

ANNEX A - WELL LOGS FOR ONE CLASS SVM AND LOF ALGORITHMS

The well log curves demonstrate the outliers detected within the data set by One Class SVM and LOF and corresponding areas highlighted in red (Fig. A.1 – A.4).

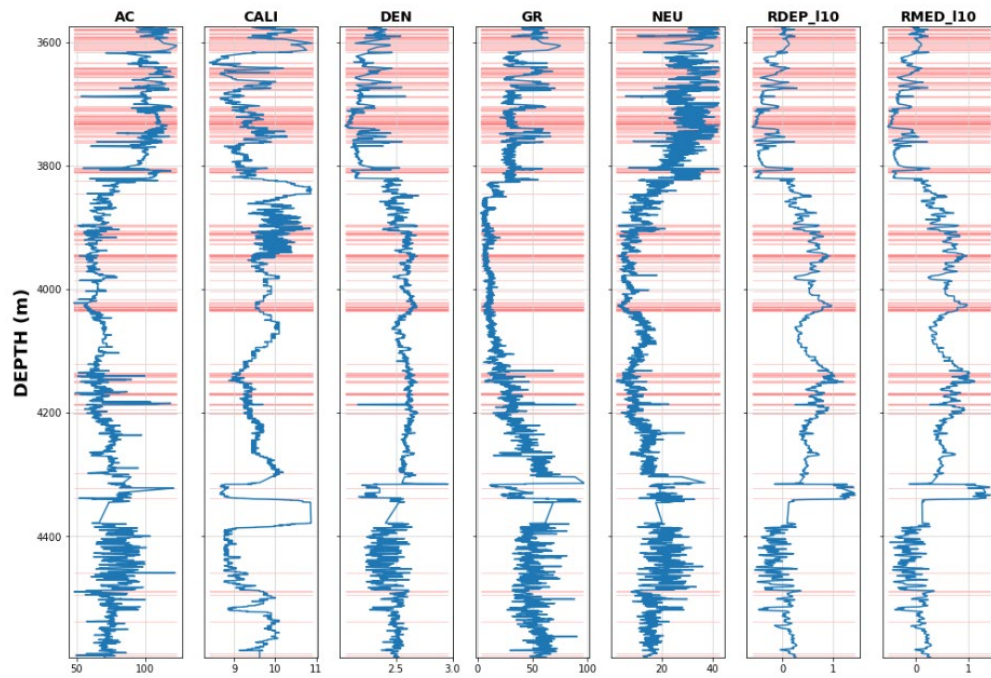


Fig. A.1: Well logs for manual and ML outlier detection and removal by One Class SVM algorithm (15/9-19SR)

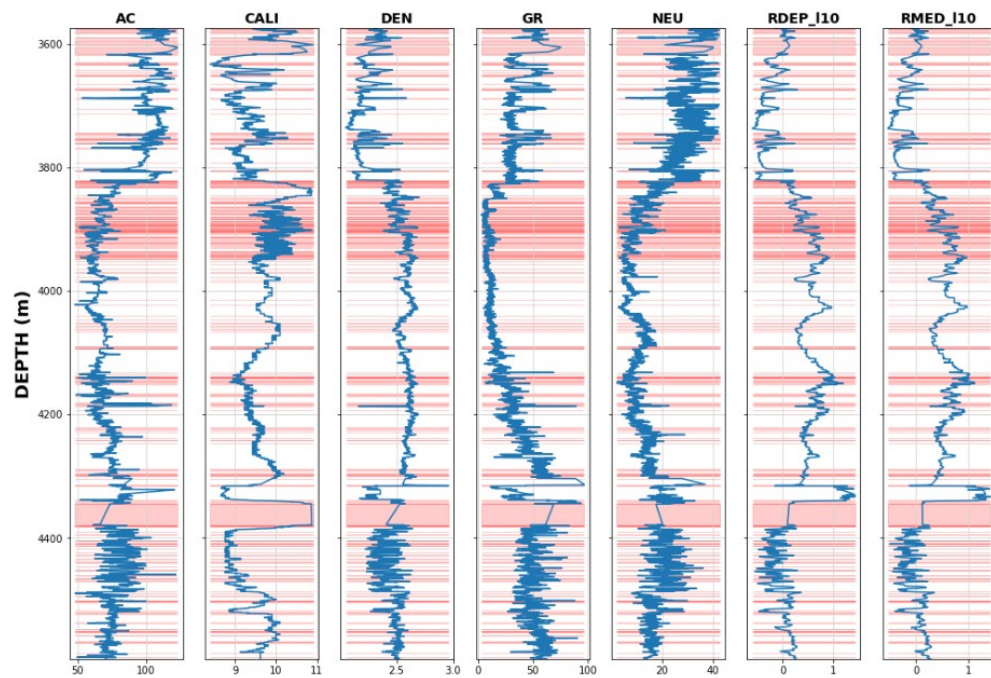


Fig. A.2: Well logs for manual and ML outlier detection and removal by One Class SVM algorithm (15/9-19SR)

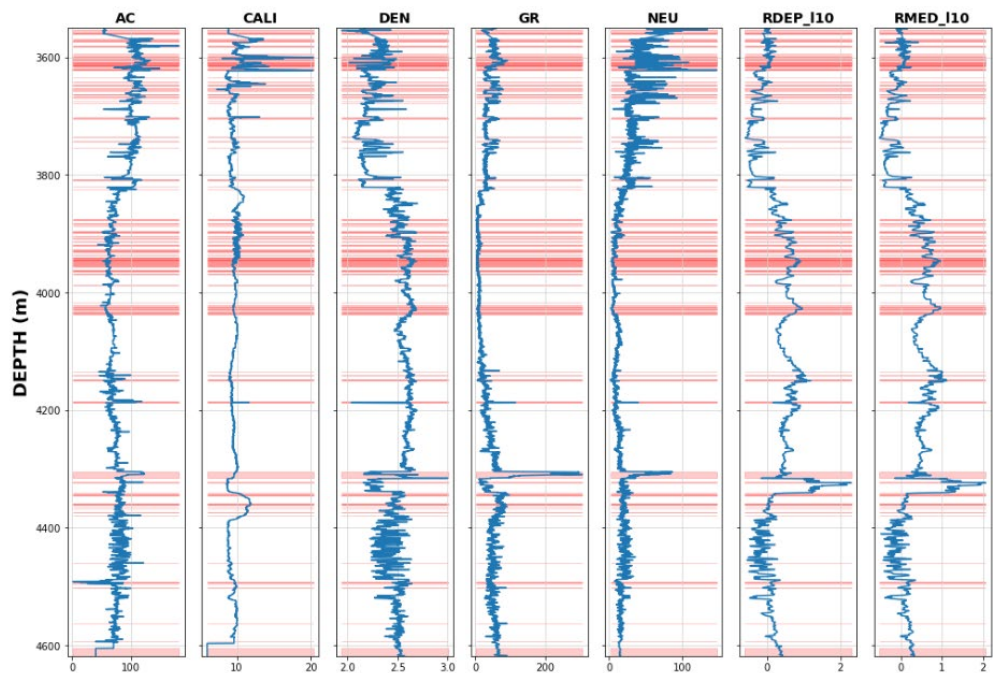


Fig. A.3: Well logs for manual and ML outlier detection and removal by One Class SVM algorithm (15/9-19SR)

