Capturing interpretational uncertainty of depositional environments with Artificial Intelligence

Thesis Appendix

Athanasios Nathanail

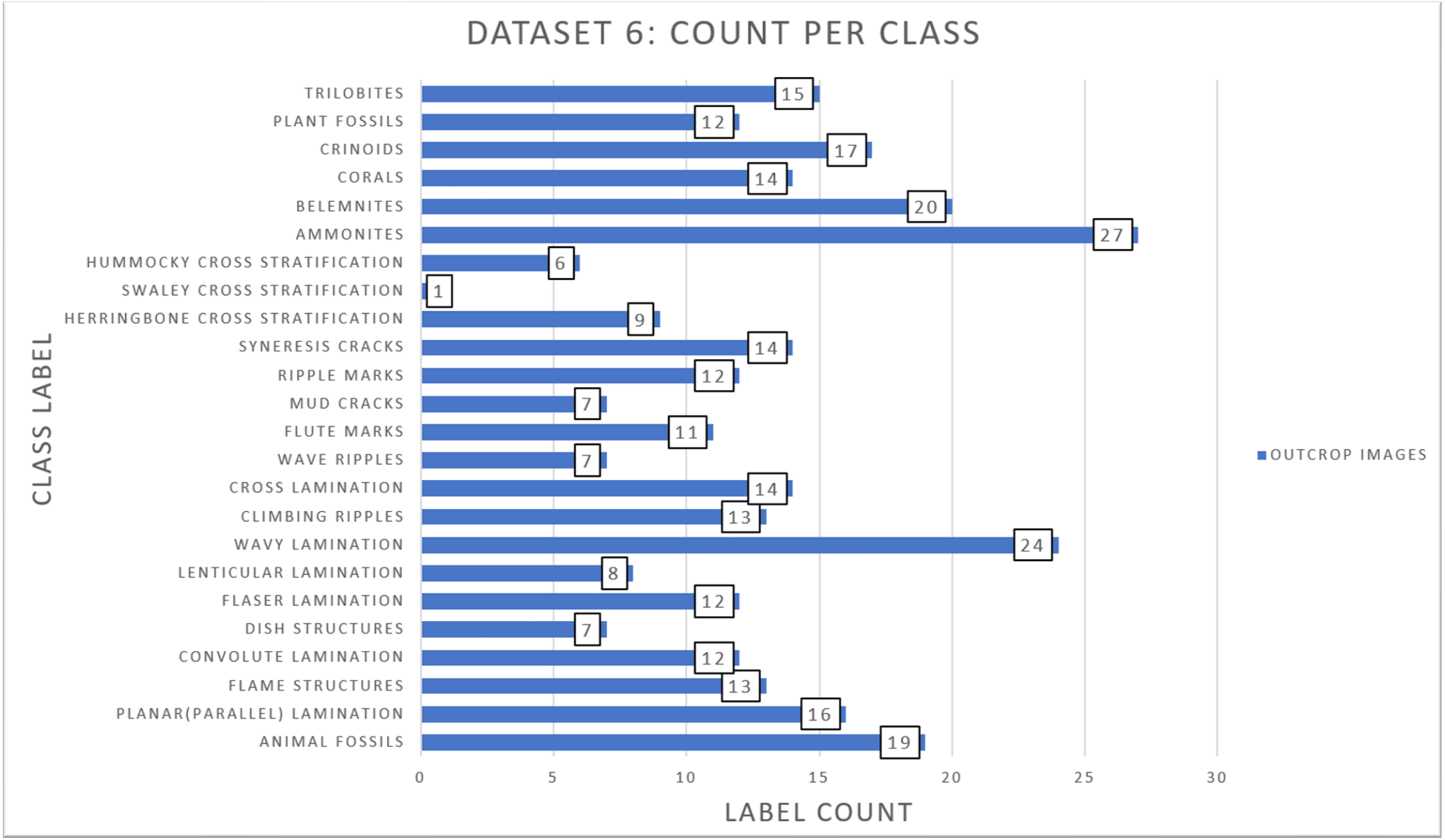


Figure 4-12: Dataset 6 Class labels vs. the label count. The figure shows the number of occurrences of each class in the dataset.

Dataset 7 (Blended Dataset: Outcrop Images + Sketches)					Outcrop Images			Sketches		
Classes	**Number of Images**	**Train**	**Validation**	**Test**	**Train**	**Validation**	**Test**	**Train**	**Validation**	**Test**
Animal Fossils	35	26	6	3	18	4	3	8	2	0
Planar(Parallel) Lamination	34	24	6	4	15	4	4	9	2	0
Flame Structures	29	21	6	2	12	4	2	9	2	0
Convolute Lamination	24	17	5	2	9	3	2	8	2	0
Dish Structures	20	13	5	2	6	3	2	7	2	0
Flaser Lamination	30	22	6	2	11	3	2	11	3	0
Lenticular Lamination	23	17	4	2	10	2	2	7	2	0
Wavy Lamination	37	23	9	5	12	6	5	11	3	0
Climbing Ripples	26	19	5	2	12	3	2	7	2	0
Cross Lamination	32	23	6	3	13	3	3	10	3	0
Wave Ripples	16	11	3	2	6	2	2	5	1	0
Flute Marks	28	19	6	3	11	3	3	8	3	0
Mud Cracks	19	14	4	1	8	2	1	6	2	0
Ripple Marks	31	23	6	2	12	3	2	11	3	0
Syneresis Cracks	27	20	5	2	12	3	2	8	2	0
Herringbone Cross Stratification	20	15	3	2	9	3	2	6	0	0
Swaley Cross Stratification	2	1	0	1	1	0	1	0	0	0
Hummocky Cross Stratification	17	12	4	1	3	2	1	9	2	0
Ammonites	49	33	12	4	23	9	4	10	3	0
Belemnites	36	27	7	2	19	4	2	8	3	0
Corals	27	20	5	2	15	3	2	5	2	0
Crinoids	32	23	6	3	16	4	3	7	2	0
Plant Fossils	25	17	6	2	11	4	2	6	2	0
Trilobites	33	25	6	2	15	4	2	10	2	0
Total number of images	**652**	**465**	**131**	**56**	**279**	**81**	**56**	**186**	**50**	**0**
Data Split, %	**100**	**71**	**20**	**9**	**60.0**	**61.8**	**100.0**	**40.0**	**38.2**	**0.0**

- Classes Labels
- Number of Images per Class
- Overall Image Split
- Outcrop Proportions
- Sketch Proportions

Table 4-11: Detailed breakdown of Dataset 7.

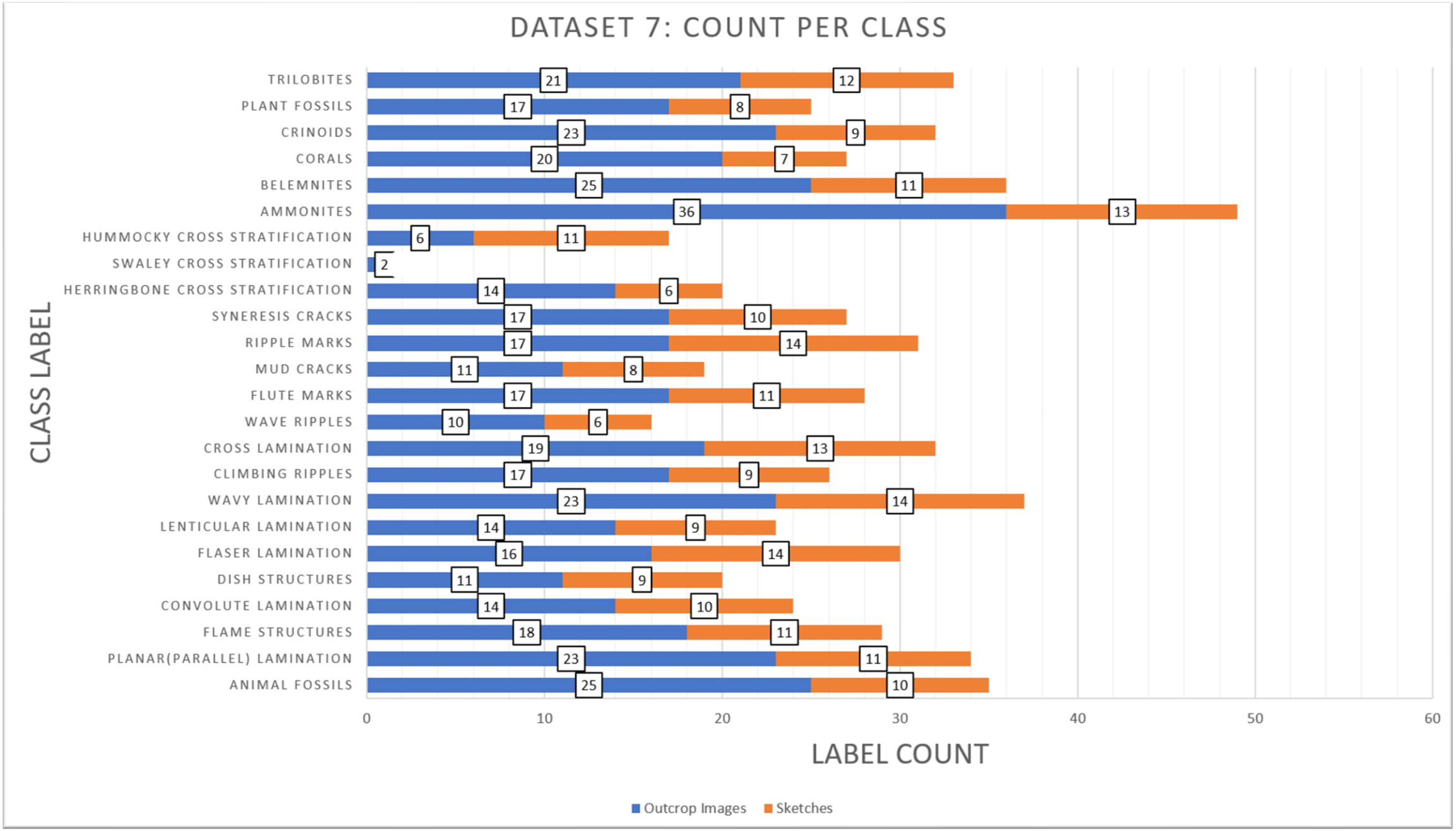


Figure 4-13: Dataset 7 Class labels vs. the label count. The figure shows the number of occurrences of each class in the dataset.

Dataset 8			
Object Detection Yolov6 Labels for Sedimentary Structures	**Label Count in Training and Validation set**	**Label Count in Training set**	**Label Count in Validation set**
Bioturbation	25	18	8
Clasts	32	22	10
Convoluted/Irregular Bedding	2	1	1
Cross Bedding/Stratification	25	18	8
Cross Lamination/Climbing Ripples	13	9	4
Desiccation Cracks	5	4	2
Erosive Features	24	17	7
Fault	7	5	2
Flame Structures	3	2	1
Flaser Lamination	2	1	1
Fossils	4	3	1
Herringbone Cross Stratification	7	5	2
Hummocky Cross Stratification	6	4	2
Lenses	13	9	4
Lenticular Bedding	5	4	2
Lenticular Lamination	4	3	1
Planar/Parallel Bedding	26	18	8
Planar/Parallel Lamination	15	11	5
Structureless	24	17	7
Swaley Cross Stratification	2	1	1
Syneresis Cracks	2	1	1
Wave Ripples/Lamination	5	4	2
Wavy Bedding	2	1	1
Total Number of Labels	**253**	**177**	**76**
Percentage of labels, %	**100**	**70**	**30**

- Classes
- Number of Labels
- Label Split
- Image Split

Dataset 8 (Outcrop Images)		
Total Number of Images	**138**	100%
Training set Images	**97**	70%
Validation set Images	**41**	30%

Table 4-12: Detailed breakdown of Dataset 8.

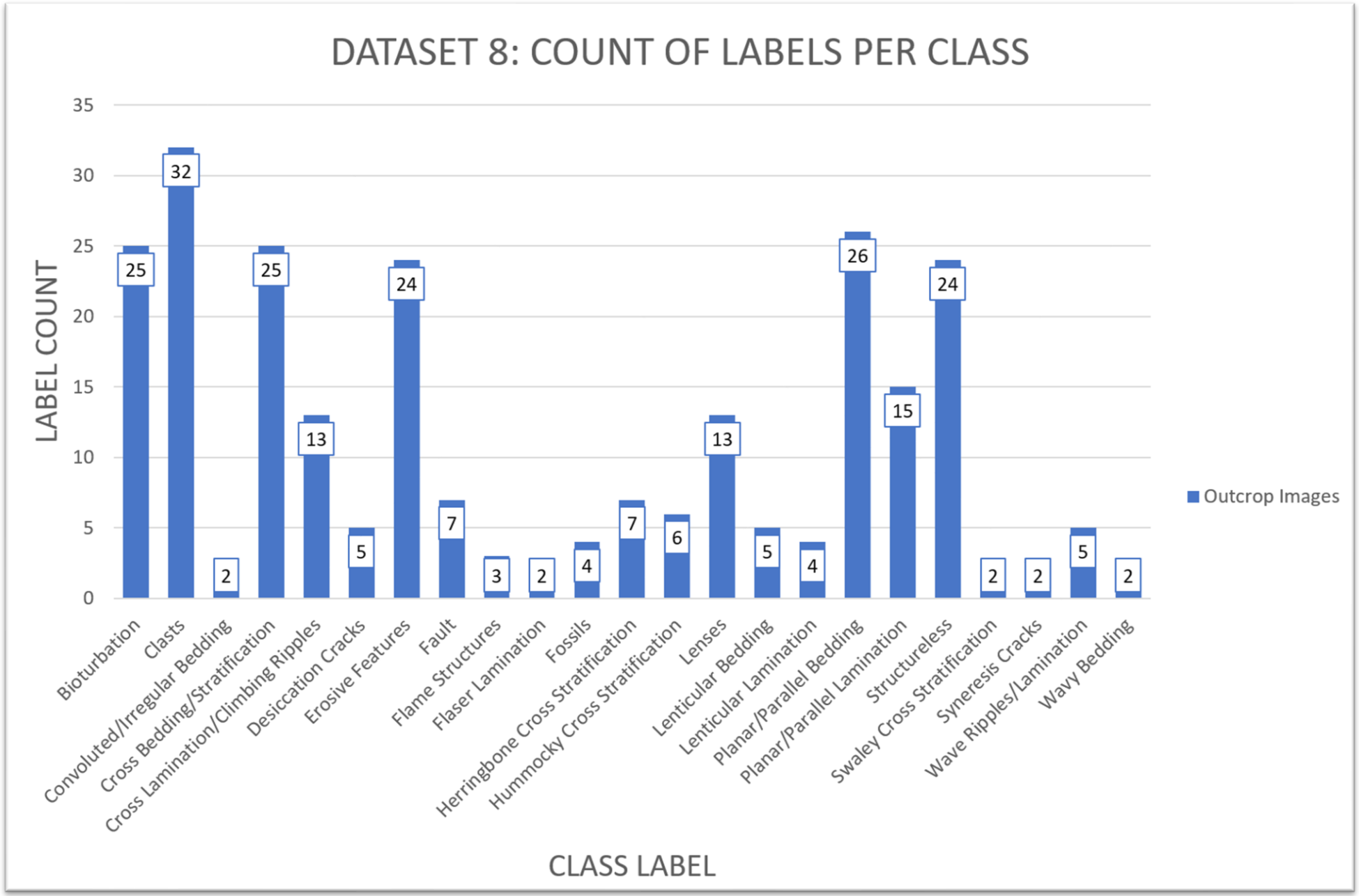


Figure 4-14: Count of labels per class for Dataset 8.

