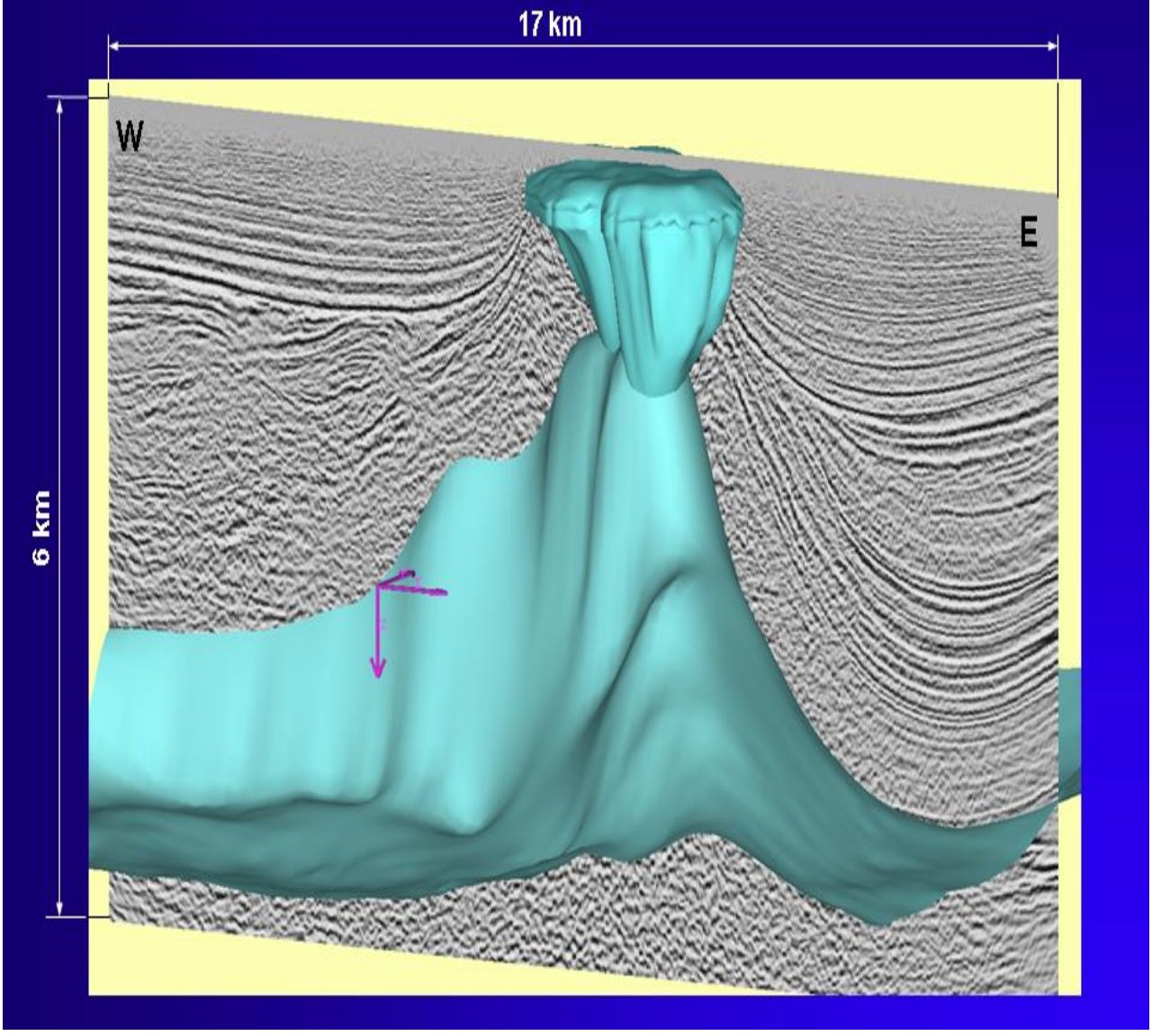

Model Improvements

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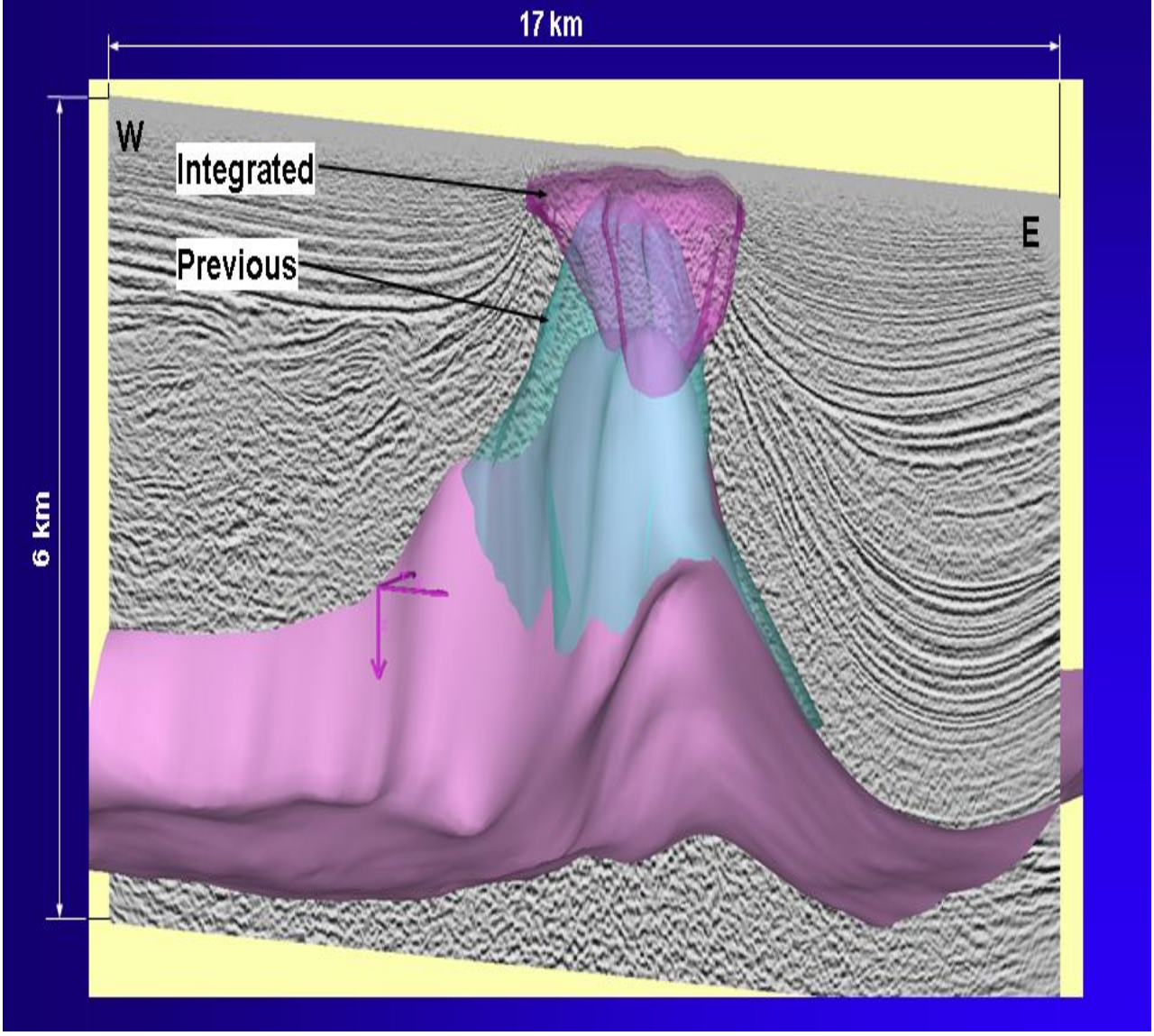

Conclusions

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TERRASYS GEOPHYSICS

- Advanced seismic depth imaging, 3-D gravity & high res MT proven to provide superior interpretation of complex salt structures
- New integrated model shows dramatic improvements over existing database
- Innovative technology developed & deployed