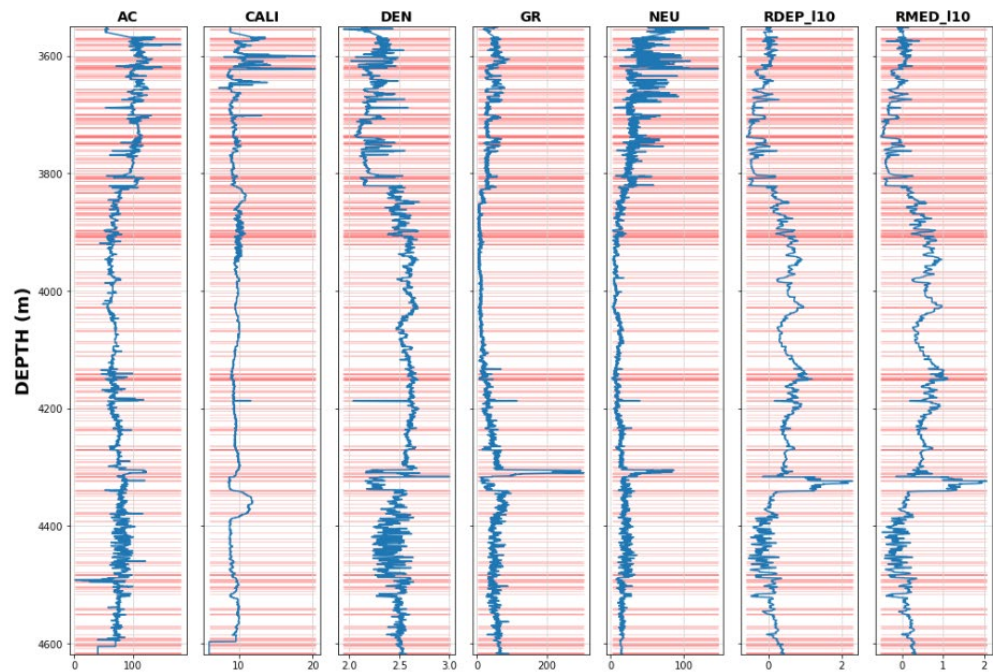


Fig. A.4: Well logs for manual and ML outlier detection and removal by One Class SVM algorithm (15/9-19SR)

ANNEX B - GRAPHICAL REPRESENTATION OF MODEL PARAMETERIZATION FOR THE ML-BASED REMOVAL OF ANOMALOUS VALUES

The graphical representation of model parameterization for both Brocher-like and Gardner-like empirical relationships fitting data set obtained through the application of ML outlier removal only (Fig. B.1 – B.14).

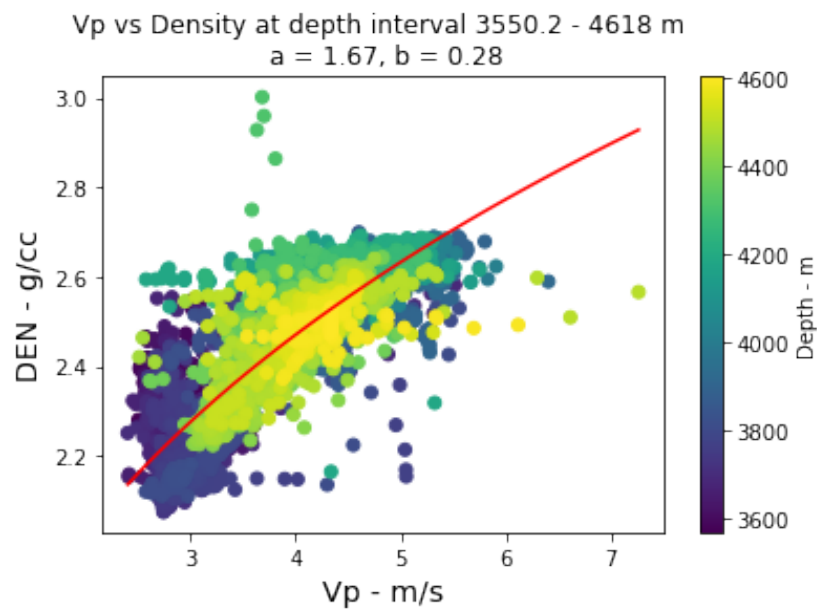


Fig. B.1: Density - velocity cross plot with Gardner curve fit (red) for entire depth interval with estimated coefficients (ML outlier removal)

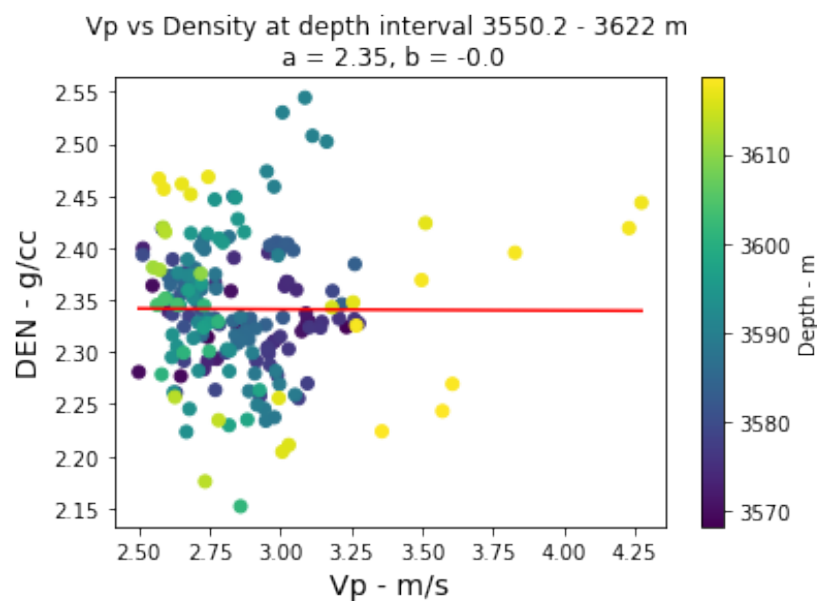


Fig. B.2: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 3550.2 – 3622 m with estimated coefficients (ML outlier removal)

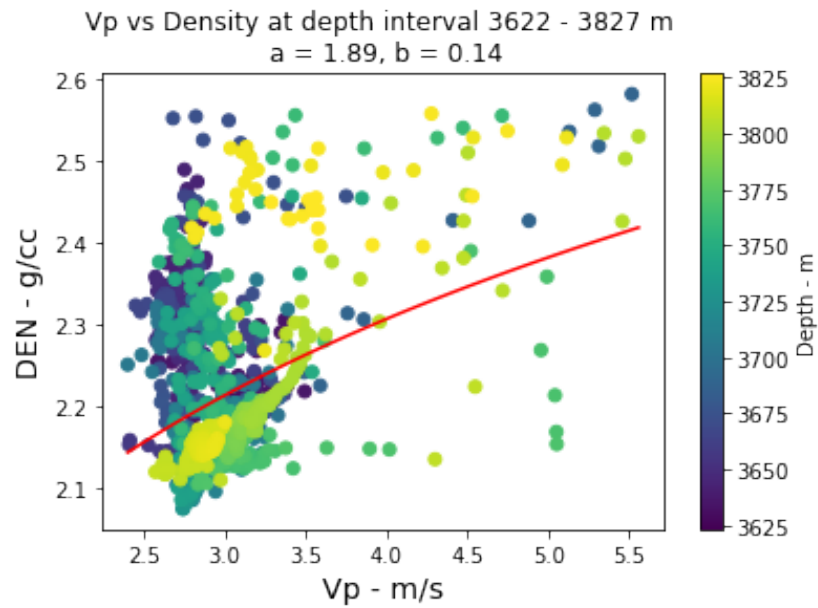


Fig. B.3: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 3622 – 3827 m with estimated coefficients (ML outlier removal)