Dataset 10B (Outcrop Images)			
Instance Segmentation Yolact Labels for Sedimentary Structures	**Label Count in Training and Validation set**	**Label Count in Training set**	**Label Count in Validation set**
Bioturbation	48	34	14
Clasts	52	36	16
Convoluted/Irregular Lamination	2	1	1
Convoluted/Irregular Bedding	2	1	1
Cross Bedding/Stratification	39	27	12
Cross Lamination/Climbing Ripples	22	15	7
Dessication Cracks	6	4	2
Erosive Contacts/Bases	76	53	23
Erosive Features	31	22	9
Faults	16	11	5
Flame Structures	6	4	2
Flaser Lamination	3	2	1
Flute Marks	42	29	13
Fossils	12	8	4
Herringbone Cross Stratification	9	6	3
Hummocky Cross Stratification	10	7	3
Lenticular Bedding	8	6	2
Lenticular Lamination	6	4	2
Planar/Parallel Bedding	46	32	14
Planar/Parallel Lamination	29	20	9
Scour Marks	6	4	2
Structureless	56	39	17
Swaley Cross Stratification	4	3	1
Syneresis Cracks	2	1	1
Wave Ripples/Lamination	6	4	2
Wavy Bedding	6	4	2
Total Number	**545**	**382**	**164**
Percentage of labels	**100**	**70**	**30**

Classes
Number of Labels
Label Split
Image Split

Dataset 10B (Outcrop Images)		
Total Number of Images	**70**	100%
Training set Images	**49**	70%
Validation set Images	**21**	30%

Table 4-16: Detailed breakdown of dataset 10B.

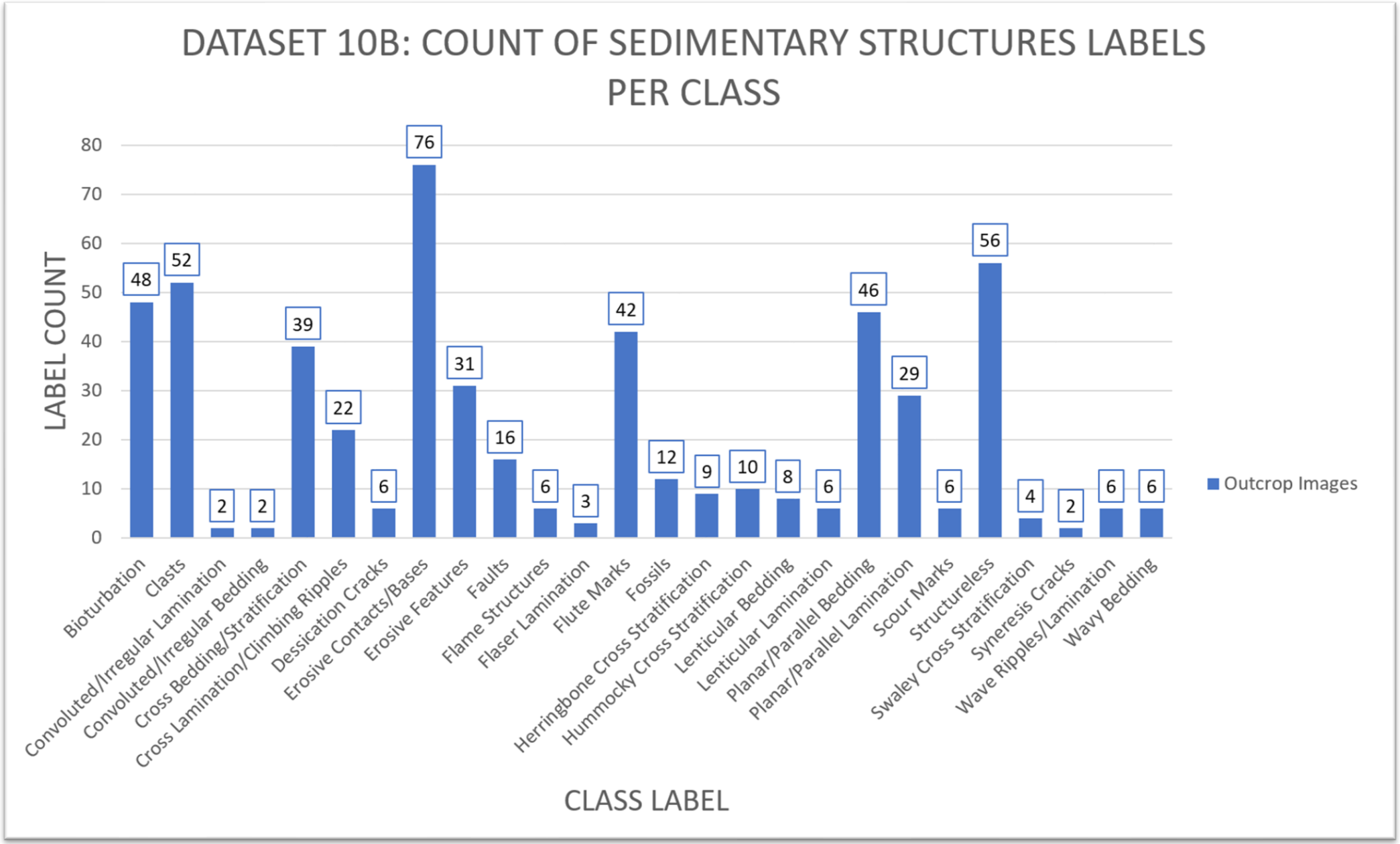


Figure 4-18: Count of labels per class for dataset 10B.

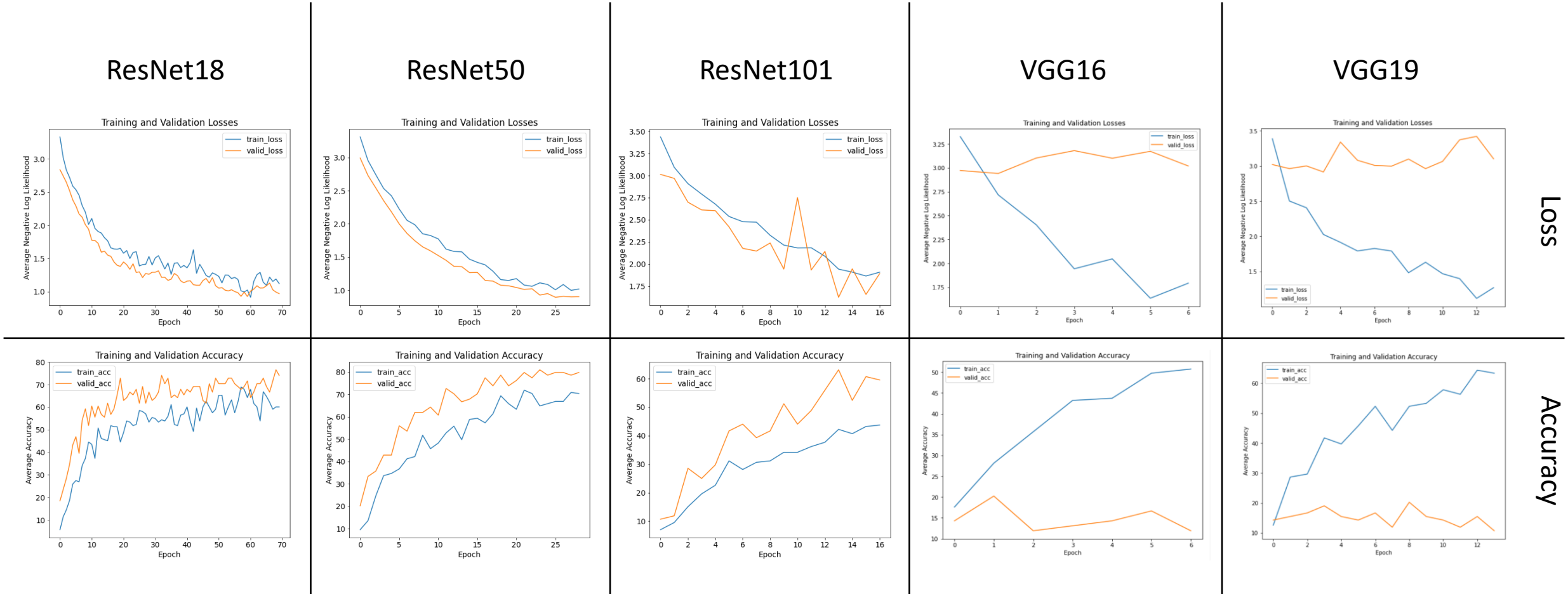


Figure 5-14: Loss and Accuracy versus the number of epochs for each model.

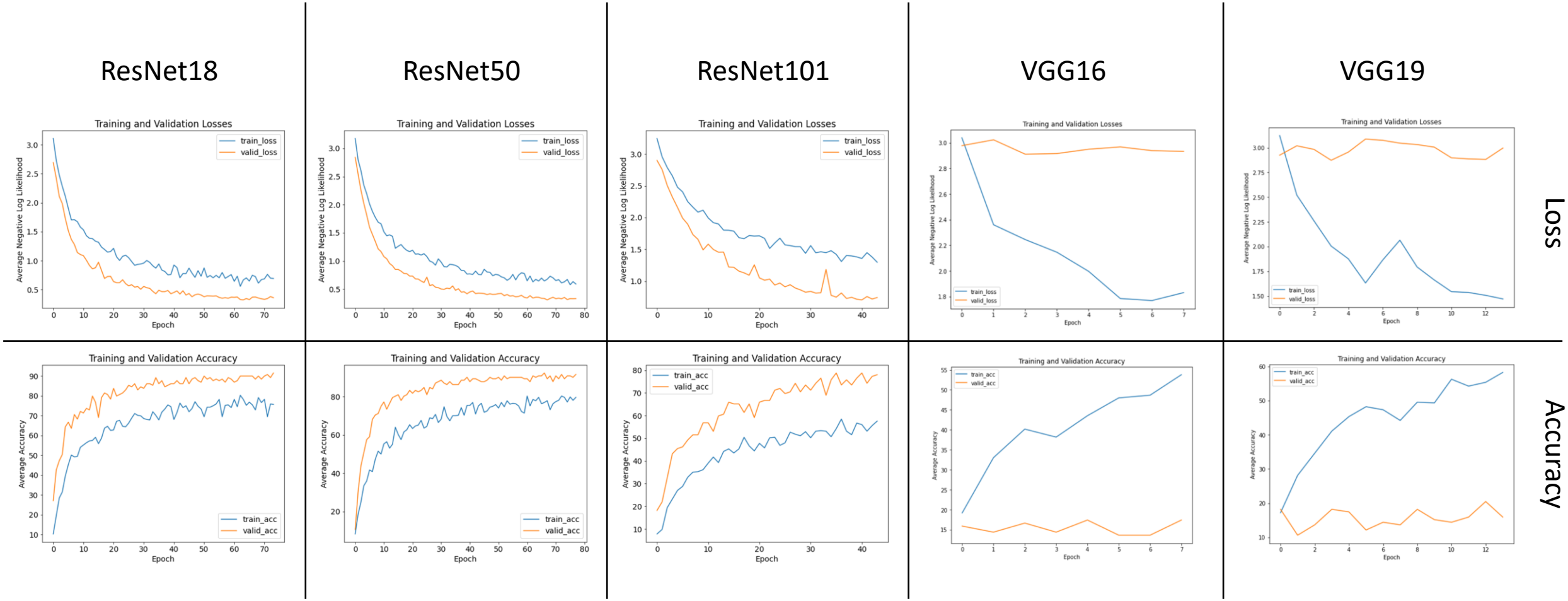


Figure 5-24: Accuracy and Loss versus the number of epochs for each model.

Object Detection Yolov6 for Sedimentary Structures on Outcrop Data				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class, %
Bioturbation	25	59	0	0
Clasts	32	47	7	15
Convoluted/Irregular Bedding	2	4	0	0
Cross Bedding/Stratification	25	41	14	34
Cross Lamination/Climbing Ripples	13	14	3	21
Desiccation Cracks	5	6	0	0
Erosive Features	24	17	1	6
Fault	7	9	0	0
Flame Structures	3	2	0	0
Flaser Lamination	2	0	0	0
Fossils	4	27	1	4
Herringbone Cross Stratification	7	15	11	73
Hummocky Cross Stratification	6	4	1	25
Lenses	13	12	0	0
Lenticular Bedding	5	6	0	0
Lenticular Lamination	4	3	0	0
Planar/Parallel Bedding	26	39	1	3
Planar/Parallel Lamination	15	25	4	16
Structureless	24	34	1	3
Swaley Cross Stratification	2	2	1	50
Syneresis Cracks	2	2	1	50
Wave Ripples/Lamination	5	7	0	0
Wavy Bedding	2	5	0	0
Total	253	380	46	
Total Percentage of misclassifications for Test set, %				12

Table 6-5: Quantitative Results of YOLOv6-S on Outcrop Images (Dataset 8).

Object Detection Yolov6 for Fossils				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class, %
Ammonite	52	40	2	5
Animal Fossil	17	11	4	36
Belemnite	43	31	0	0
Coral	25	11	2	18
Crinoid	63	7	2	29
Plant Fossil	27	12	0	0
Trilobite	21	11	0	0
Total	248	123	10	
Total Percentage of misclassifications for Test set, %				8

Table 6-9: Quantitative Results of YOLOv6-S on Fossil Images (Dataset 11).

Object Detection Yolov6 for Sedimentary Structures on Core Data				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class, %
Bioturbation	25	5	5	100
Clasts	32	20	0	0
Convoluted/Irregular Bedding	2	0	0	0
Cross Bedding/Stratification	25	57	14	25
Cross Lamination/Climbing Ripples	13	6	0	0
Desiccation Cracks	5	0	0	0
Erosive Features	24	28	1	4
Fault	7	0	0	0
Flame Structures	3	0	0	0
Flaser Lamination	2	0	0	0
Fossils	4	0	0	0
Herringbone Cross Stratification	7	4	4	100
Hummocky Cross Stratification	6	1	1	100
Lenses	13	0	0	0
Lenticular Bedding	5	3	0	0
Lenticular Lamination	4	5	1	20
Planar/Parallel Bedding	26	10	1	10
Planar/Parallel Lamination	15	14	4	29
Structureless	24	12	4	33
Swaley Cross Stratification	2	0	0	0
Syneresis Cracks	2	0	0	0
Wave Ripples/Lamination	5	0	0	0
Wavy Bedding	2	3	1	33
Total	253	168	36	
Total Percentage of misclassifications for Test set, %				21

Table 6-10: Quantitative Results for the Detection of Sedimentary Structures on Core Images.

Experiments	Objective	Key Findings	Training Dataset/Data Type	Test Data Type	Backbone	Hyperparameter Setup
Experiment 1	Assess the suitability of YOLACT (DarkNet53) for outcrop geology segmentation	YOLACT is a suitable model for this task, but it often misclassifies image features and generates masks with significant overlap	Dataset 9 / Outcrop Images	Outcrop Images	DarkNet53	Table 7.
Experiment 2	Refine and improve segmentation outputs by modifying the YOLACT model	1)Using a shallower version of the Darknet53 backbone (cDarkNet53) improved the model's predictions. 2) Training the model separately on datasets 10a (for lithology) and 10b (for sedimentary structures) yields more interpretable results. 3)Higher dataset variability leads to better and more generalized results on unseen data.	Dataset 10a, 10b / Outcrop Images	Outcrop Images/Video	cDarkNet53	Table 7.
Experiment 3	Conduct a comparative study between YOLACT models with different backbones (cDarkNet53 and ResNet101)	YOLACT (ResNet101) offered slightly better accuracy and mask fit, while YOLACT (cDarkNet53) provided real-time predictions, faster inference, and FPS performance.	Dataset 10a, 10b / Outcrop Images	Outcrop Images	cDarkNet53, ResNet101	Table 7.
Experiment 4	Test the trained YOLACT (cDarkNet53) model on core images to assess its generalization ability	The YOLACT (cDarkNet53) model generalized well on core images without using any core images in training. The Instance Segmentation model demonstrated adaptability and good performance on diverse geological datasets.	-	Core Images/Video	cDarkNet53	

Table 7-2: Objective, key findings, training dataset/data type, test data type, backbone, and hyperparameter for each experiment.

