Comparison of published interpretations of SAGEEP2011 blind refraction data, by Prof. Bob Whiteley :

Synthetic traveltime data (Zelt, 2010) was interpreted by ten different parties using eight different inversion algorithms, with the true model unknown until it was revealed at the 2011 SAGEEP meeting (Zelt et al., 2013).

On the following pages Prof. Bob Whiteley compares the GRM interpretation (Stoyer, 2012) of above data with our blind WET interpretation (Rohdewald, 2011) and the true model (Zelt et al., 2013); (R. Whiteley, personal communication, May 21, 2012).

We thank Prob. Bob Whiteley for his permission to put this comparison on our web site.

Siegfried Rohdewald, Vancouver, Canada on March 8, 2014.

References :

Rohdewald, S.R., 2011, Interpretation of First−Arrival Travel Times with Wavepath Eikonal Traveltime Inversion and Wavefront Refraction Method. Proceedings of SAGEEP 2011, Charleston, South Carolina, USA, 10-14 April, 31-38. http://library.seg.org/doi/abs/10.4133/1.3614086 .

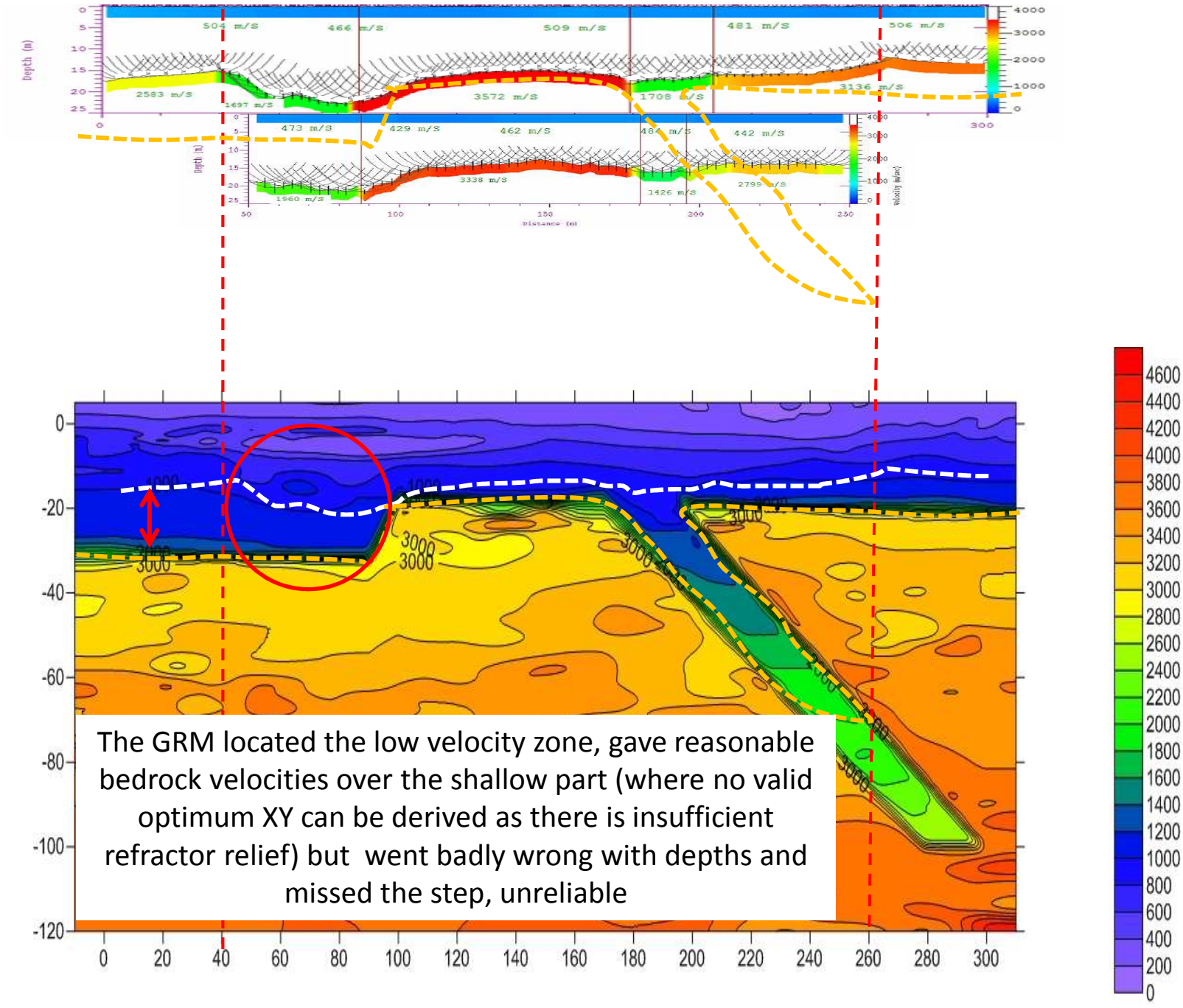
Stoyer, C., 2012, Interpreting Colin Zelt's "Shootout" Seismic Refraction Data Set using the Generalized Reciprocal Method. Proceedings of SAGEEP 2012, Tucson, Arizona, USA, 25-29 March, 470-478. http://library.seg.org/doi/abs/10.4133/1.4721848 .