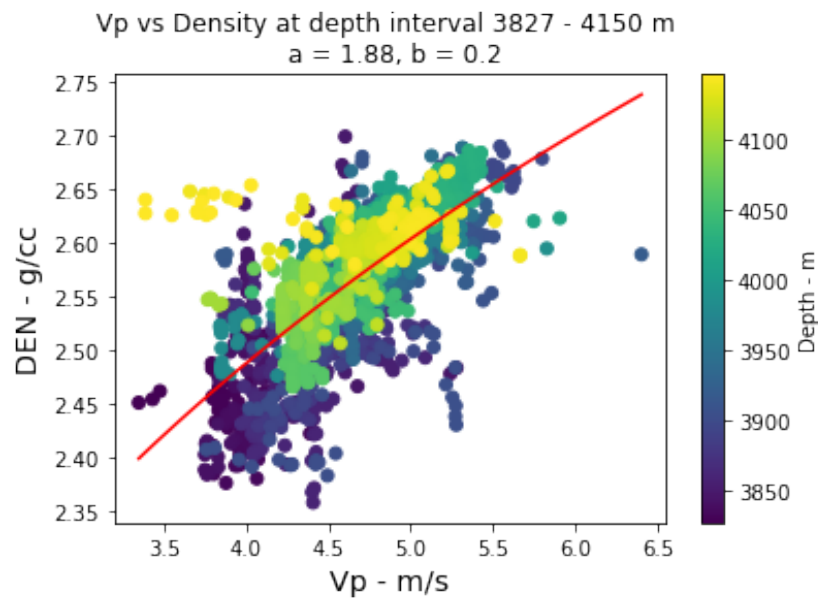


Fig. B.4: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 3827 – 4150 m with estimated coefficients (ML outlier removal)

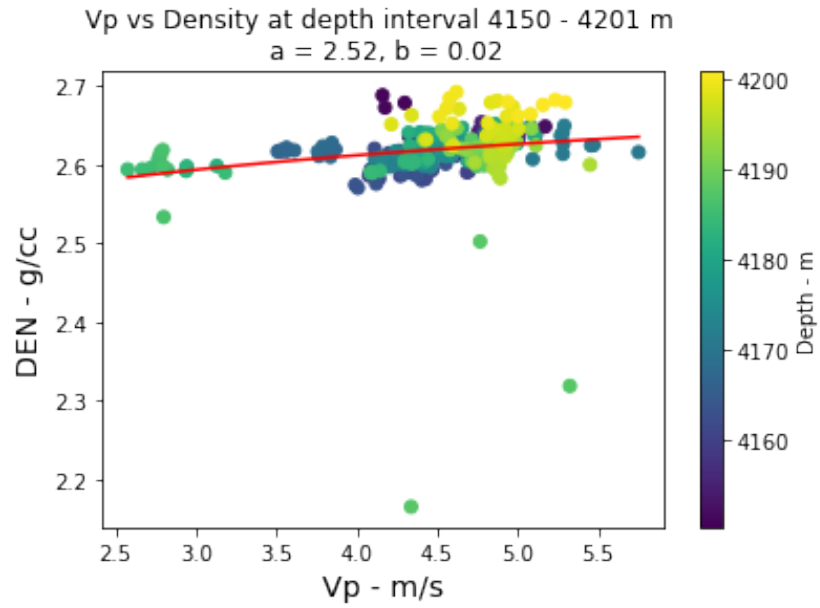


Fig. B.5: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 4150 – 4201 m with estimated coefficients (ML outlier removal)

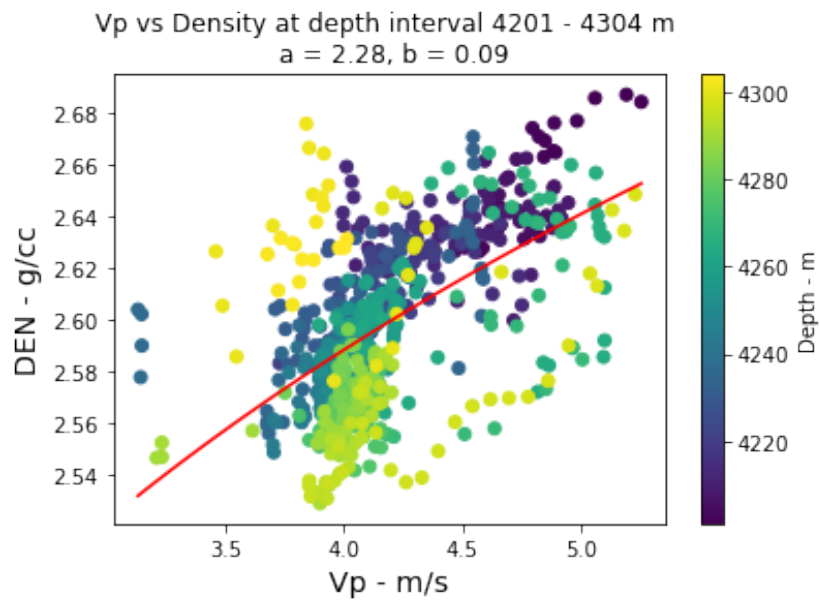


Fig. B.6: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 4201 – 4304 m with estimated coefficients (ML outlier removal)

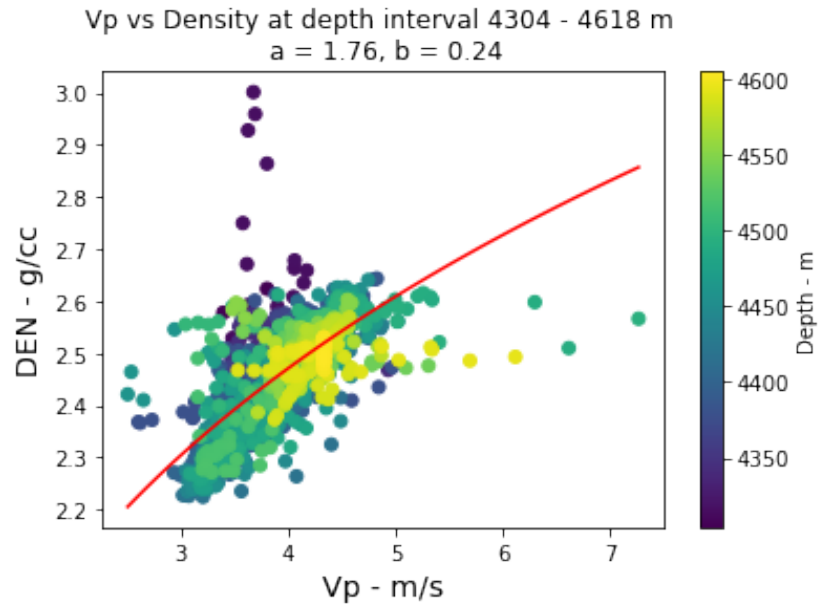


Fig. B.7: Density - velocity cross plot with Gardner curve fit (red) for depth interval of 4304 – 4618 m with estimated coefficients (ML outlier removal)