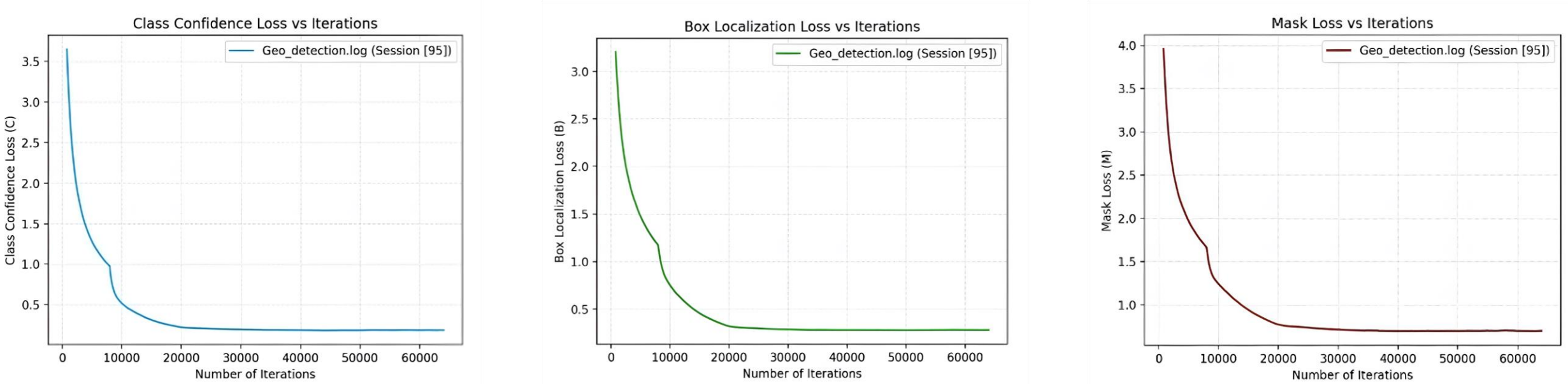


Figure 7-9: Overall Loss scores of classes confidence, masks, and bounding boxes on validation data versus the number of iterations/epochs.

Instance Segmentation Yolact for Lithology & Sedimentary Structures on Partially Seen Data				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class
Planar_Bedding	13	22	2	9
Planar_Lamination	6	9	2	22
Cross_Bedding	5	7	3	43
Cross_Lamination	5	4	1	25
Interbedded_Sands	33	29	4	14
Erosive_Feature	34	25	5	20
Cemented_Sands__Eroded_Sands	10	18	7	39
Mudstones	79	52	4	8
Medium_to_Fine_Sandstone	1	6	2	33
Coarse_to_Medium_Sandstone	5	4	1	25
Conglomerate	50	33	4	12
Siltstone	3	3	0	0
Uncomformity	12	9	6	67
Rip_up_clasts_Silty_sands	12	5	1	20
Sandstone	103	78	5	6
Total	**371**	**304**	**47**	
Total Percentage of misclassifications for Test set, %				15.5

Table 7-4: Quantitative Results of the default YOLACT model on partially seen outcrop images.

Instance Segmentation Yolact for Lithology & Sedimentary Structures on Unknown				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class
Planar_Bedding	13	10	4	40
Planar_Lamination	6	2	2	100
Cross_Bedding	5	4	0	0
Cross_Lamination	5	0	0	0
Interbedded_Sands	33	0	0	0
Erosive_Feature	34	0	0	0
Cemented_Sands__Eroded_Sands	10	10	9	90
Mudstones	79	0	0	0
Medium_to_Fine_Sandstone	1	0	0	0
Coarse_to_Medium_Sandstone	5	0	0	0
Conglomerate	50	0	0	0
Siltstone	3	0	0	0
Uncomformity	12	0	0	0
Rip_up_clasts_Silty_sands	12	3	2	67
Sandstone	103	0	0	0
Total	**371**	**29**	**17**	
Total Percentage of misclassifications for Test set, %				58.6

Table 7-5: Quantitative Results of the default YOLACT model on unknown outcrop images.

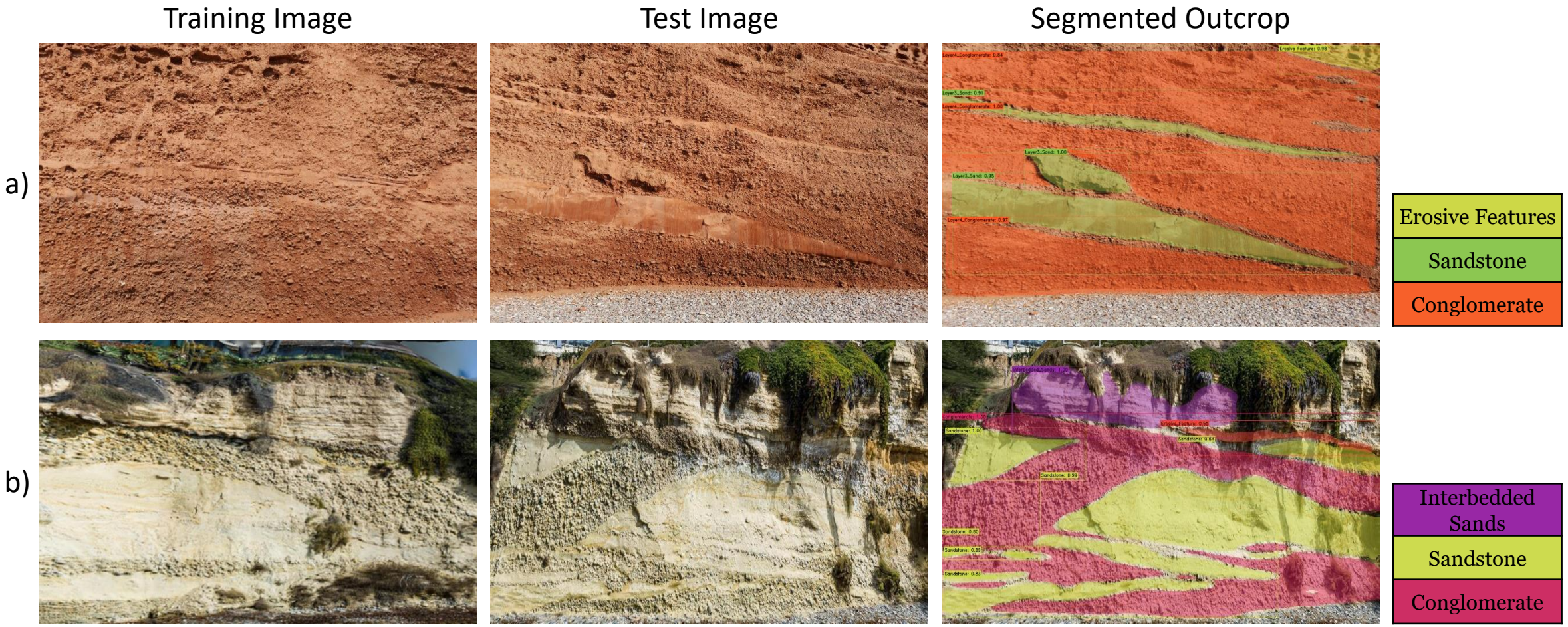


Figure 7-11: a) Instance Segmentation predictions, including a mask, bounding box, label, and the associated probability of the prediction on an Aeolian/Fluvial depositional environment. b) Instance Segmentation predictions, including a mask, bounding box, label, and the associated probability of the prediction on a Deep Marine depositional environment.

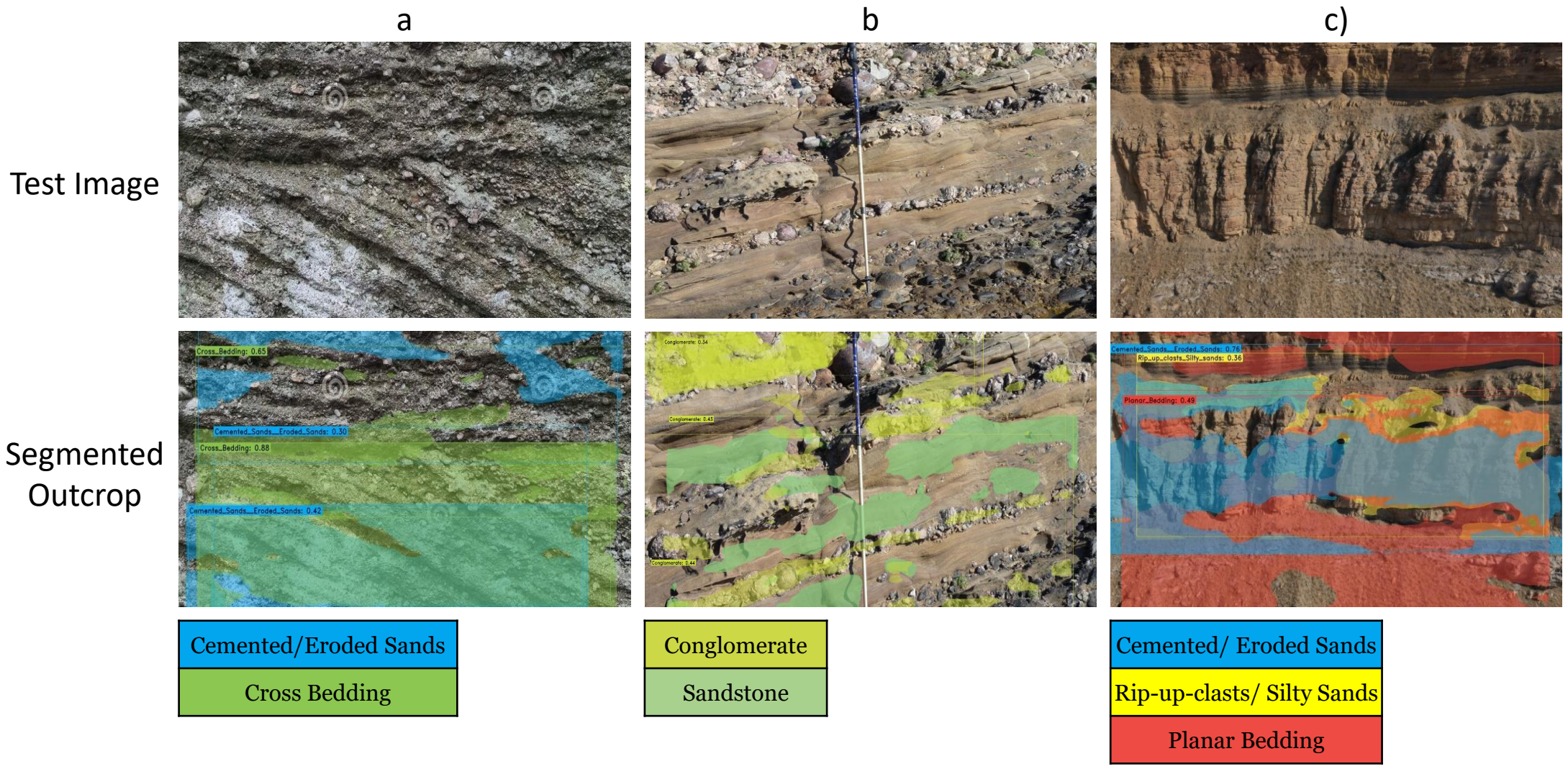


Figure 7-12: Instance Segmentation on unseen data demonstrating the model's performance getting worse as the test pictures are getting progressively different from the train set (from a to c).

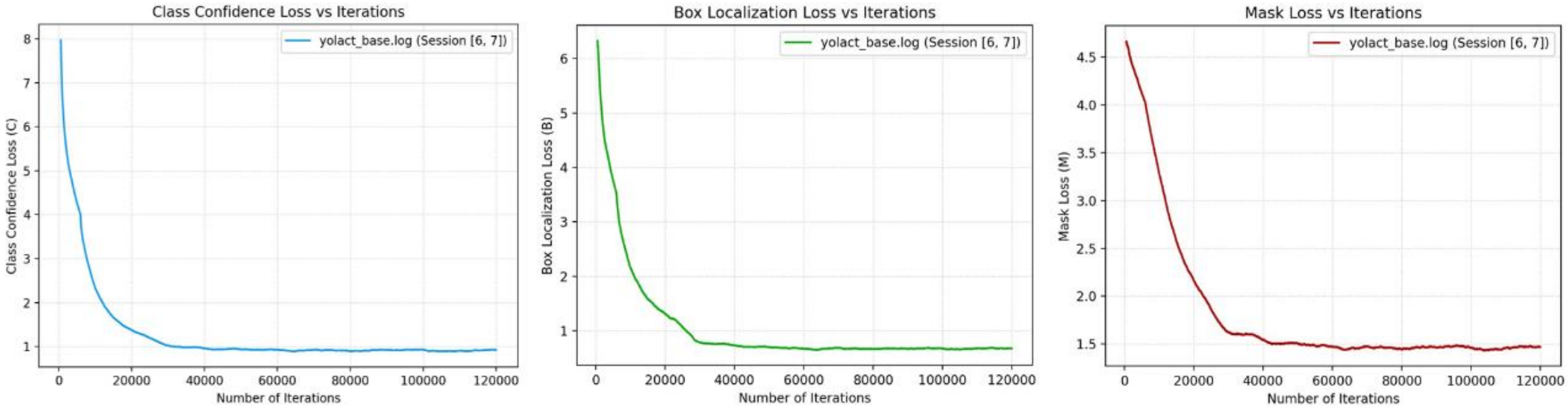


Figure 7-15: Overall Loss scores of classes confidence, masks, and bounding boxes on validation data versus the number of iterations/epochs.

Instance Segmentation Yolact for Lithology (cDarkNet53)				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class
Amalgamated/Cemented Bed	1	0	0	0
Breccia	5	5	0	0
Carbonates	7	6	0	0
Conglomerate	29	20	0	0
Interbedded mudstone-siltstone	27	20	1	5
Interbedded sandstone-mudstone	6	4	0	0
Interbedded sandstone-siltstone	21	21	1	5
Iron Rich Sediment	7	5	2	40
Mudstone	53	43	2	5
Organic Material	37	30	1	3
Red (Sandstone) Beds	21	21	0	0
Sandstone	79	71	1	1
Siltstone	28	23	1	4
Total	**321**	**269**	**9**	
Total Percentage of misclassifications for Test set, %				**3.35**

Table 7-7: Quantitative Results of the YOLACT (cDarkNet53) model. The model was trained on dataset 10a and tested on outcrop images to segment the various lithology types present.

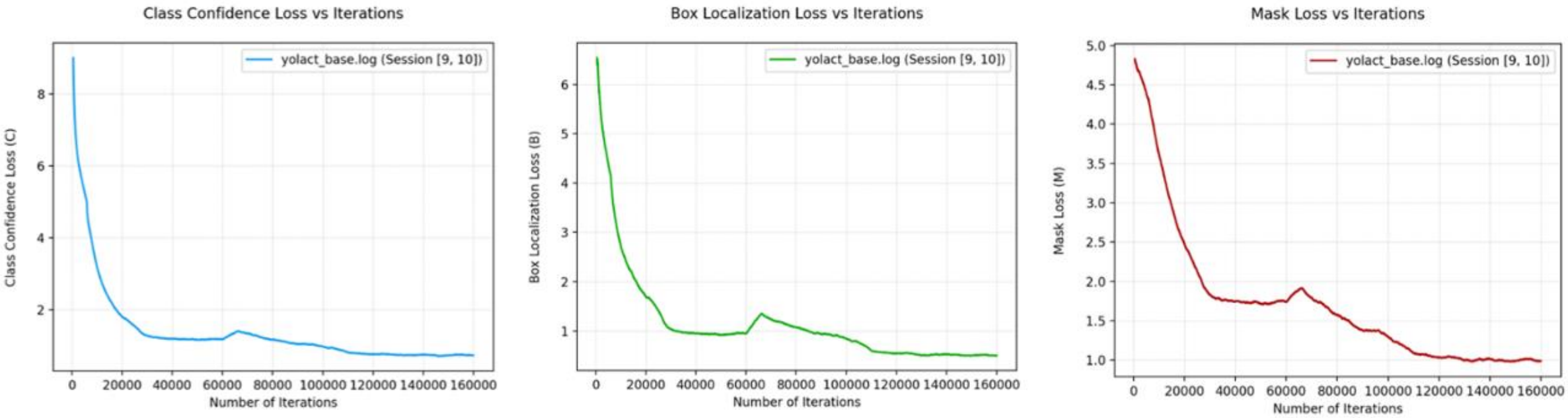


Figure 7-19: Overall Loss scores of classes confidence, masks, and bounding boxes on validation data versus the number of iterations/epochs.