Acknowledgements

We wish to thank RWE Dea
for its kind permission to present current data

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High Resolution MT Data Flow

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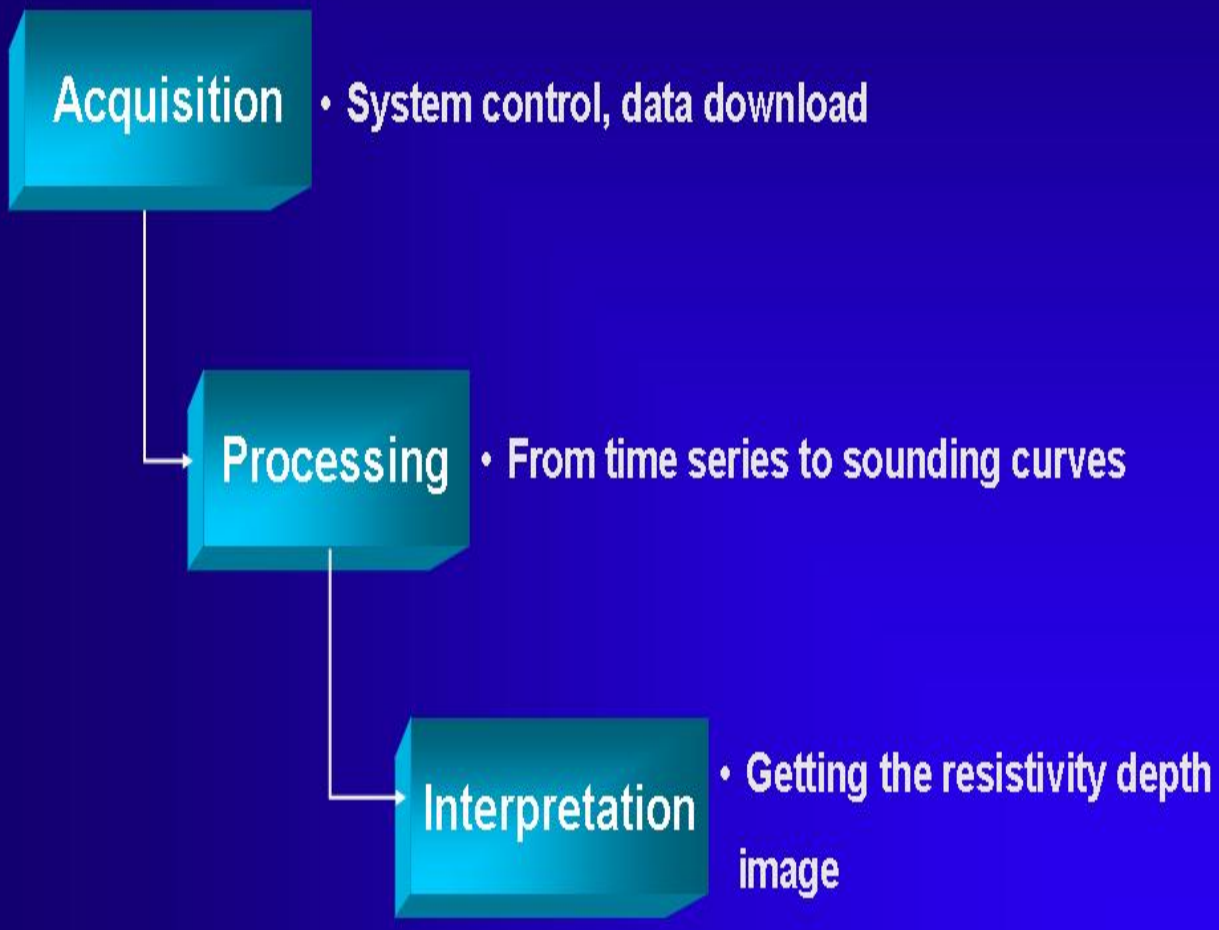

KMS Technologies – KJT Enterprises Inc.
6420 Richmond Ave., Suite 610
Houston, Texas, 77057, USA
Tel: 713.532.8144

info@kmstechnologies.com

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