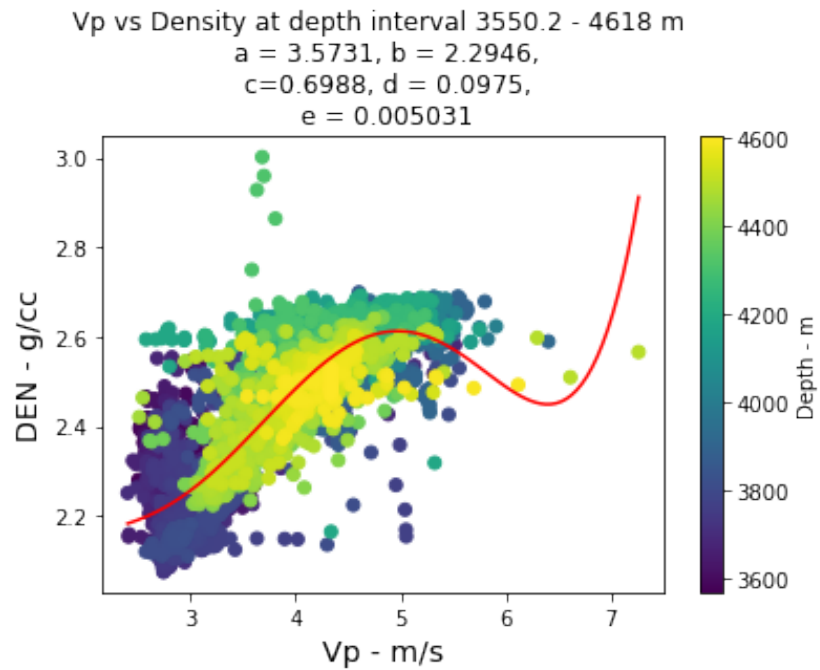


Fig. B.8: Density - velocity cross plot with Brocher curve fit (red) for entire depth interval with estimated coefficients (ML outlier removal)

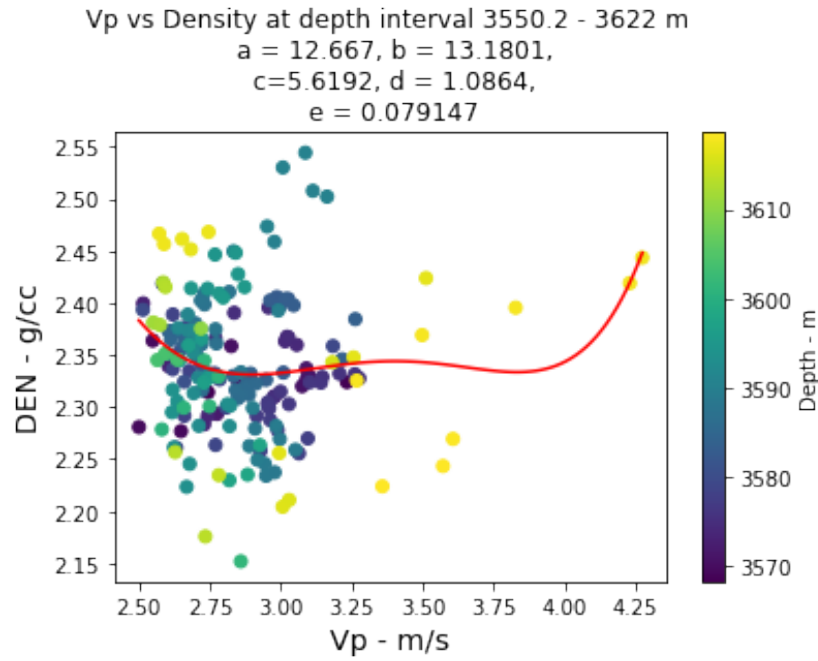


Fig. B.9: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 3550.2 – 3622 m with estimated coefficients (ML outlier removal)

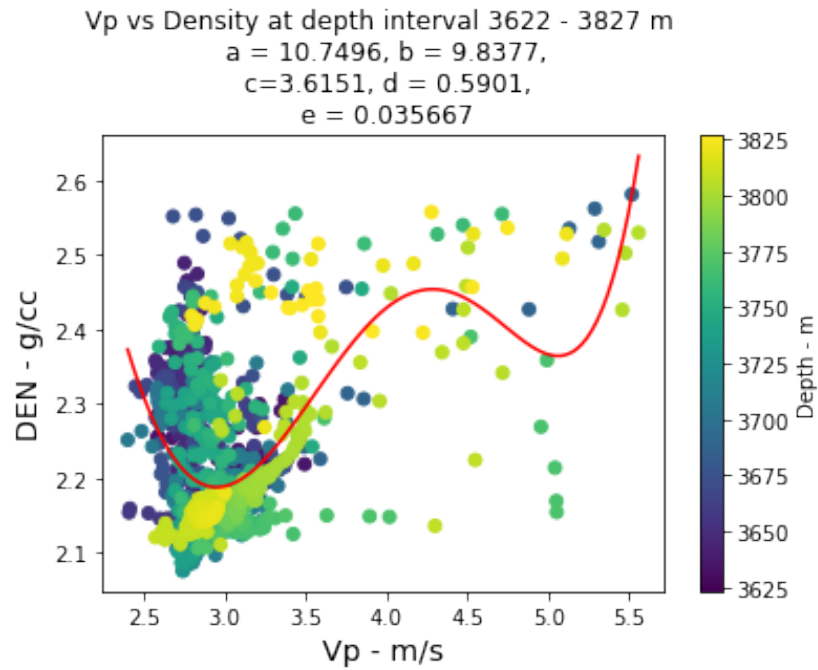


Fig. B.10: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 3622 – 3827 m with estimated coefficients (ML outlier removal)

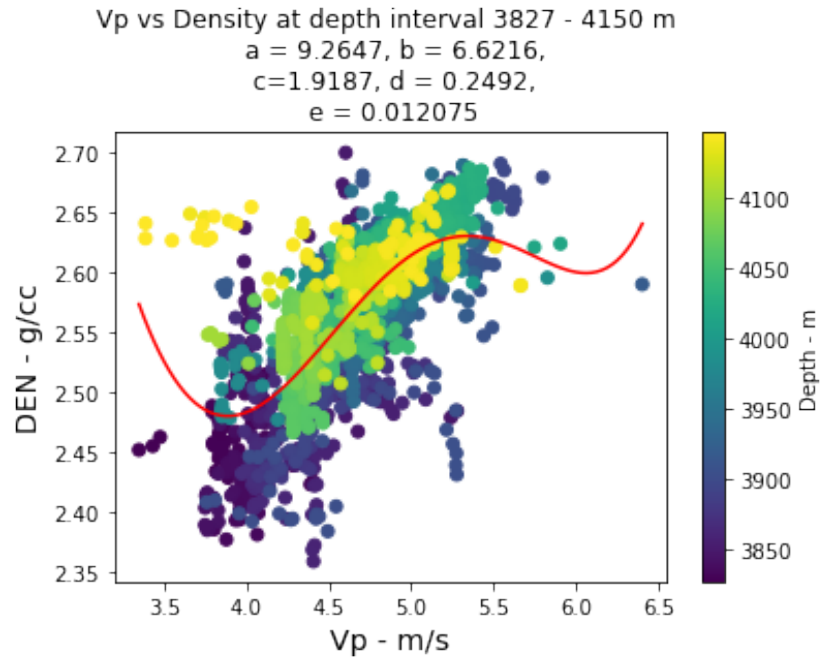


Fig. B.11: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 3827 – 4150 m with estimated coefficients (ML outlier removal)