Instance Segmentation Yolact for Sedimentary Structures (cDarkNet53)				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class, %
Bioturbation	48	32	0	0
Clasts	52	17	0	0
Convoluted/Irregular Lamination	2	1	0	0
Convoluted/Irregular Bedding	2	2	0	0
Cross Bedding/Stratification	39	34	8	24
Cross Lamination/Climbing Ripples	22	13	1	8
Dessication Cracks	5	4	0	0
Erosive Contacts/Bases	75	26	0	0
Erosive Features	31	10	1	10
Faults	16	7	0	0
Flame Structures	6	3	0	0
Flaser Lamination	3	2	2	100
Flute Marks	42	0	0	0
Fossils	12	12	0	0
Herringbone Cross Stratification	9	3	2	67
Hummocky Cross Stratification	10	2	0	0
Lenticular Bedding	8	4	0	0
Lenticular Lamination	5	3	0	0
Planar/Parallel Bedding	45	20	1	5
Planar/Parallel Lamination	29	18	2	11
Scour Marks	6	3	1	33
Structureless	56	33	1	3
Swaley Cross Stratification	4	1	0	0
Syneresis Cracks	2	4	3	75
Wave Ripples/Lamination	6	6	1	17
Wavy Bedding	5	3	0	0
Total	**540**	**263**	**23**	
Total Percentage of misclassifications for Test set, %				8.75

Table 7-9: Quantitative Results of the YOLACT (cDarkNet53) model. The model was trained on dataset 10b and tested on outcrop images to segment the various sedimentary structures present.

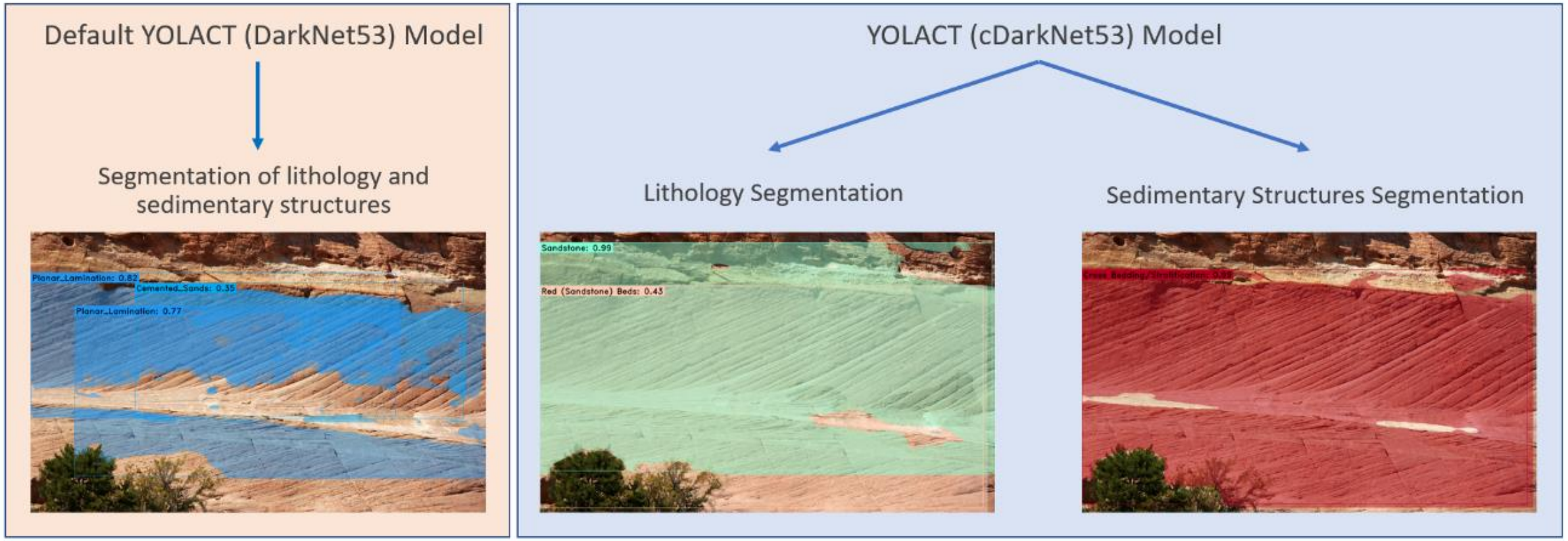


Figure 7-22: A comparison of the Default YOLACT (DarkNet53) Model vs. the YOLACT (cDarkNet53) on an unseen image.

Instance Segmentation Yolact for Lithology (ResNet101)				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class
Amalgamated/Cemented Bed	1	0	0	0
Breccia	5	5	0	0
Carbonates	7	8	0	0
Conglomerate	29	20	0	0
Interbedded mudstone-siltstone	27	31	2	6
Interbedded sandstone-mudstone	6	6	0	0
Interbedded sandstone-siltstone	21	27	2	7
Iron Rich Sediment	7	5	1	20
Mudstone	53	54	5	9
Organic Material	37	52	1	2
Red (Sandstone) Beds	21	23	3	13
Sandstone	79	82	3	4
Siltstone	28	35	4	11
Total	**321**	**348**	**21**	
Total Percentage of misclassifications for Test set, %				6

Table 7-10: Quantitative Results of the YOLACT (ResNet101) model. The model was trained on dataset 10b and tested on outcrop images to segment the various sedimentary structures present.

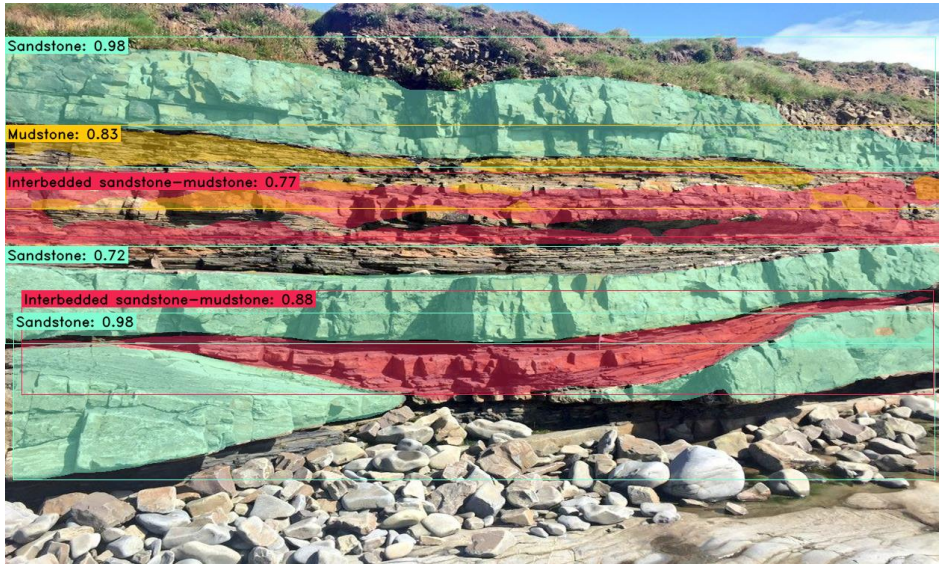
Instance Segmentation Yolact for Sedimentary Structures (ResNet101)				
Labels/Classes	Label Count in Training and Validation Sets	Predicted Label Appearances in test data	Misclassifications per Label (Class)	Percentage of misclassifications per class
Bioturbation	48	32	0	0
Clasts	52	16	0	0
Convoluted/Irregular Lamination	2	1	0	0
Convoluted/Irregular Bedding	2	2	0	0
Cross Bedding/Stratification	39	36	8	22
Cross Lamination/Climbing Ripples	22	13	1	8
Dessication Cracks	5	4	0	0
Erosive Contacts/Bases	75	27	0	0
Erosive Features	31	11	1	9
Faults	16	7	0	0
Flame Structures	6	3	0	0
Flaser Lamination	3	3	2	67
Flute Marks	42	0	0	0
Fossils	12	11	0	0
Herringbone Cross Stratification	9	3	2	67
Hummocky Cross Stratification	10	2	0	0
Lenticular Bedding	8	4	0	0
Lenticular Lamination	5	3	0	0
Planar/Parallel Bedding	45	23	1	4
Planar/Parallel Lamination	29	12	0	0
Scour Marks	6	2	1	50
Structureless	56	32	0	0
Swaley Cross Stratification	4	1	0	0
Syneresis Cracks	2	1	0	0
Wave Ripples/Lamination	6	7	1	14
Wavy Bedding	5	3	0	0
Total	**540**	**259**	**17**	
Total Percentage of misclassifications for Test set, %				6.56

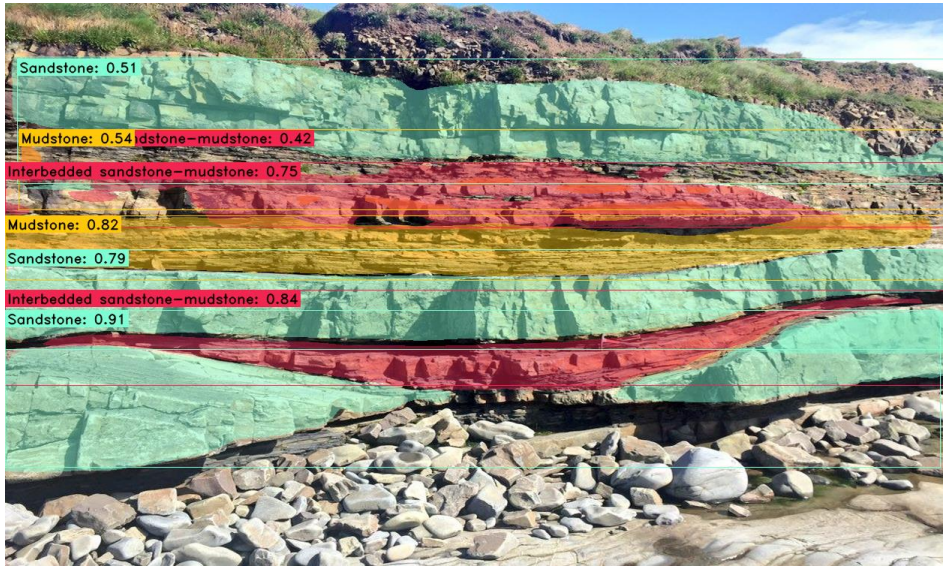
Table 7-11: Quantitative Results of the YOLACT (ResNet101) model. The model was trained on dataset 10b and tested on outcrop images to segment the various sedimentary structures present.

cDarkNet53 Backbone

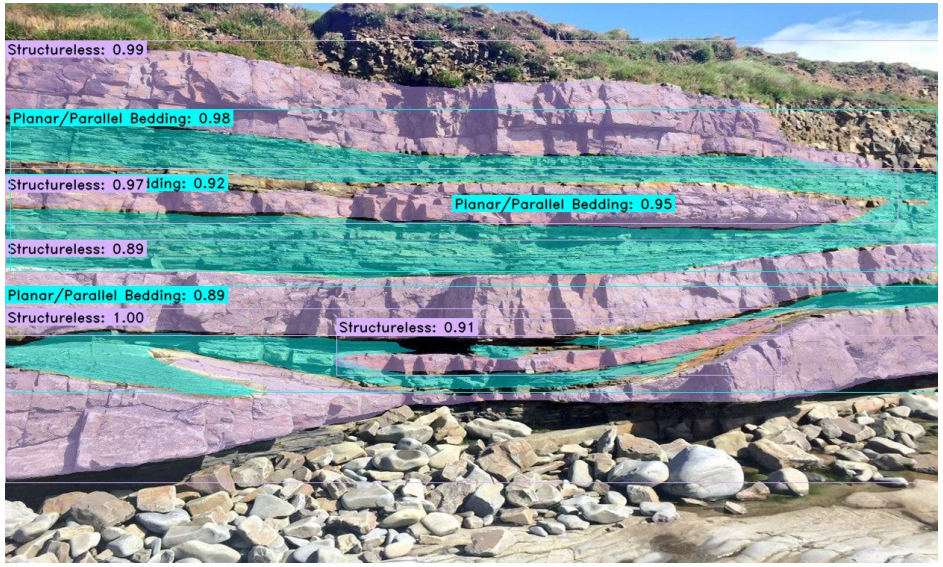
ResNet 101 Backbone

Lithology





Sedimentary Structures



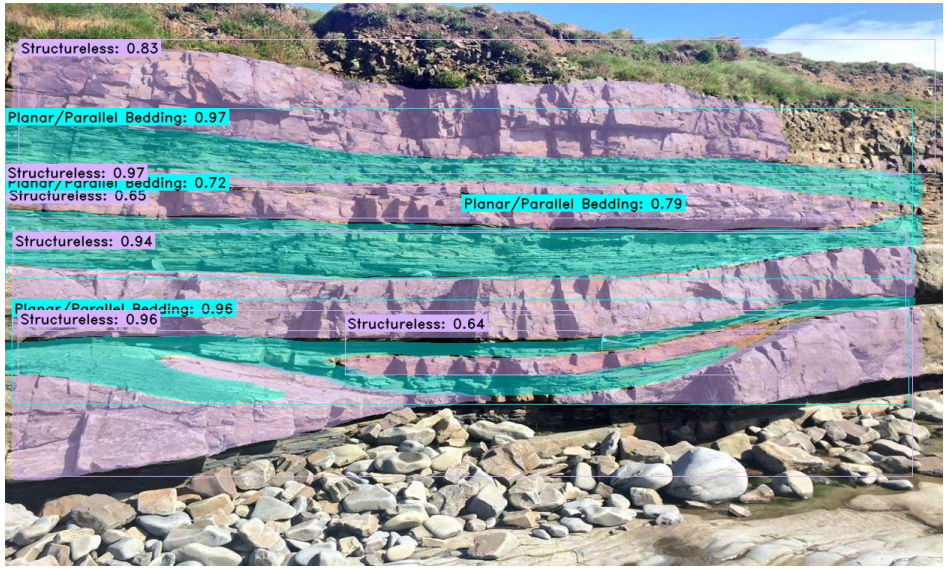


Figure 7-31: Backbone Comparison for the Lithology and Sedimentary structures models.

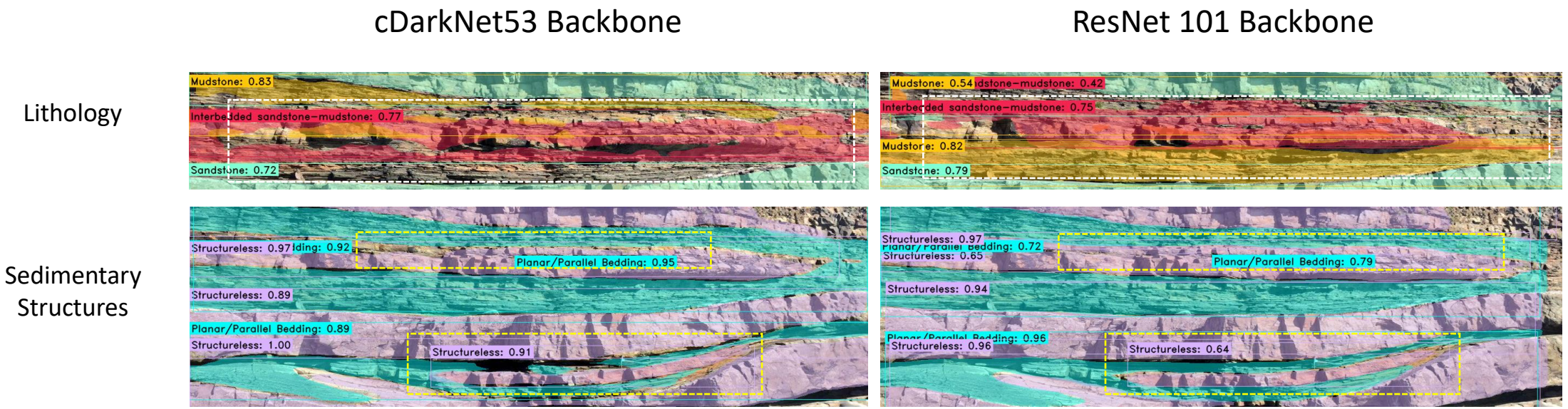


Figure 7-32: Backbone Comparison for the Lithology and Sedimentary Structures models depicted in more detail.