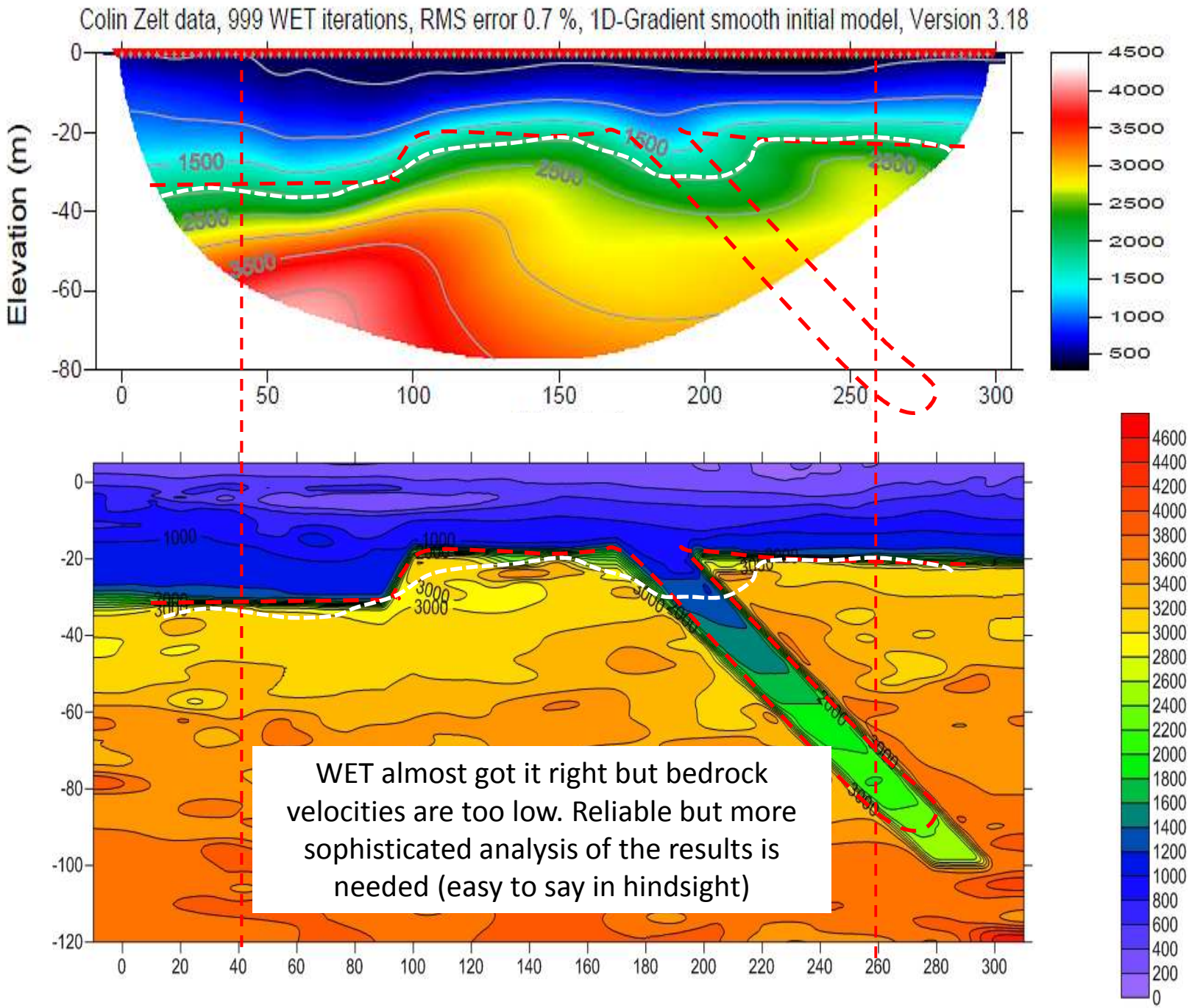
Zelt, C.A., 2010, SAGEEP 2011 Seismic refraction shootout: blind test of methods for obtaining velocity models from first-arrival travel times. http://terra.rice.edu/department/faculty/zelt/sageep2011 .