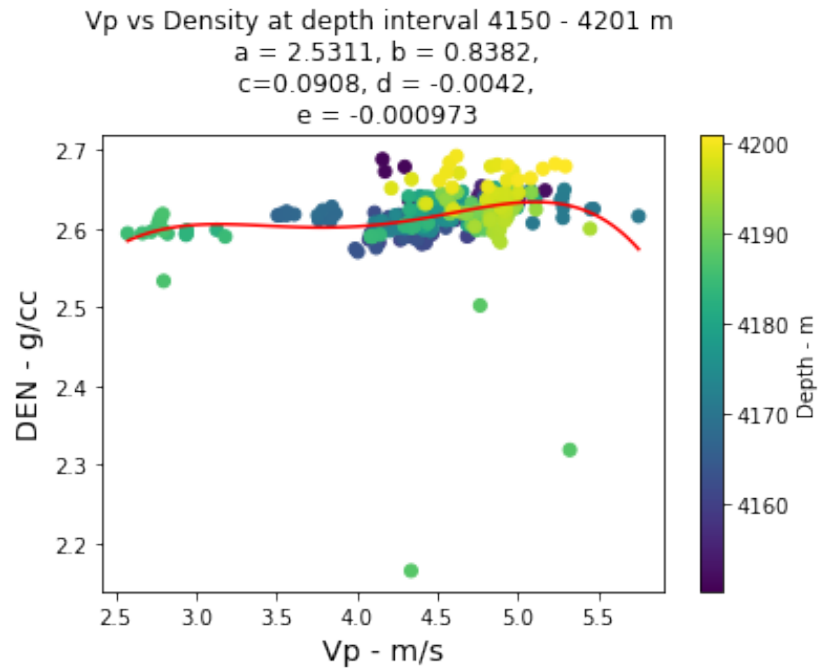


Fig. B.12: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 4150 – 4201 m with estimated coefficients (ML outlier removal)

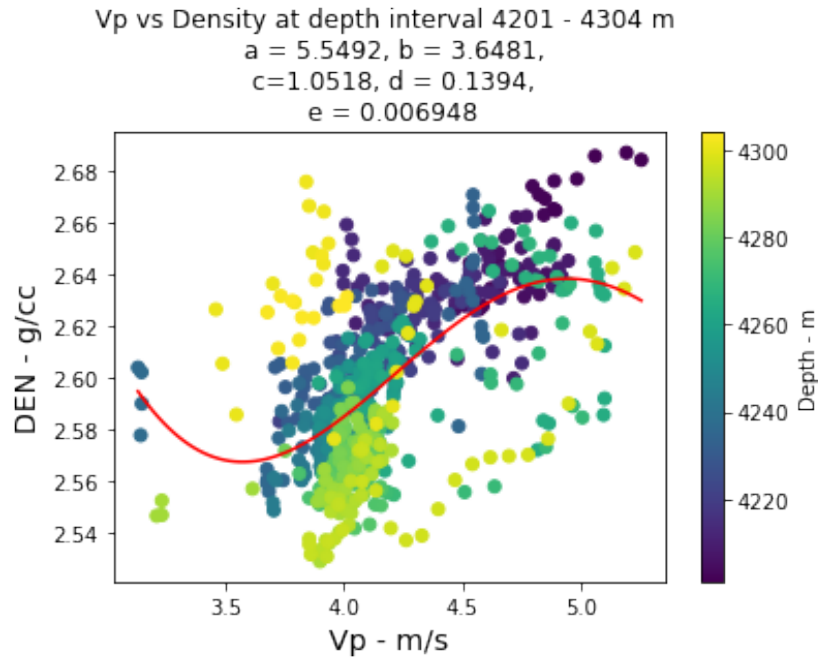


Fig. B.13: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 4201 – 4304 m with estimated coefficients (ML outlier removal)

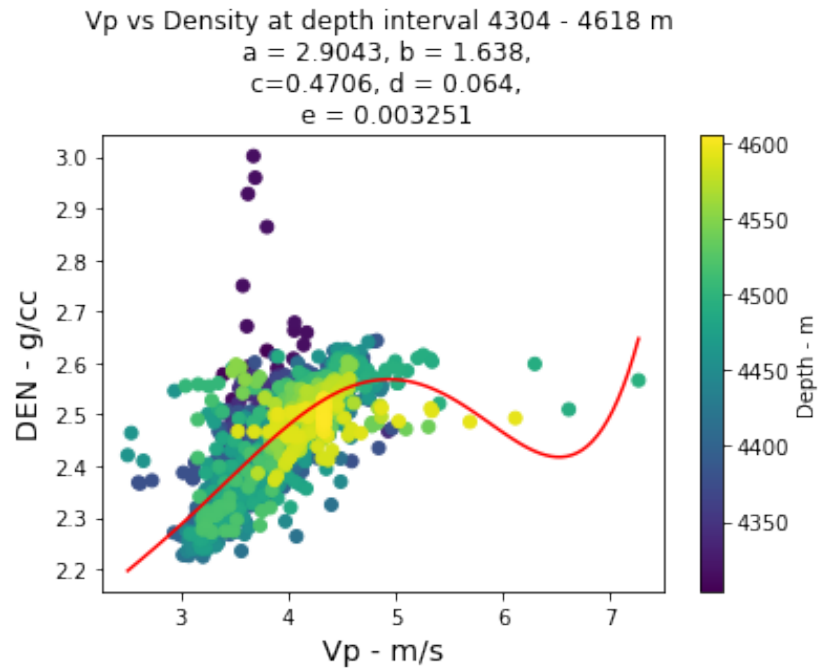


Fig. B.14: Density - velocity cross plot with Brocher curve fit (red) for depth interval of 4304 – 4618 m with estimated coefficients (ML outlier removal)

ANNEX C – METHOD SELECTION FOR ML OUTLIER REMOVAL ONLY

The synthetic curves obtained for the entire depth interval are plotted against real density values in normal and smoothed states and demonstrated in Fig. C.1 – C.2 altogether with confidence intervals and corresponding mismatch analyses.