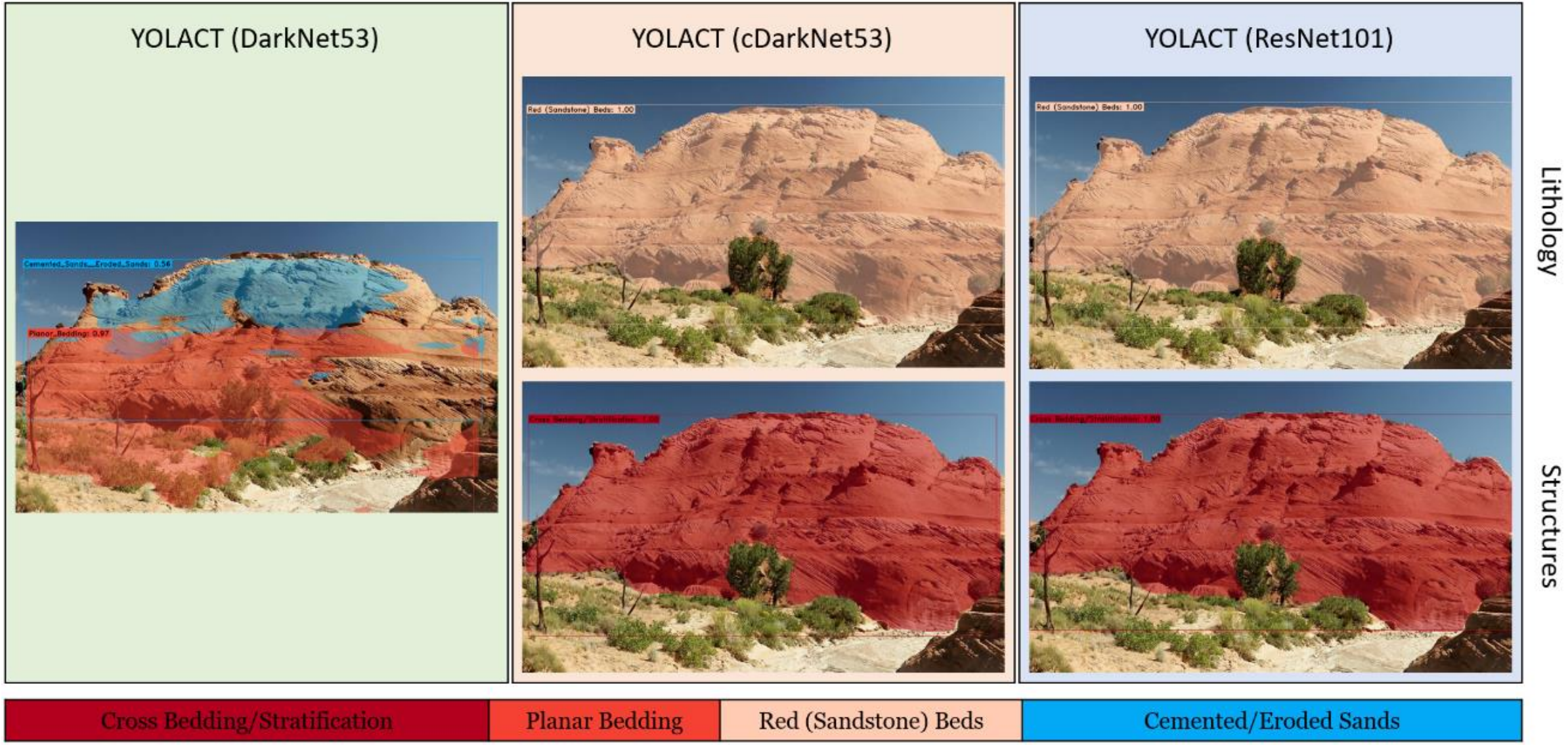


Figure 7-33: Comparison between all three models YOLACT (DarkNet53), YOLACT (cDarkNet53), and YOLACT (ResNet101) on a new outcrop image.

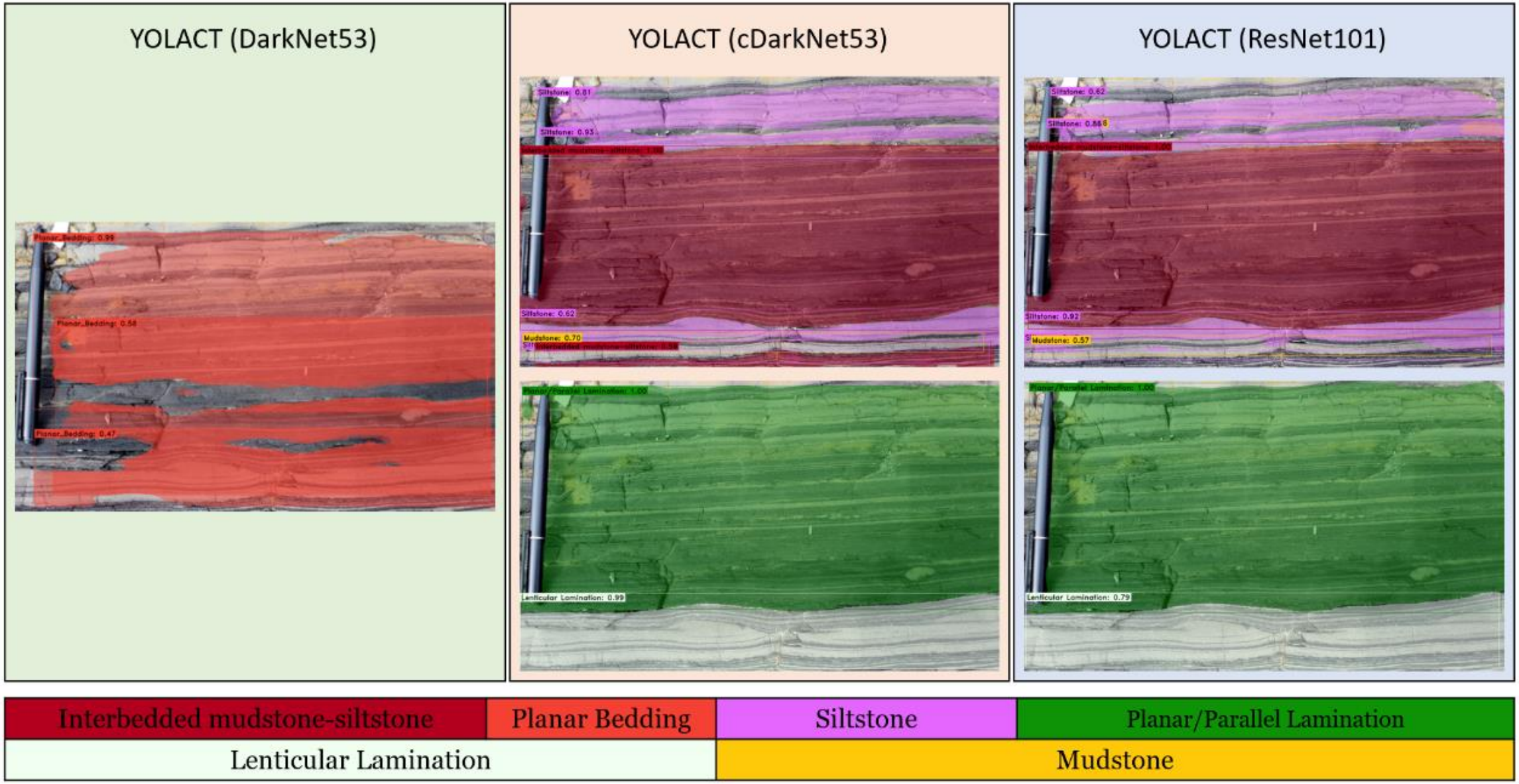


Figure 7-34: Comparison between all three models YOLACT (DarkNet53), YOLACT (cDarkNet53), and YOLACT (ResNet101) on another new outcrop image.

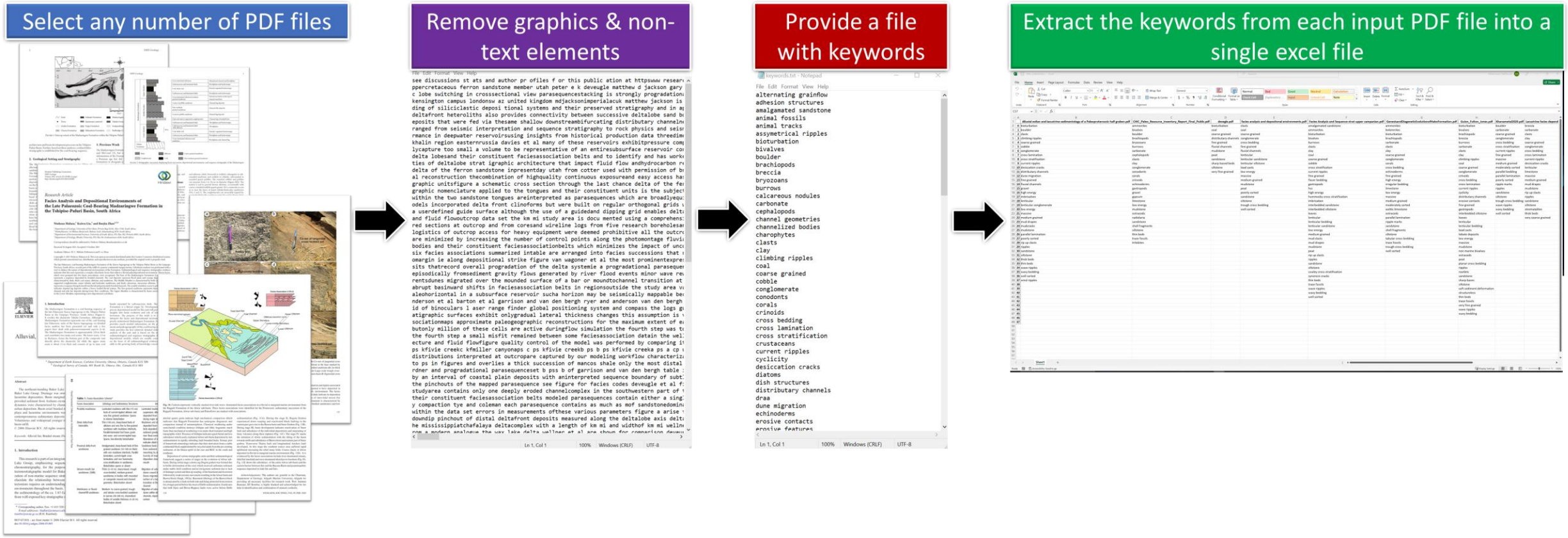


Figure 8-2: The main steps followed to extract the geological information from multiple geological pdf files into a single Excel file.

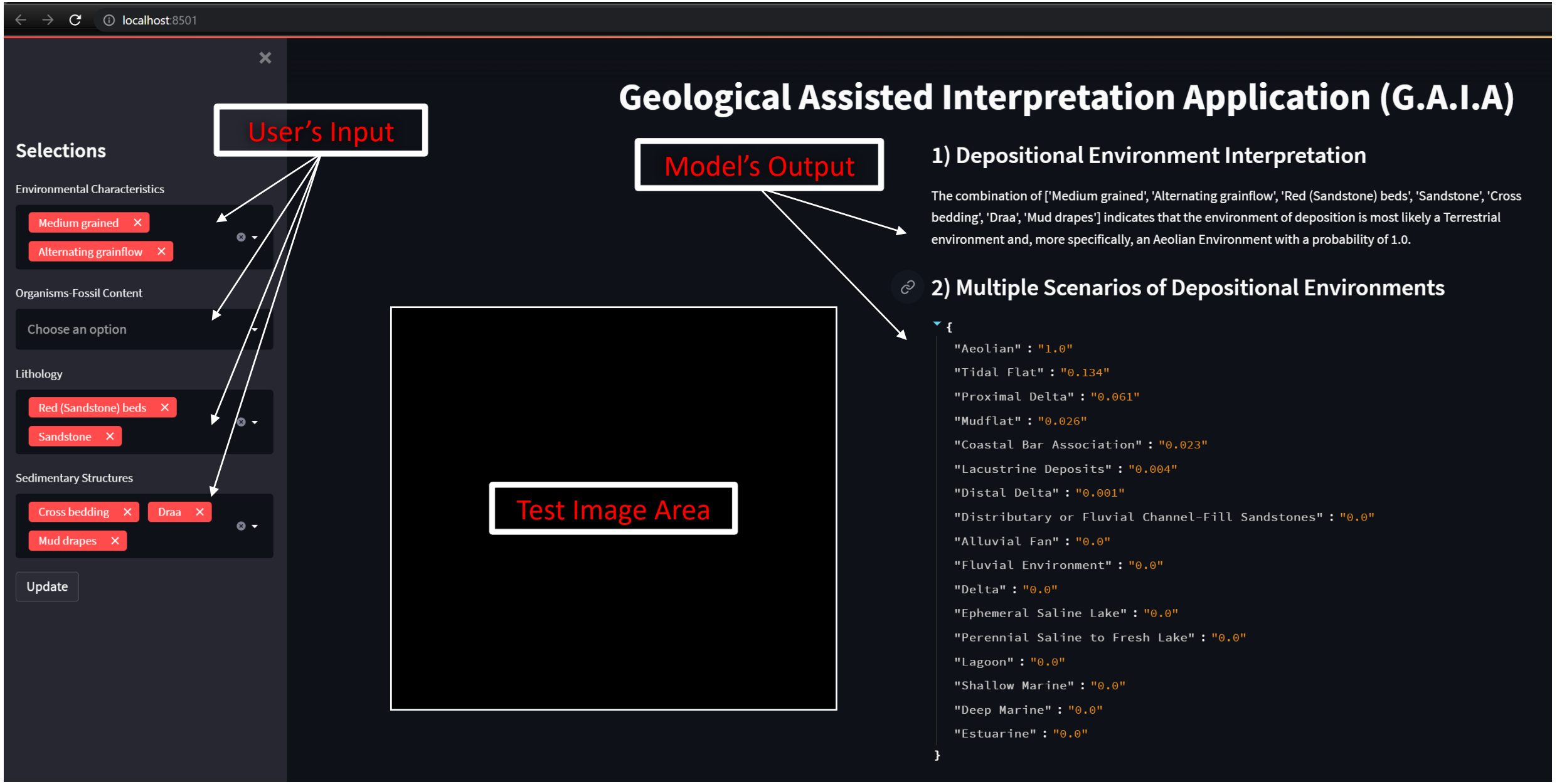


Figure 8-6: Sample of the Graphical User Interface layout with the fields and outputs.