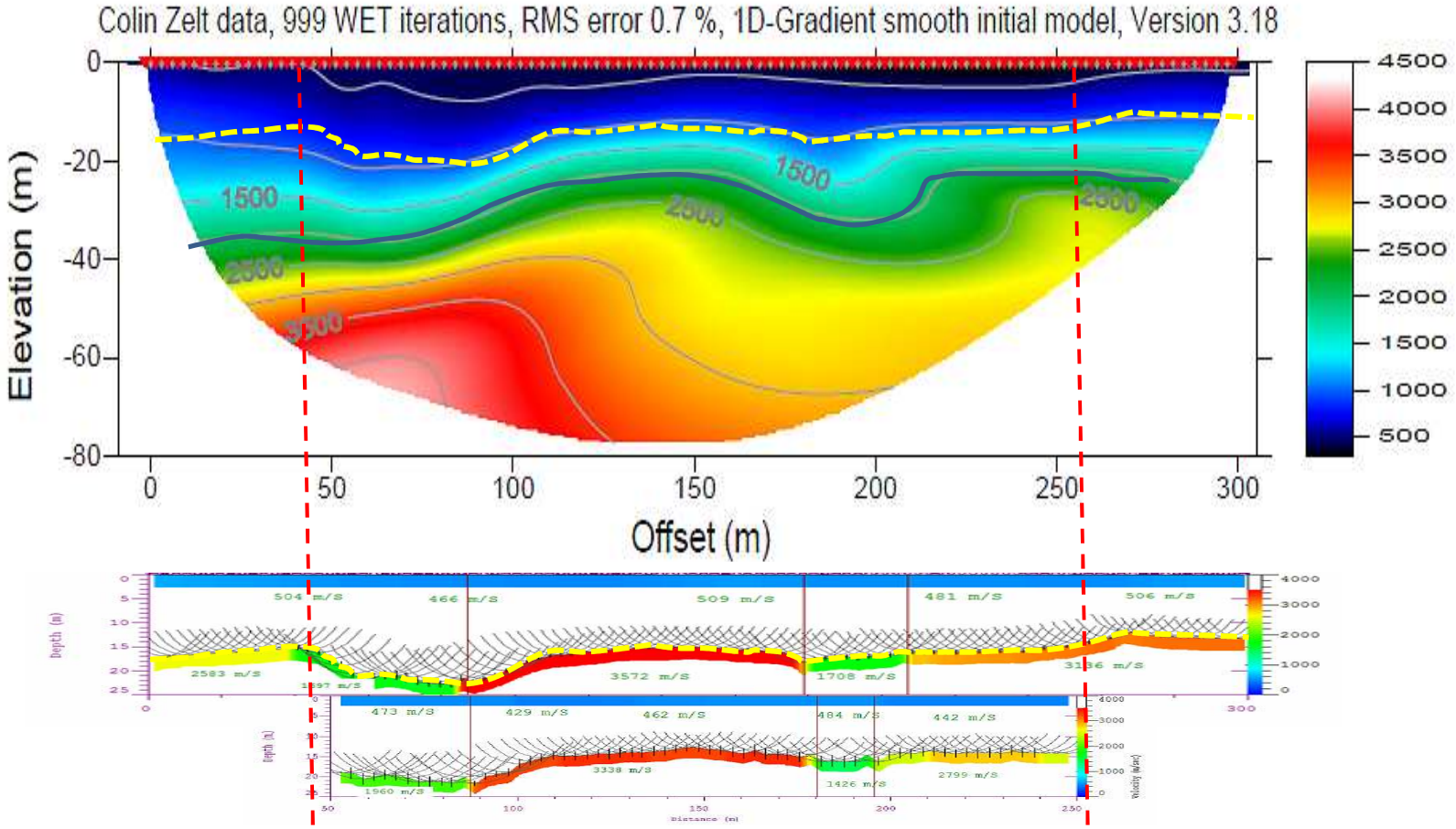
Zelt, C.A.; Haines, S.; Powers, M.H.; Sheehan, J.; Rohdewald, S.; Link, C.; Hayashi, K.; Zhao, D.; Zhou, H.; Burton, B.L.; Petersen, U.K.; Bonal, N.D.; Doll, W.E., 2013, Blind test of methods for obtaining 2-D near-surface seismic velocity models from first-arrival traveltimes, JEEG, Volume 18(3), 183–194. http://dx.doi.org/10.2113/JEEG18.3.183 .

SAGEEP 2011 Refraction blind shootout

Comparison of GRM interpretation (Charlie Stoyer, IXRefrax™) and WET interpretation (Siegfried Rohdewald, RAYFRACT™)


The GRM located the low velocity zone, gave reasonable bedrock velocities over the shallow part (where no valid optimum XY can be derived as there is insufficient refractor relief) but went badly wrong with depths and missed the step, unreliable


Colin Zelt data, 999 WET iterations, RMS error 0.7 %, 1D-Gradient smooth initial model, Version 3.18
Elevation (m)
0
-20
-40
-60
-80
0
50
100
150
200
250
300
1500
2500
3500
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-20
-40
-60
-80
-100
-120
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
1000
3000
4600
4400
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
WET almost got it right but bedrock velocities are too low. Reliable but more sophisticated analysis of the results is needed (easy to say in hindsight)



The 2000m/s contour is close to the actual bedrock surface which is interesting as this is what we normally use if there are unsaturated soils at the surface. The 2500 m/s contour is used in the marine environment . We then use the Reciprocal method to check bedrock velocities and ray tracing on interesting sections to check lower velocity zones