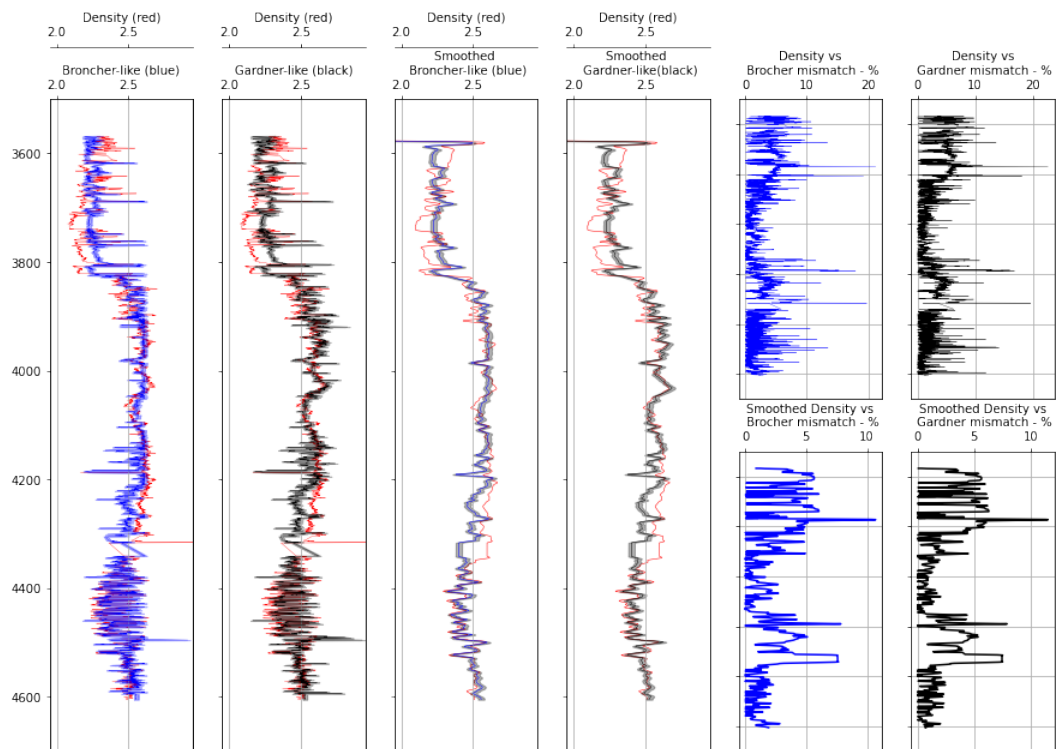


Fig. C.1: Synthetic and smoothed curves fitting and mismatch analysis for the entire depth after ML outlier removal

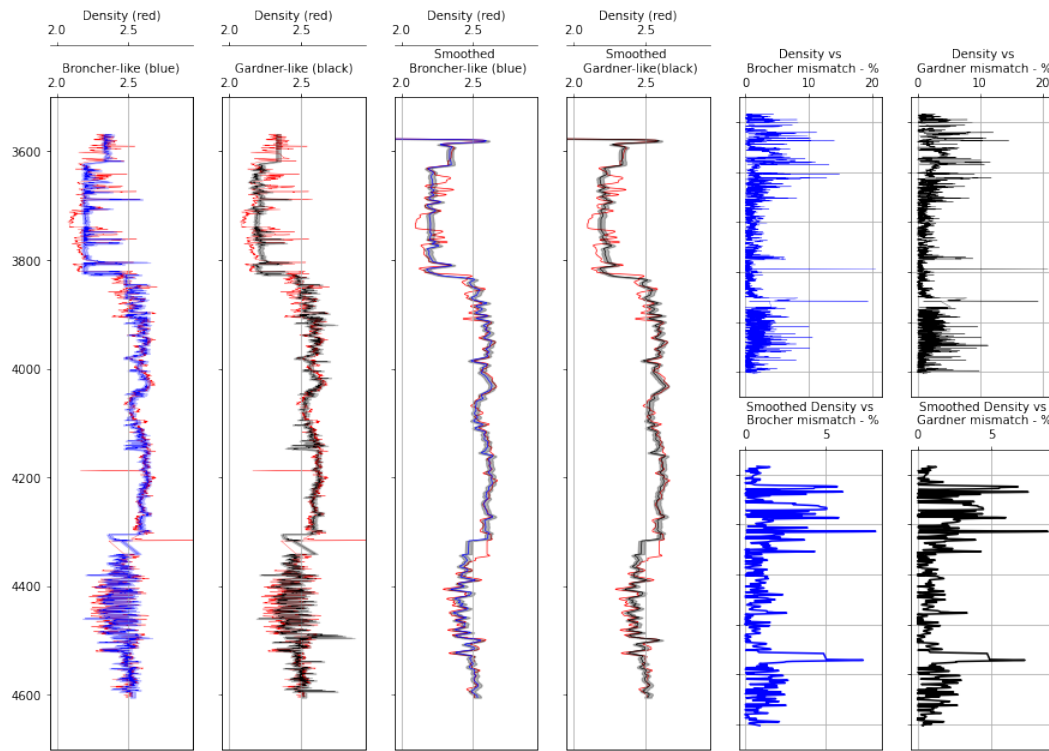


Fig. C.2: Synthetic and smoothed curves fitting and mismatch analysis for the entire depth after ML outlier removal

ANNEX D – 2D DENSITY SLICES

Brocher-like and Gardner-like models after ML outlier identification and model parameterization applied to the whole data set are demonstrated altogether with density differences in Fig. D.1 – D.6.

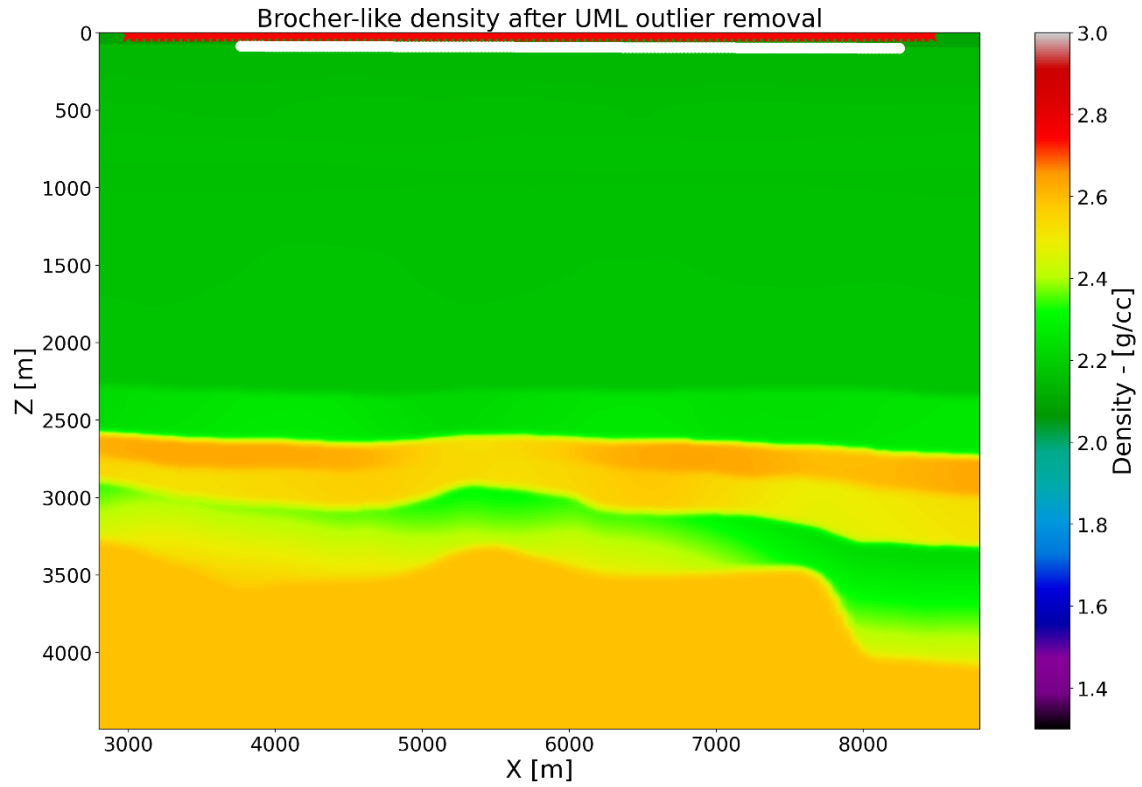


Fig. D.1: Brocher-like 2D density slice №1 (real model/ML outlier removal)