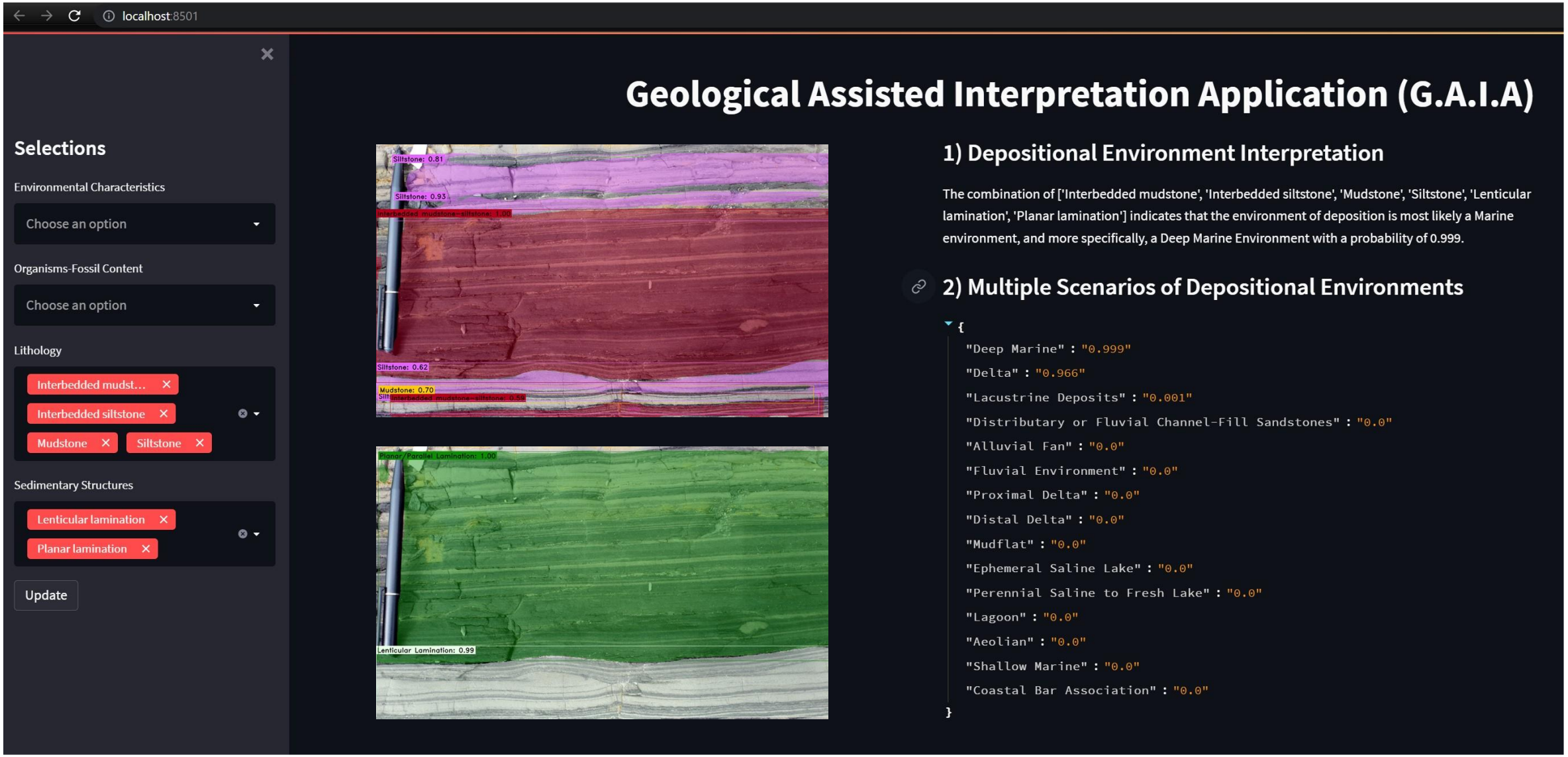


Figure 8-7: Example 1 of the GUI model's predictions based on outcrop images.

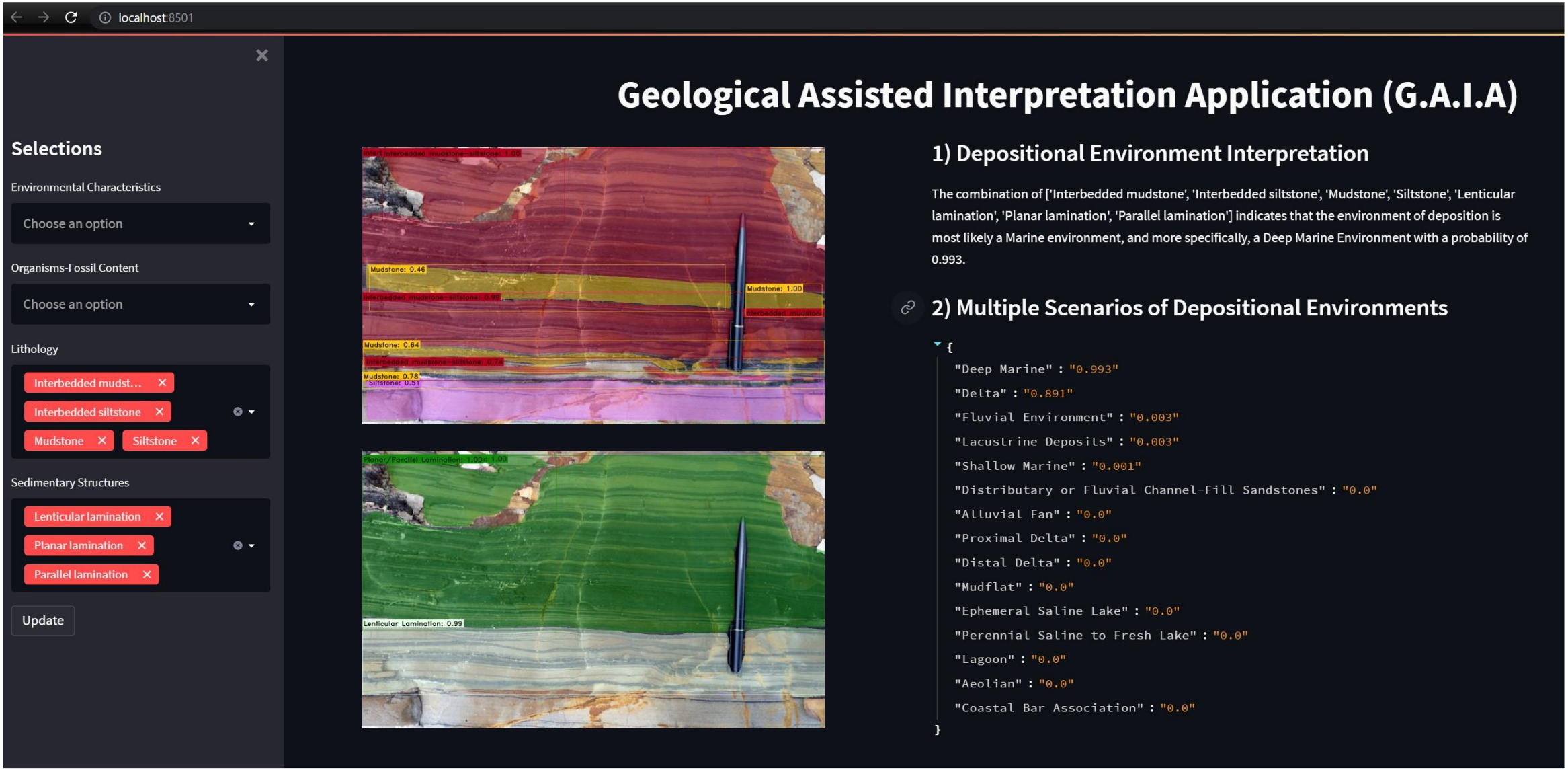


Figure 8-8: Example 2 of the GUI model's predictions based on outcrop images.

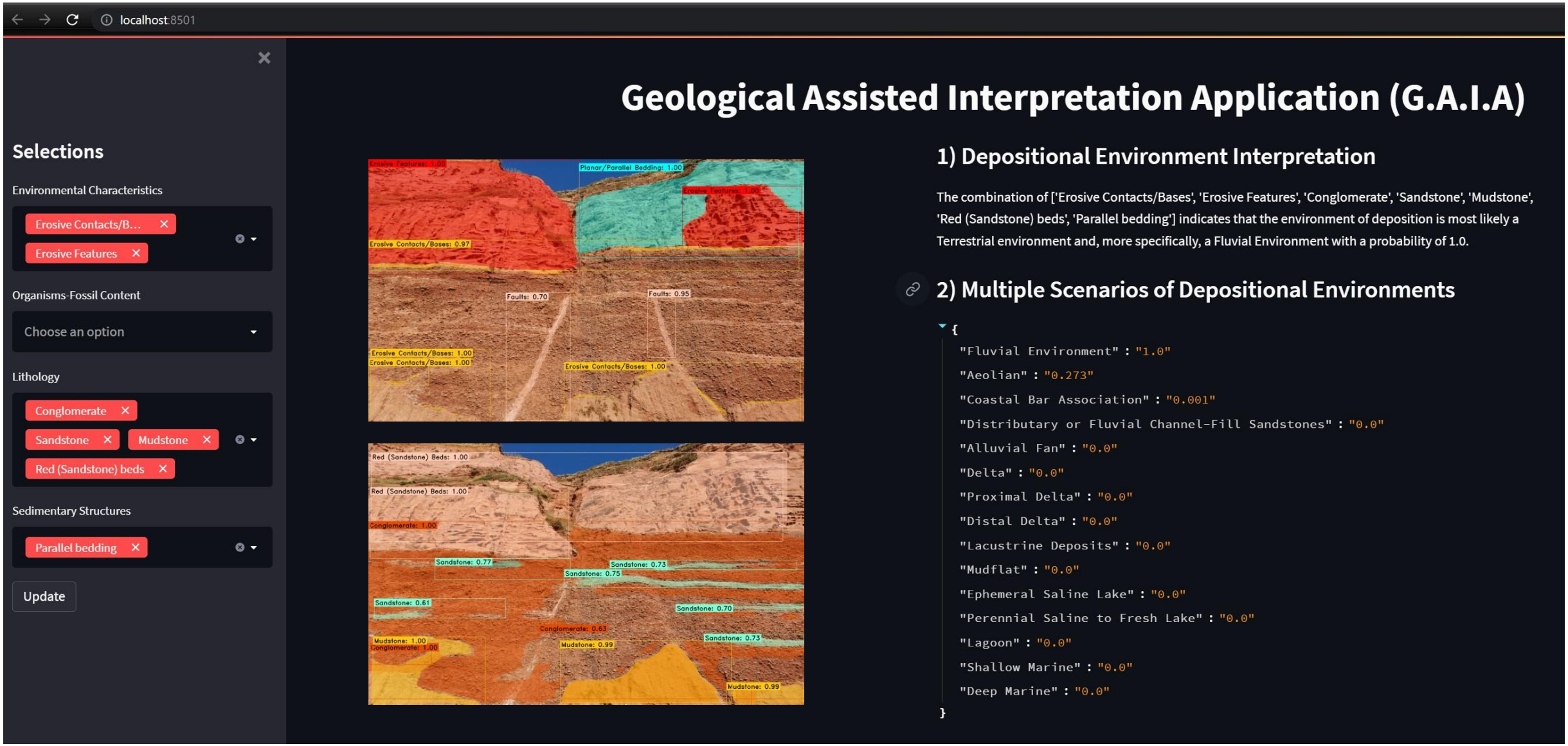


Figure 8-9: Example 3 of the GUI model's predictions based on outcrop images.

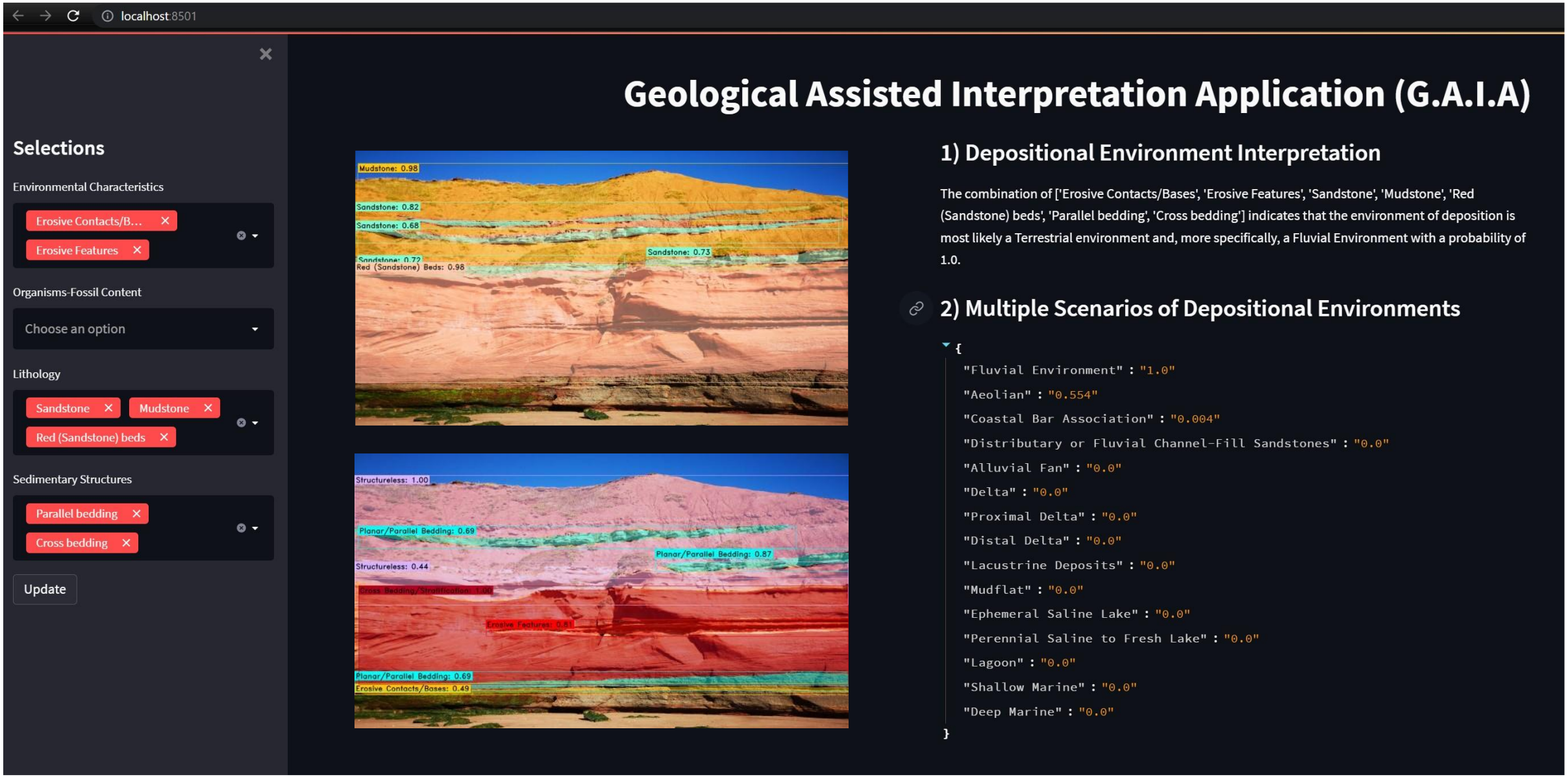


Figure 8-10: Example 4 of the GUI model's predictions based on outcrop images.

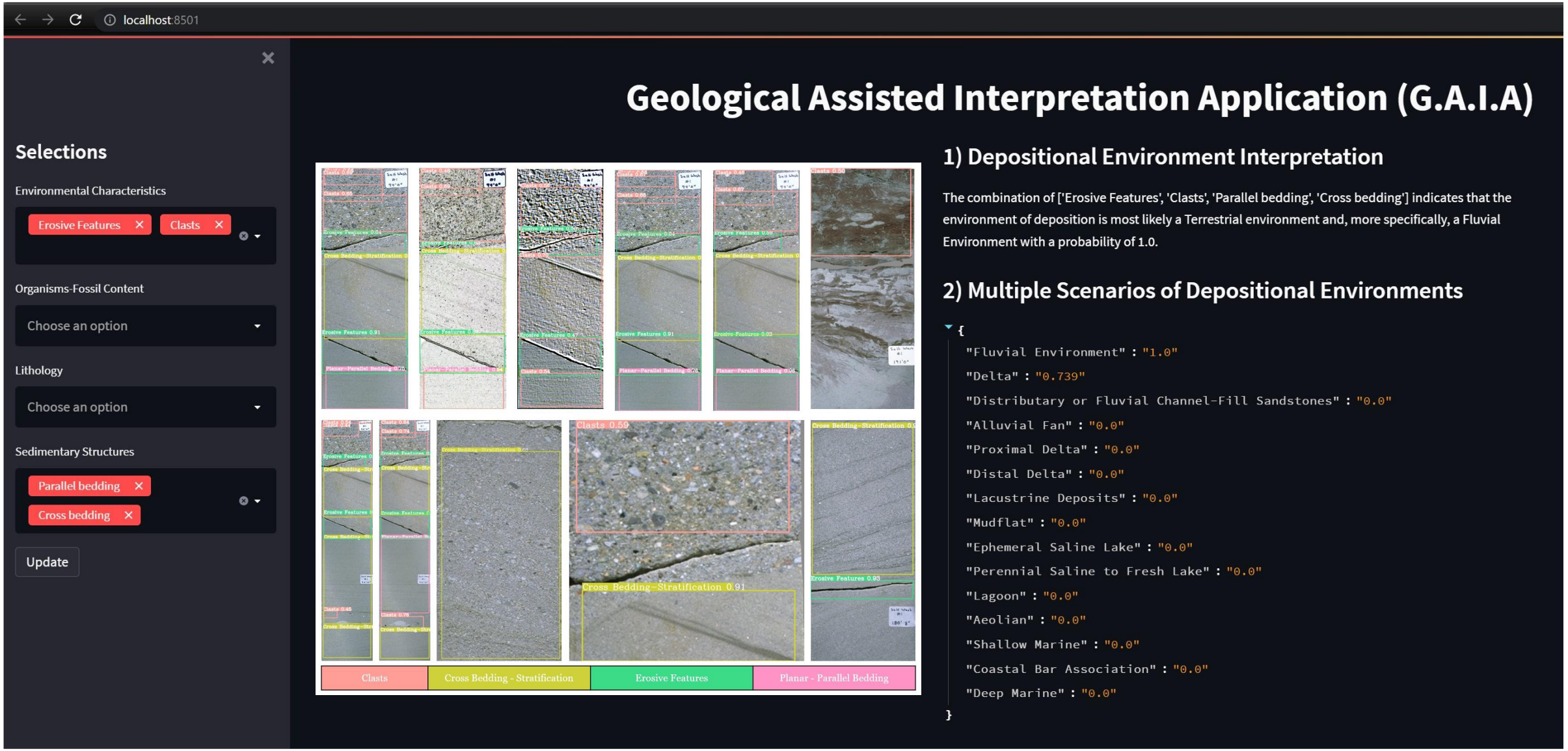


Figure 8-11: Example 5 of the GUI model's predictions based on core images.

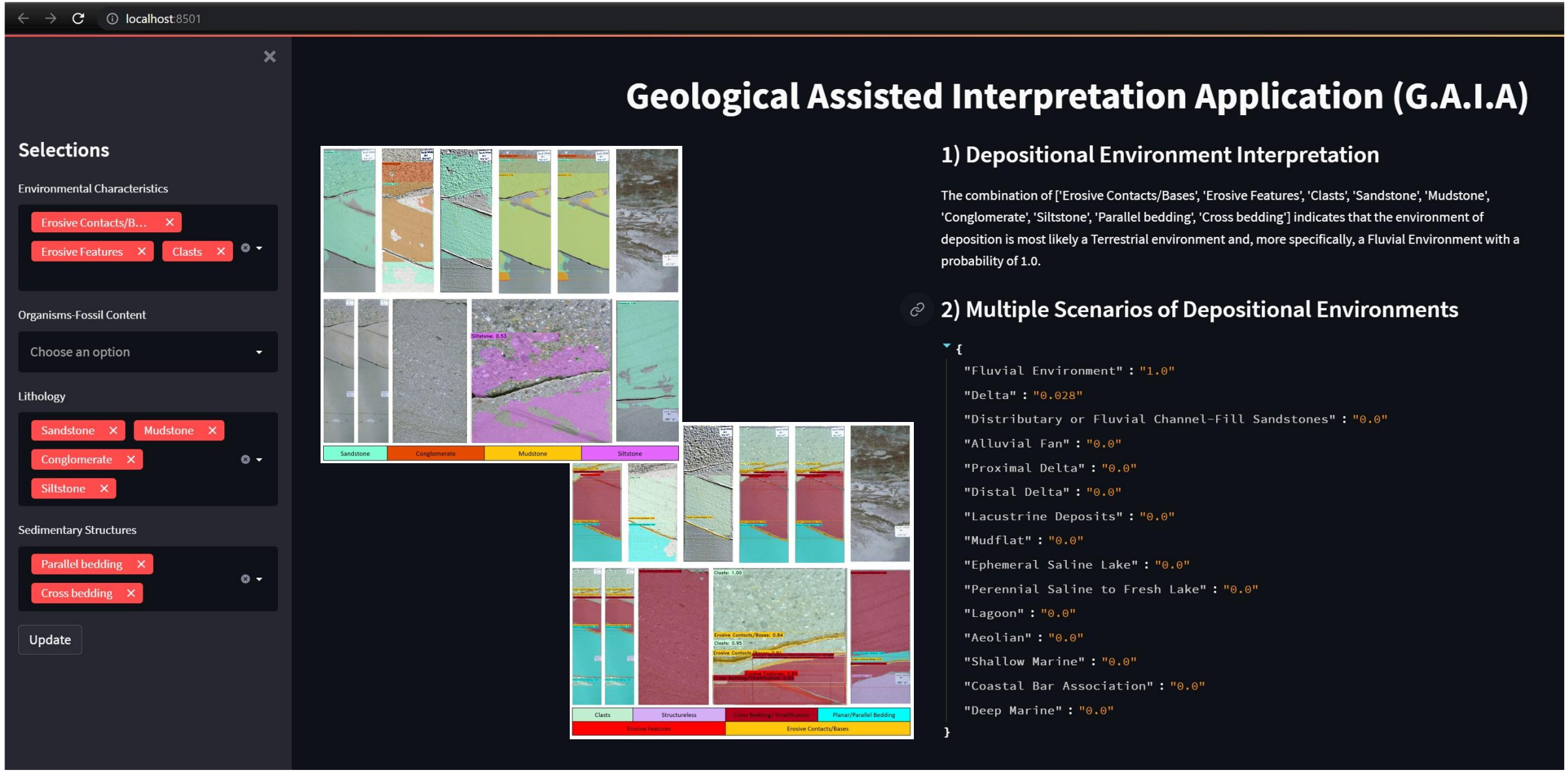


Figure 8-12: Example 6 of the GUI model's predictions based on core images.

Isona

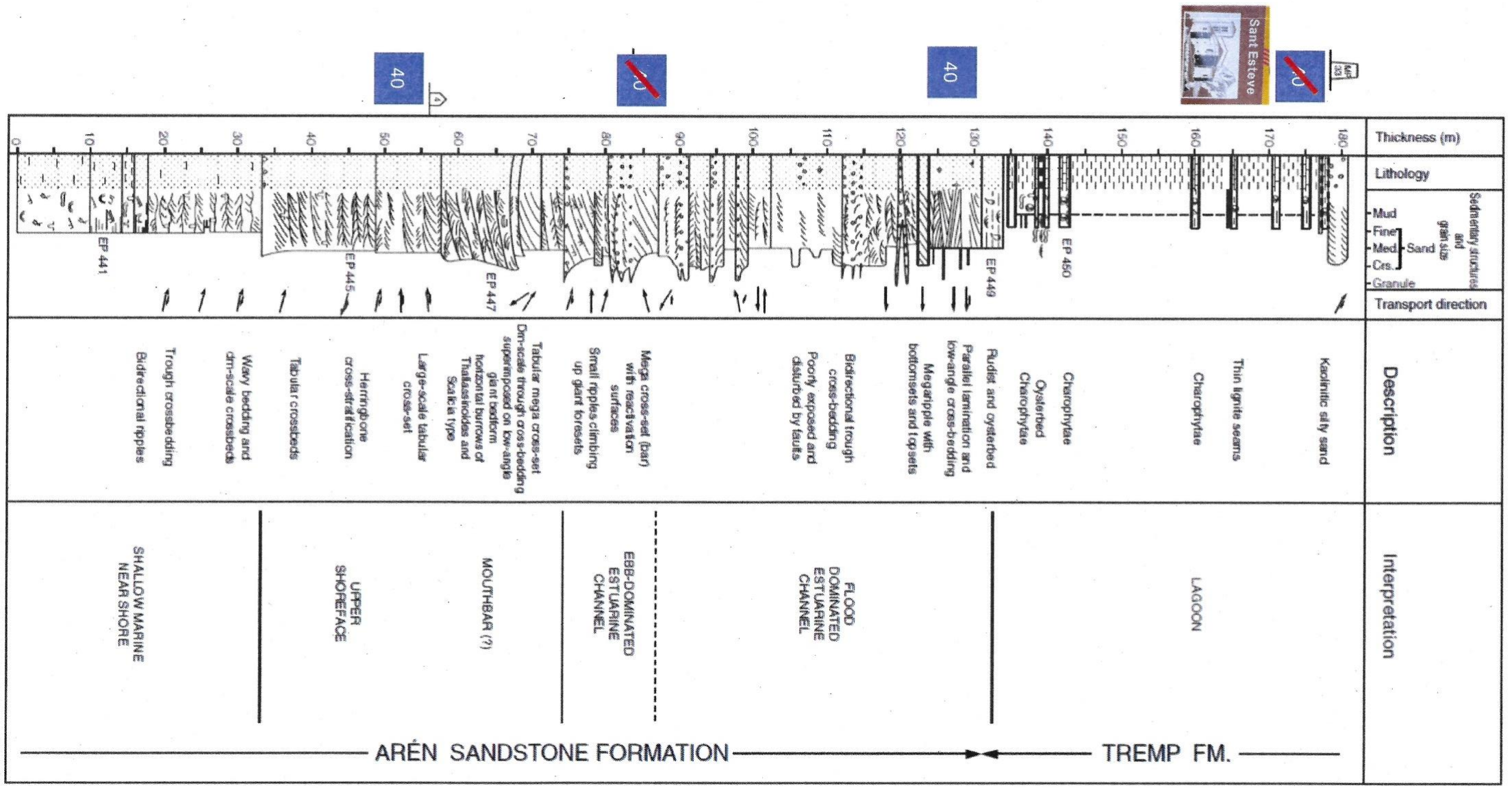


Figure 8-13: Sedimentary log of the Isona outcrop.

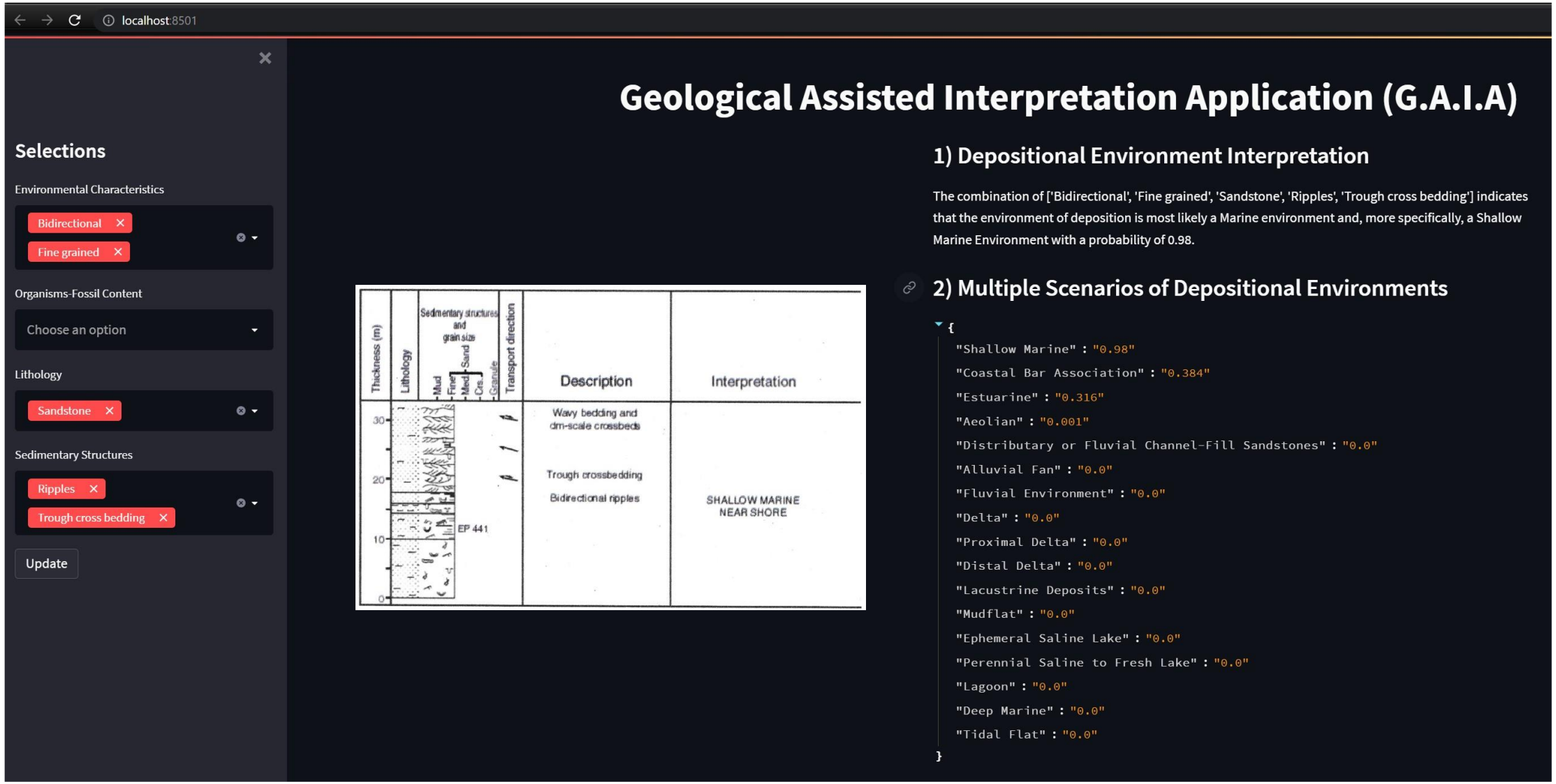


Figure 8-14: Example 7 of the GUI model's predictions based on sedimentary logs.