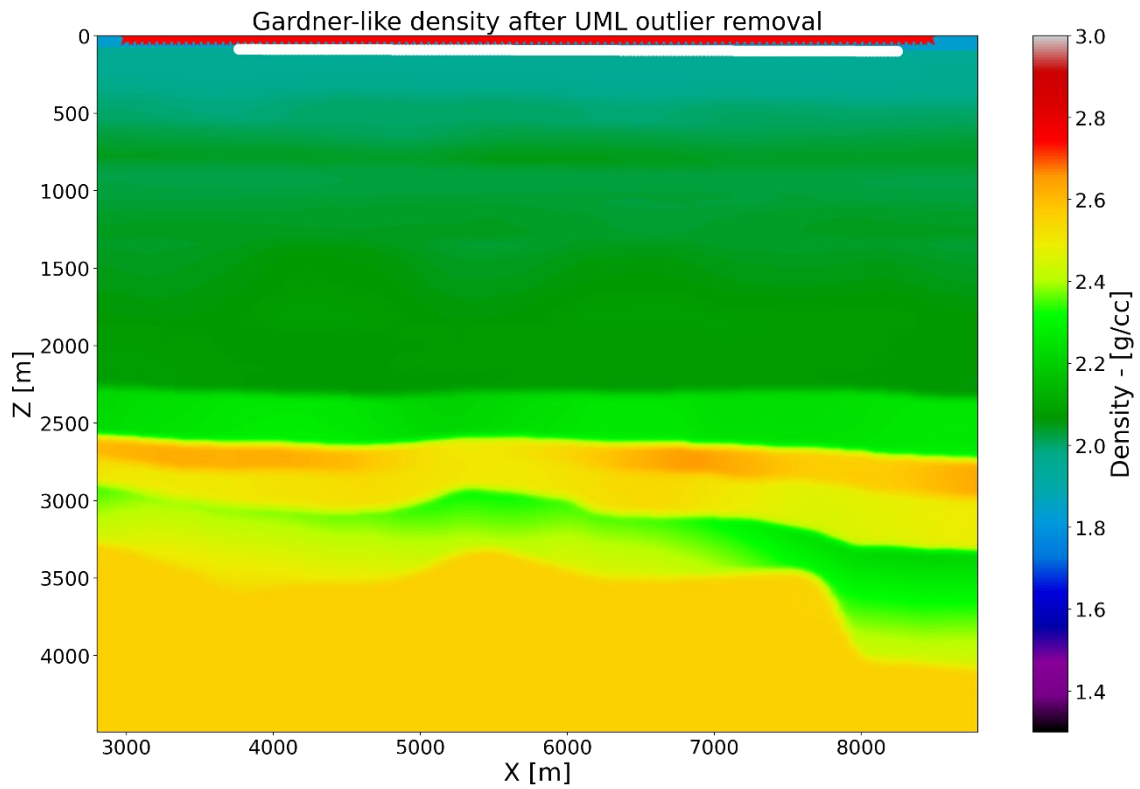


Fig. D.2: Gardner-like 2D density slice №1 (real model/ML outlier removal)

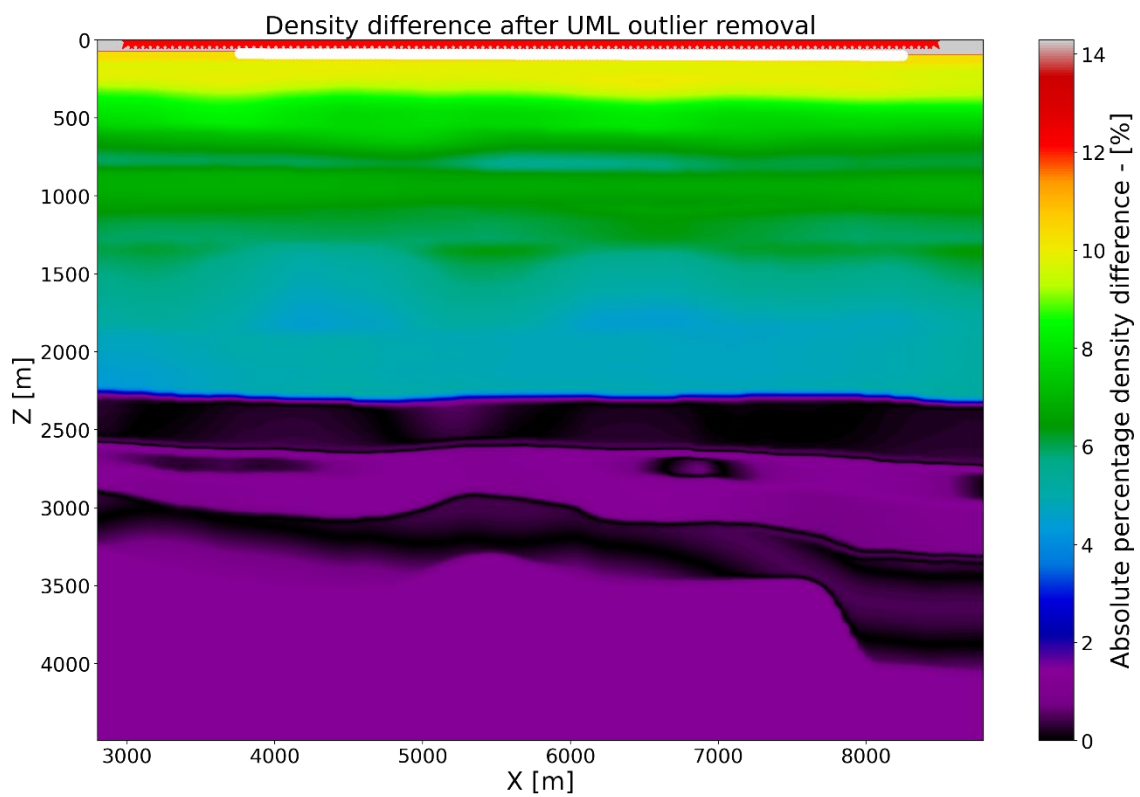


Fig. D.3: Absolute density difference (real model/ML outlier removal)