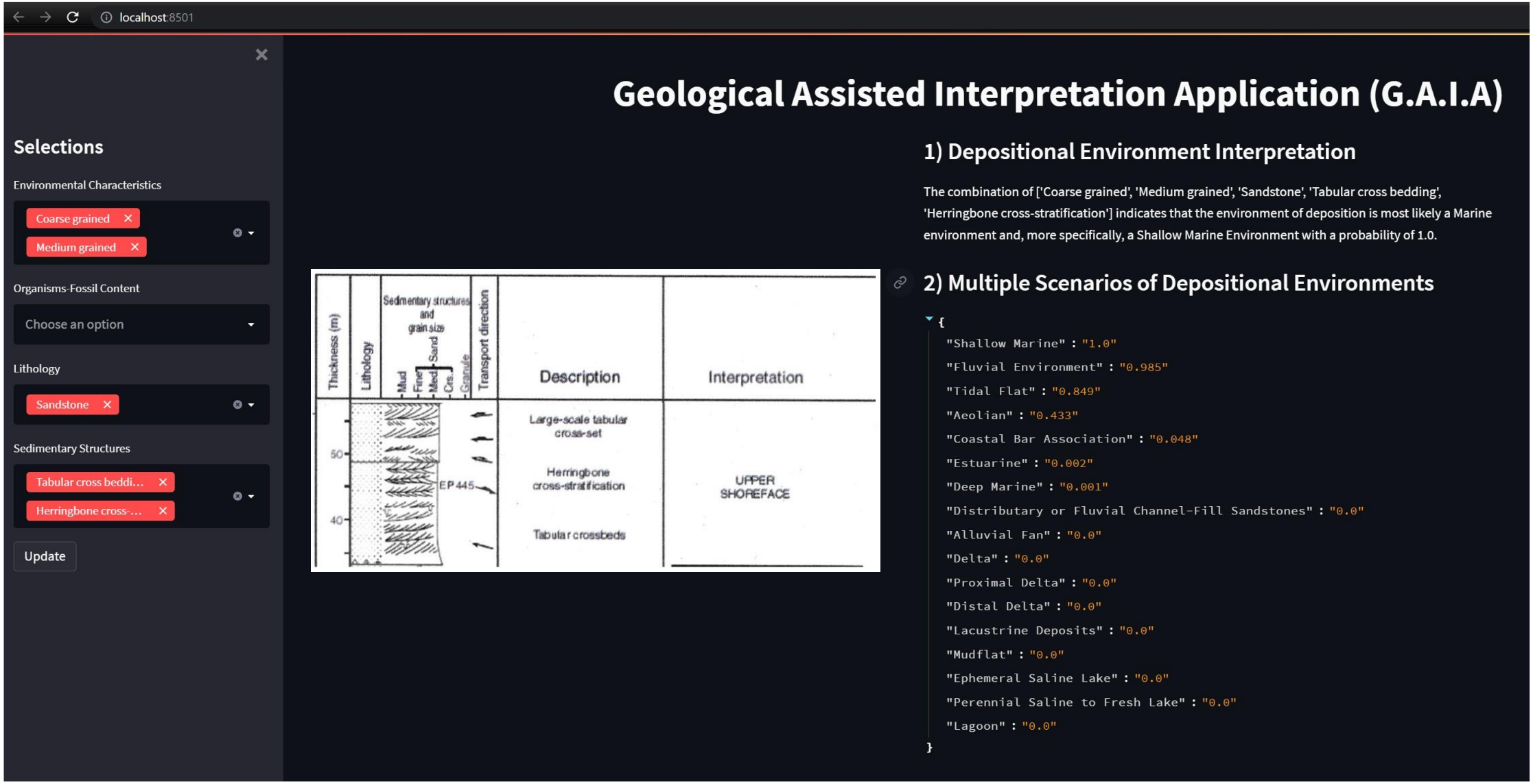


Figure 8-15: Example 8 of the GUI model's predictions based on sedimentary logs.

localhost:8501

Selections

Environmental Characteristics

Coarse grained ×

Medium grained ×

Organisms-Fossil Content

Burrows ×

Lithology

Sandstone ×

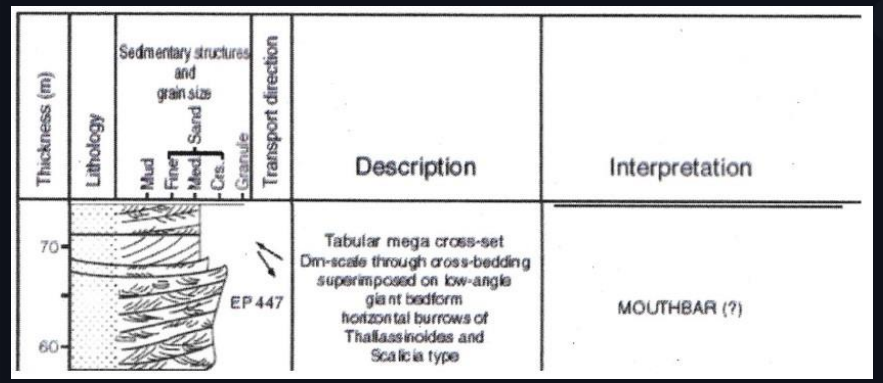
Sedimentary Structures

Tabular cross beddi… ×

Trough cross bedding ×

Update

Geological Assisted Interpretation Application (G.A.I.A)



1) Depositional Environment Interpretation

The combination of ['Coarse grained', 'Medium grained', 'Burrows', 'Sandstone', 'Tabular cross bedding', 'Trough cross bedding'] indicates that the environment of deposition is most likely a Terrestrial environment and, more specifically, a Fluvial Environment with a probability of 0.937.

2) Multiple Scenarios of Depositional Environments


```
{
  "Fluvial Environment" : "0.937"
  "Lacustrine Deposits" : "0.915"
  "Aeolian" : "0.603"
  "Distributary or Fluvial Channel-Fill Sandstones" : "0.578"
  "Coastal Bar Association" : "0.034"
  "Estuarine" : "0.031"
  "Ephemeral Saline Lake" : "0.015"
  "Delta" : "0.013"
  "Tidal Flat" : "0.007"
  "Mudflat" : "0.002"
  "Perennial Saline to Fresh Lake" : "0.002"
  "Shallow Marine" : "0.001"
  "Alluvial Fan" : "0.0"
  "Proximal Delta" : "0.0"
  "Distal Delta" : "0.0"
  "Lagoon" : "0.0"
  "Deep Marine" : "0.0"
}
```


Figure 8-16: Example 9 of the GUI model's predictions based on sedimentary logs.

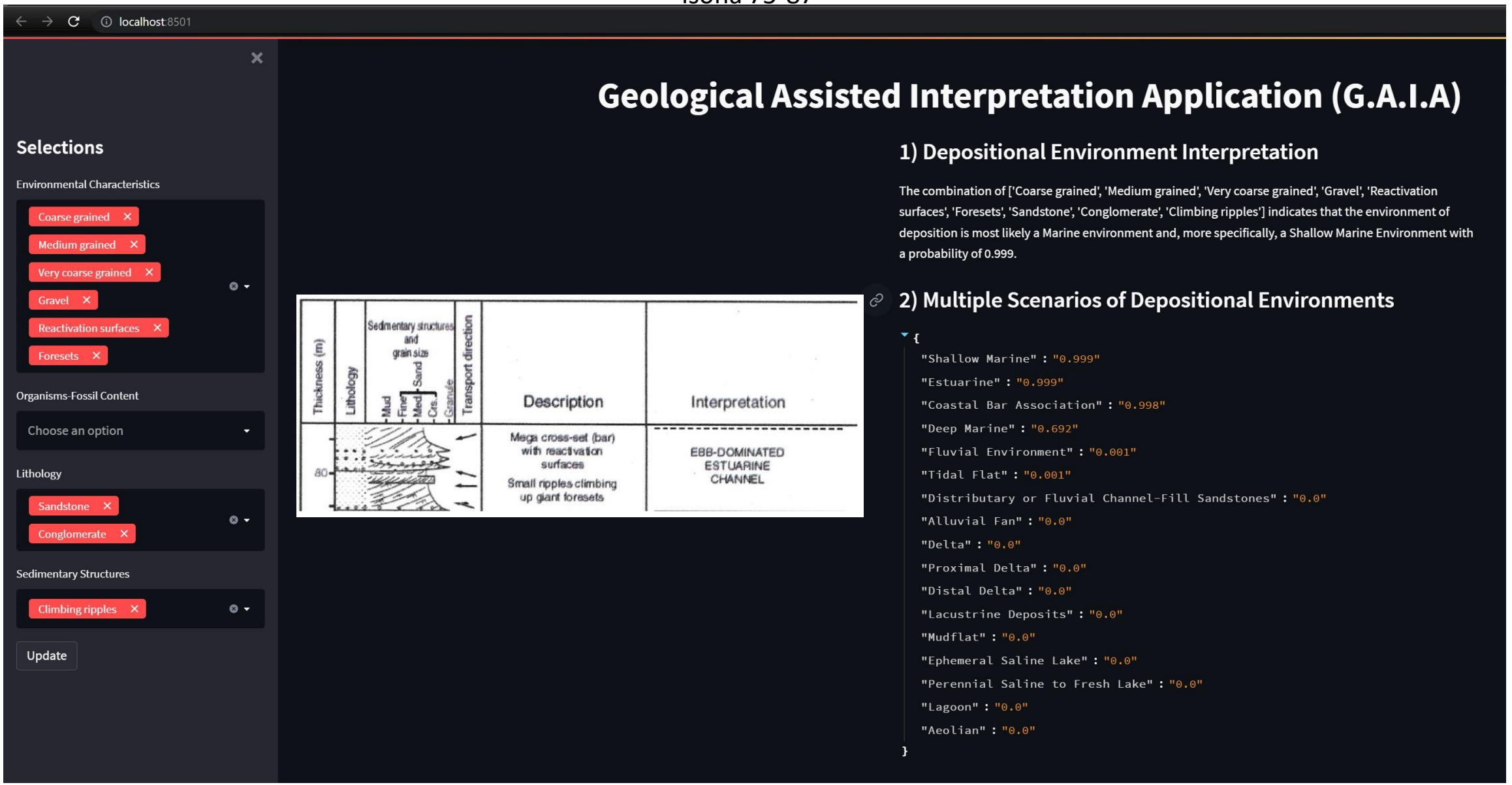


Figure 8-17: Example 10 of the GUI model's predictions based on sedimentary logs.

localhost:8501

Geological Assisted Interpretation Application (G.A.I.A)

Selections

Environmental Characteristics

Coarse grained × Medium grained × Gravel × Bottomsets × Topsets × Bidirectional ×

Organisms-Fossil Content

Choose an option

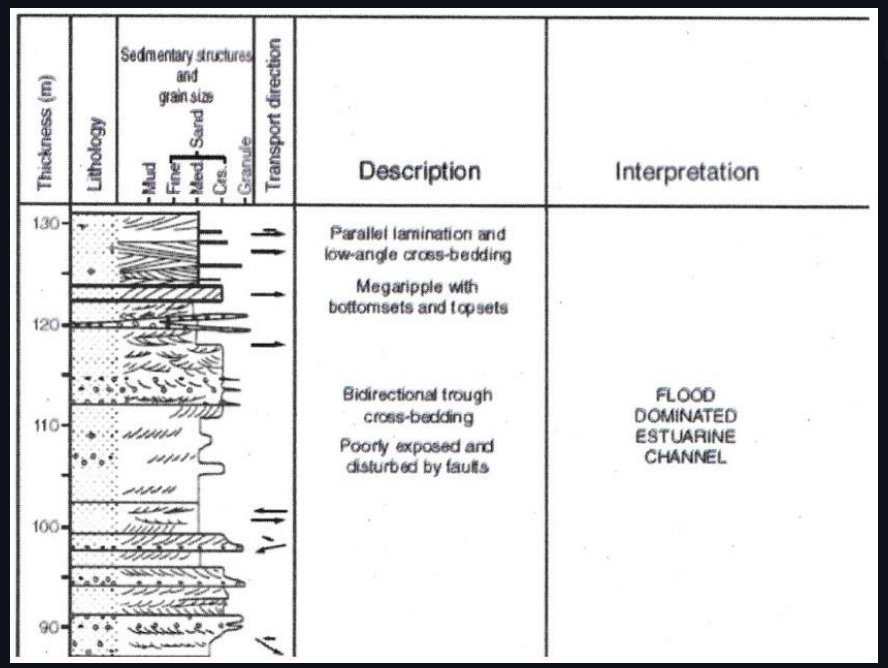
Lithology

Sandstone × Conglomerate ×

Sedimentary Structures

Cross bedding × Parallel lamination × Trough cross bedding ×

Update



1) Depositional Environment Interpretation

The combination of ['Coarse grained', 'Medium grained', 'Gravel', 'Bottomsets', 'Topsets', 'Bidirectional', 'Sandstone', 'Conglomerate', 'Cross bedding', 'Parallel lamination', 'Trough cross bedding'] indicates that the environment of deposition is most likely a Transitional environment and, more specifically, an Estuarine with a probability of 1.0.

2) Multiple Scenarios of Depositional Environments


```
{
  "Estuarine" : "1.0"
  "Coastal Bar Association" : "0.986"
  "Shallow Marine" : "0.982"
  "Fluvial Environment" : "0.008"
  "Tidal Flat" : "0.006"
  "Aeolian" : "0.004"
  "Ephemeral Saline Lake" : "0.001"
  "Distributary or Fluvial Channel-Fill Sandstones" : "0.0"
  "Alluvial Fan" : "0.0"
  "Delta" : "0.0"
  "Proximal Delta" : "0.0"
  "Distal Delta" : "0.0"
  "Lacustrine Deposits" : "0.0"
  "Mudflat" : "0.0"
  "Perennial Saline to Fresh Lake" : "0.0"
  "Lagoon" : "0.0"
  "Deep Marine" : "0.0"
}
```


Figure 8-18: Example 11 of the GUI model's predictions based on sedimentary logs.

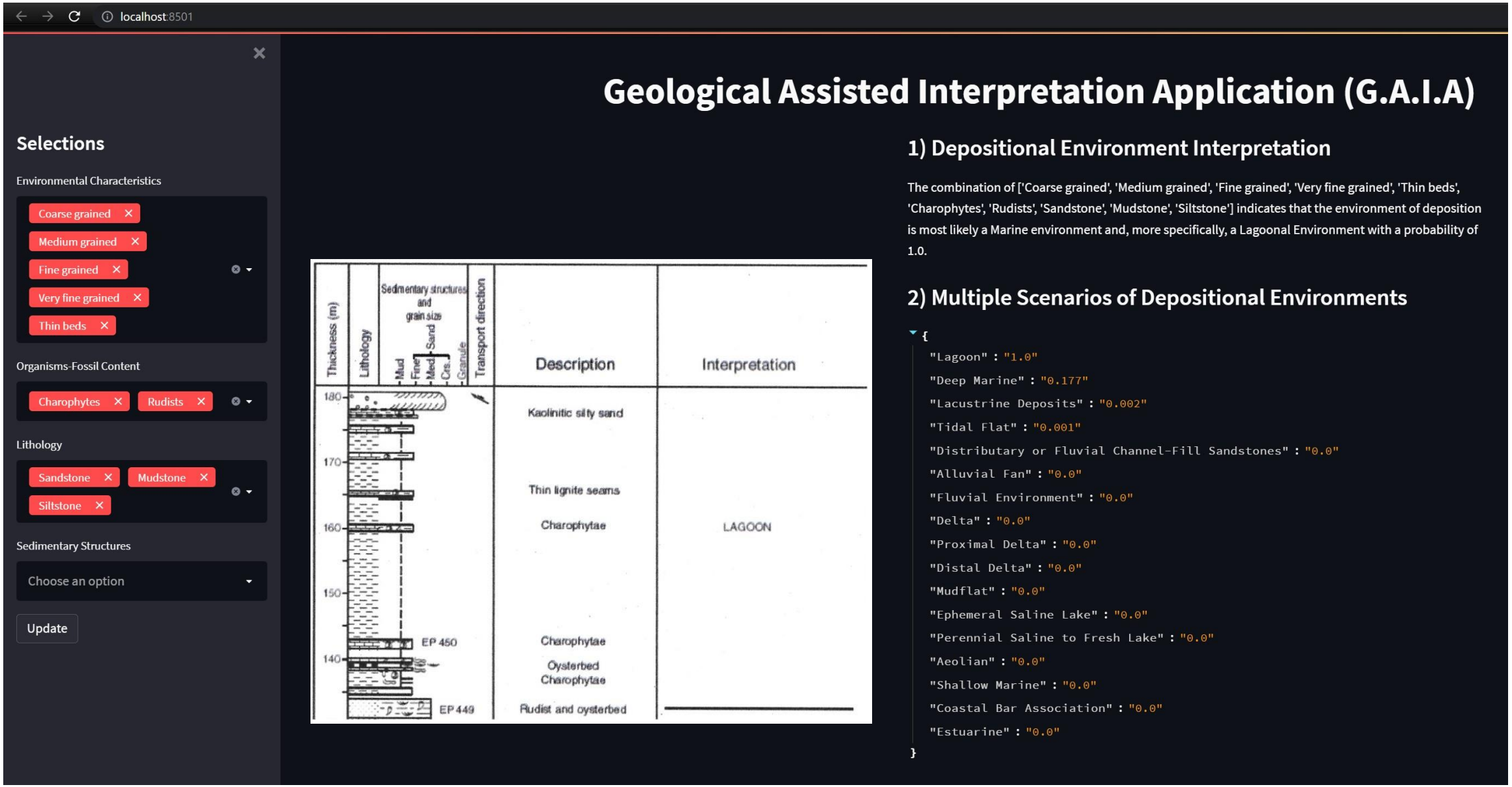


Figure 8-19: Example 12 of the GUI model's predictions based on sedimentary logs.