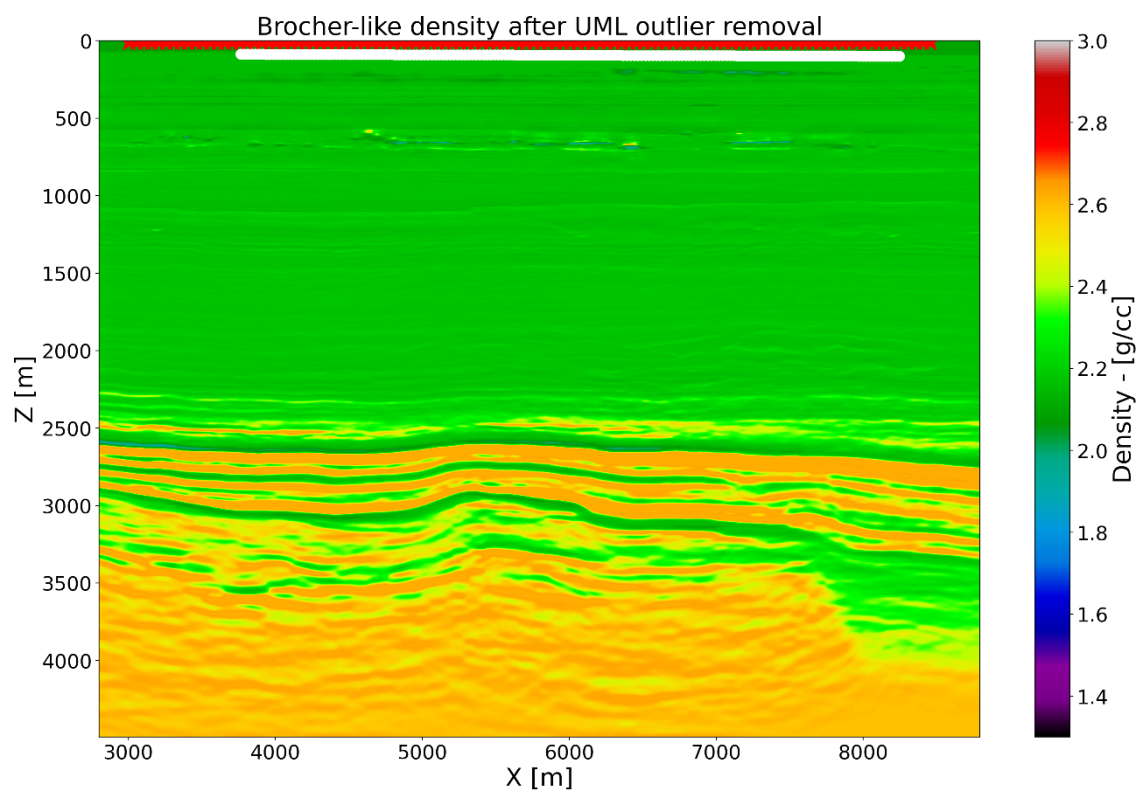


Fig. D.4: Brocher-like 2D density slice №1 (sharp model/ML outlier removal)

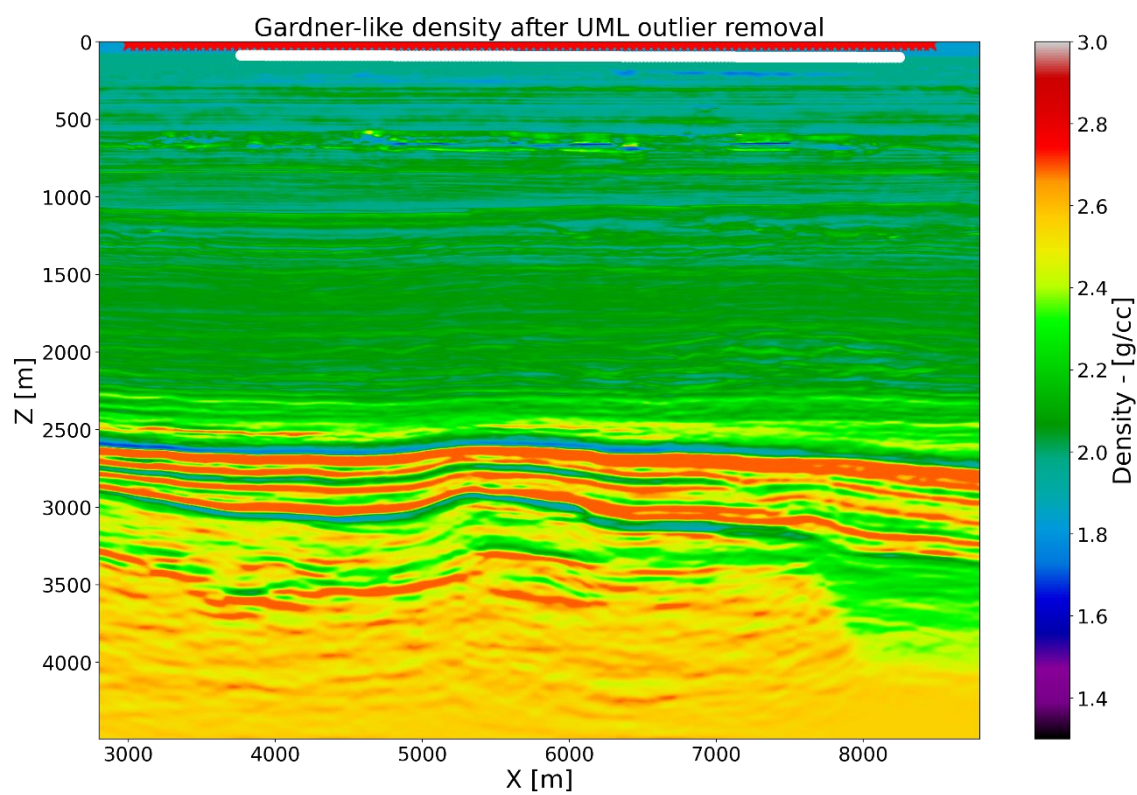


Fig. D.5: Gardner-like 2D density slice №1 (sharp model/ML outlier removal)

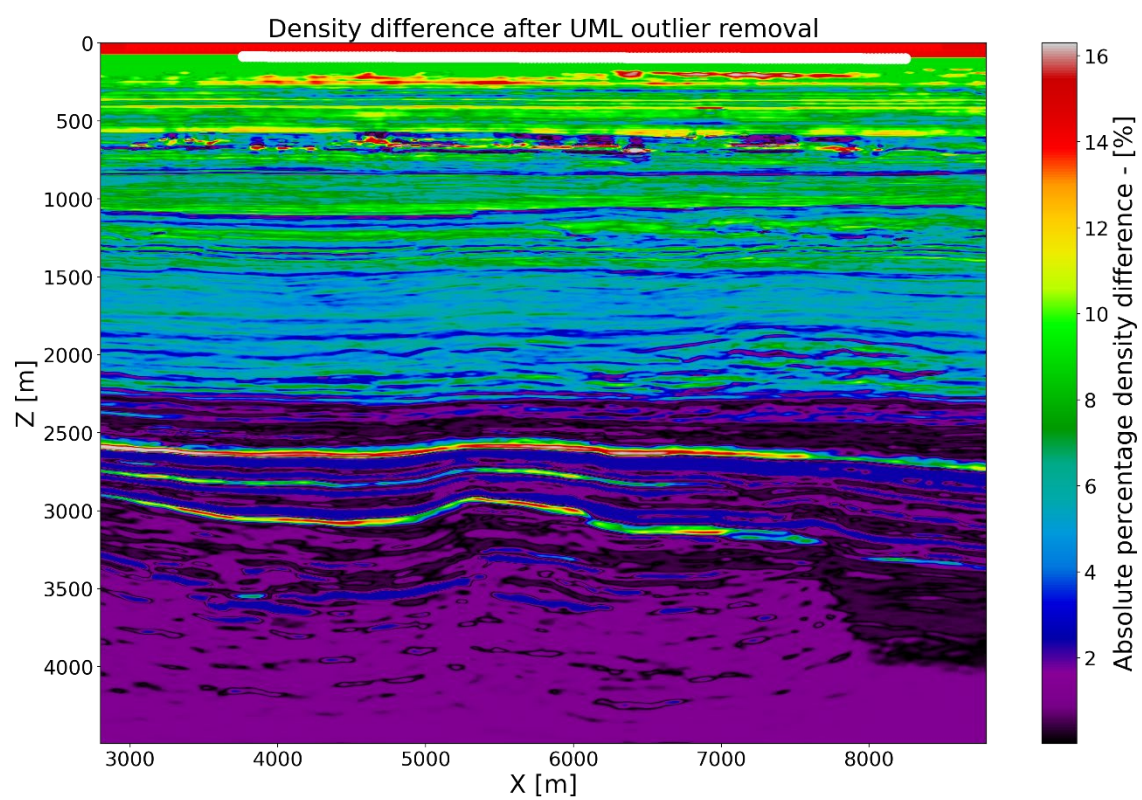


Fig. D.6: Absolute density difference (sharp model/ML outlier removal)