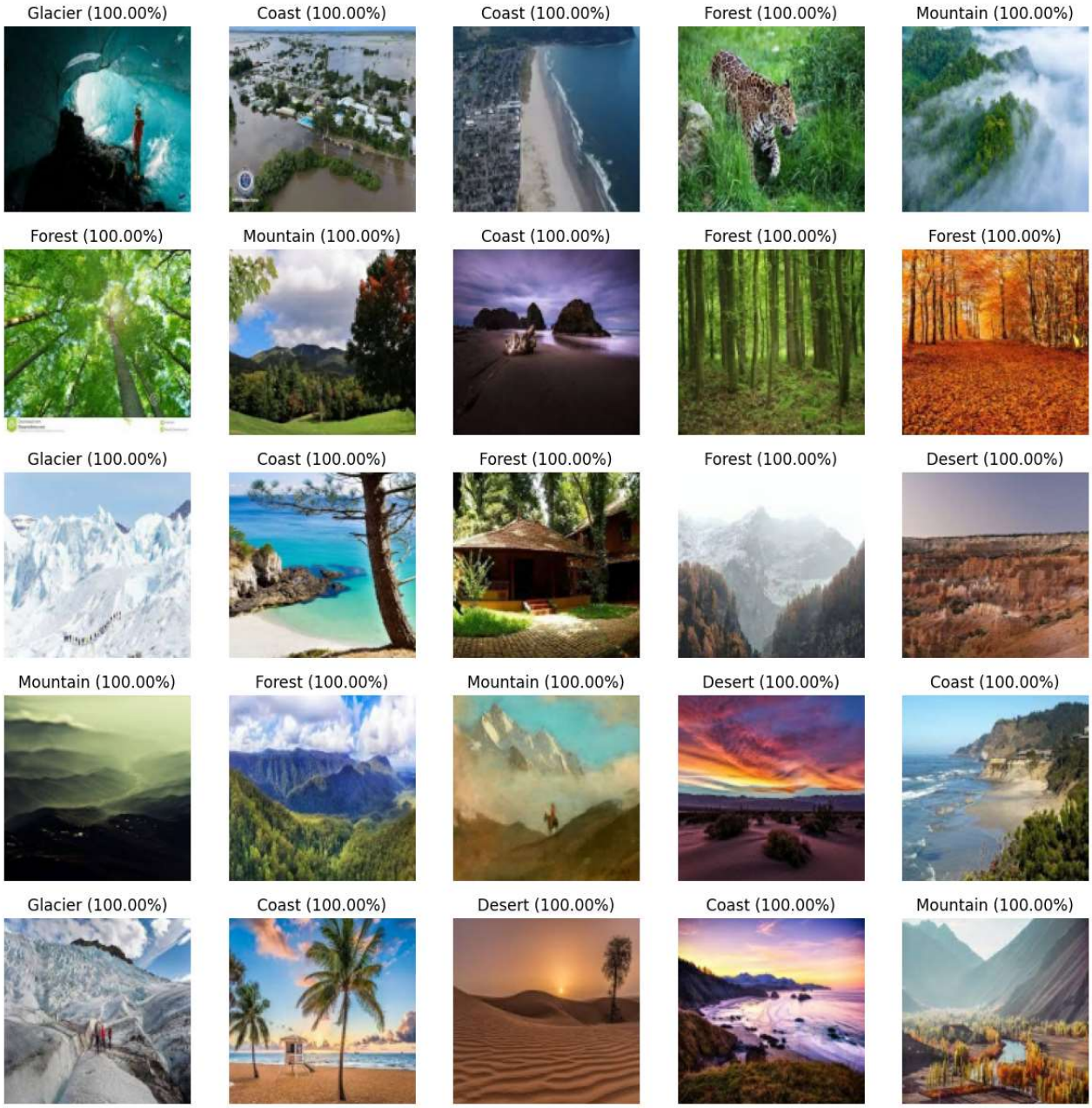
Visualize Dataset



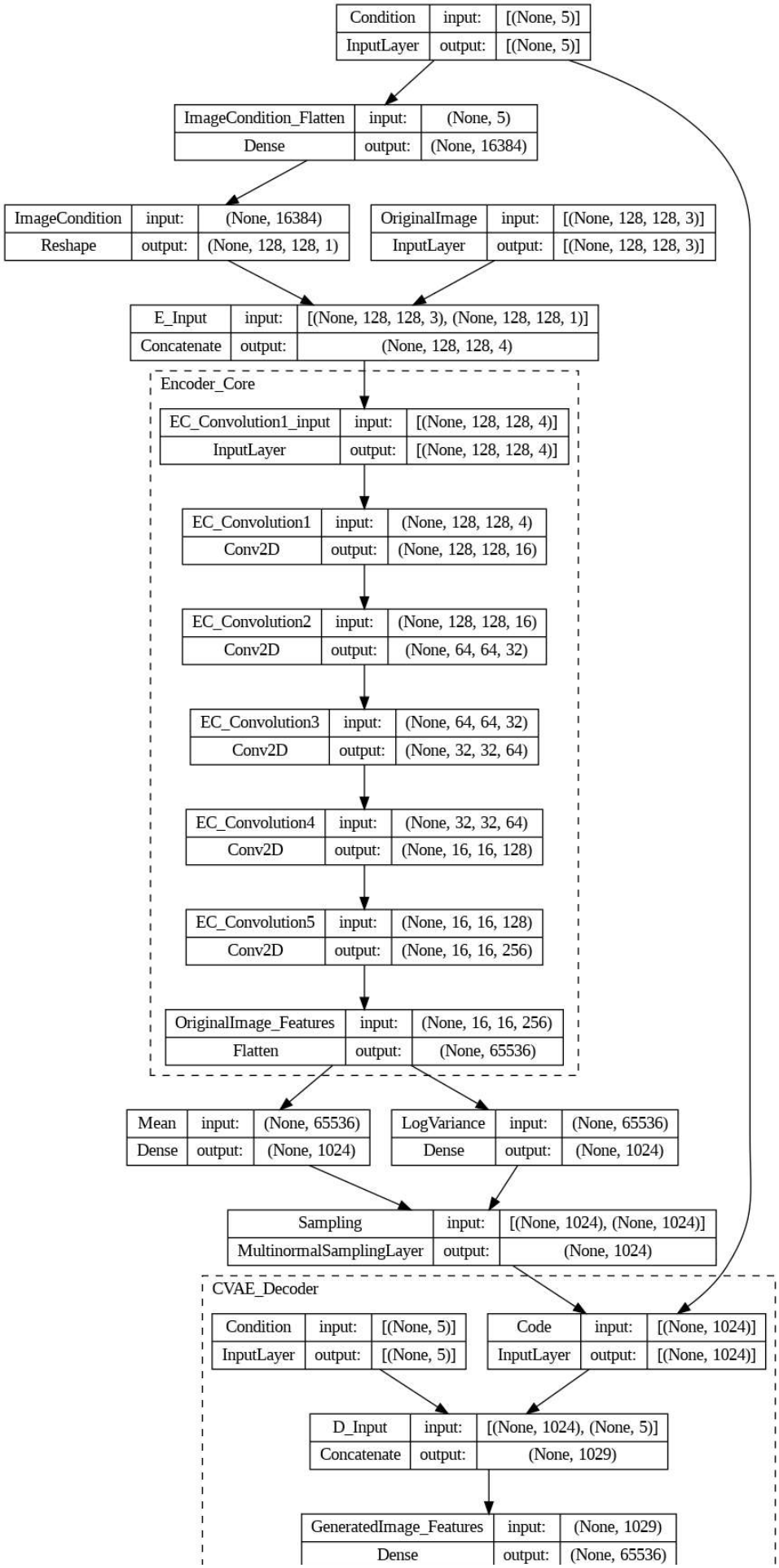
CVAE

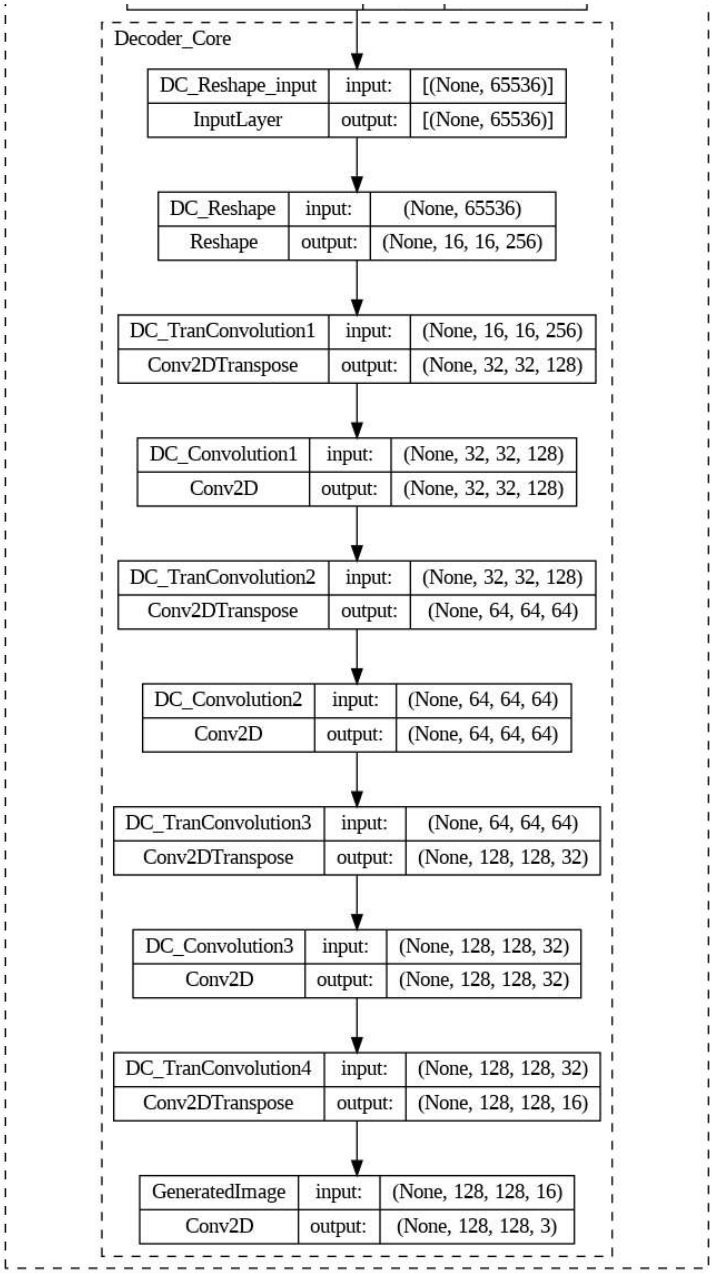
Model: "CVAE"

Layer (type)	Output Shape	Param #	Connected to
Condition (InputLayer)	[(None, 5)]	0	[]
ImageCondition_Flatten (Dense)	(None, 16384)	98304	['Condition[0][0]']
OriginalImage (InputLayer)	[(None, 128, 128, 3)]	0	[]
ImageCondition (Reshape)	(None, 128, 128, 1)	0	['ImageCondition_Flatten[0][0]']
E_Input (Concatenate)	(None, 128, 128, 4)	0	['OriginalImage[0][0]', 'ImageCondition[0][0]']
Encoder_Core (Sequential)	(None, 65536)	392752	['E_Input[0][0]']
Mean (Dense)	(None, 1024)	67109888	['Encoder_Core[0][0]']
LogVariance (Dense)	(None, 1024)	67109888	['Encoder_Core[0][0]']
Sampling (MultinormalSamplingLayer)	(None, 1024)	0	['Mean[0][0]', 'LogVariance[0][0]']
CVAE_Decoder (Functional)	(None, 128, 128, 3)	67762835	['Sampling[0][0]', 'Condition[0][0]']

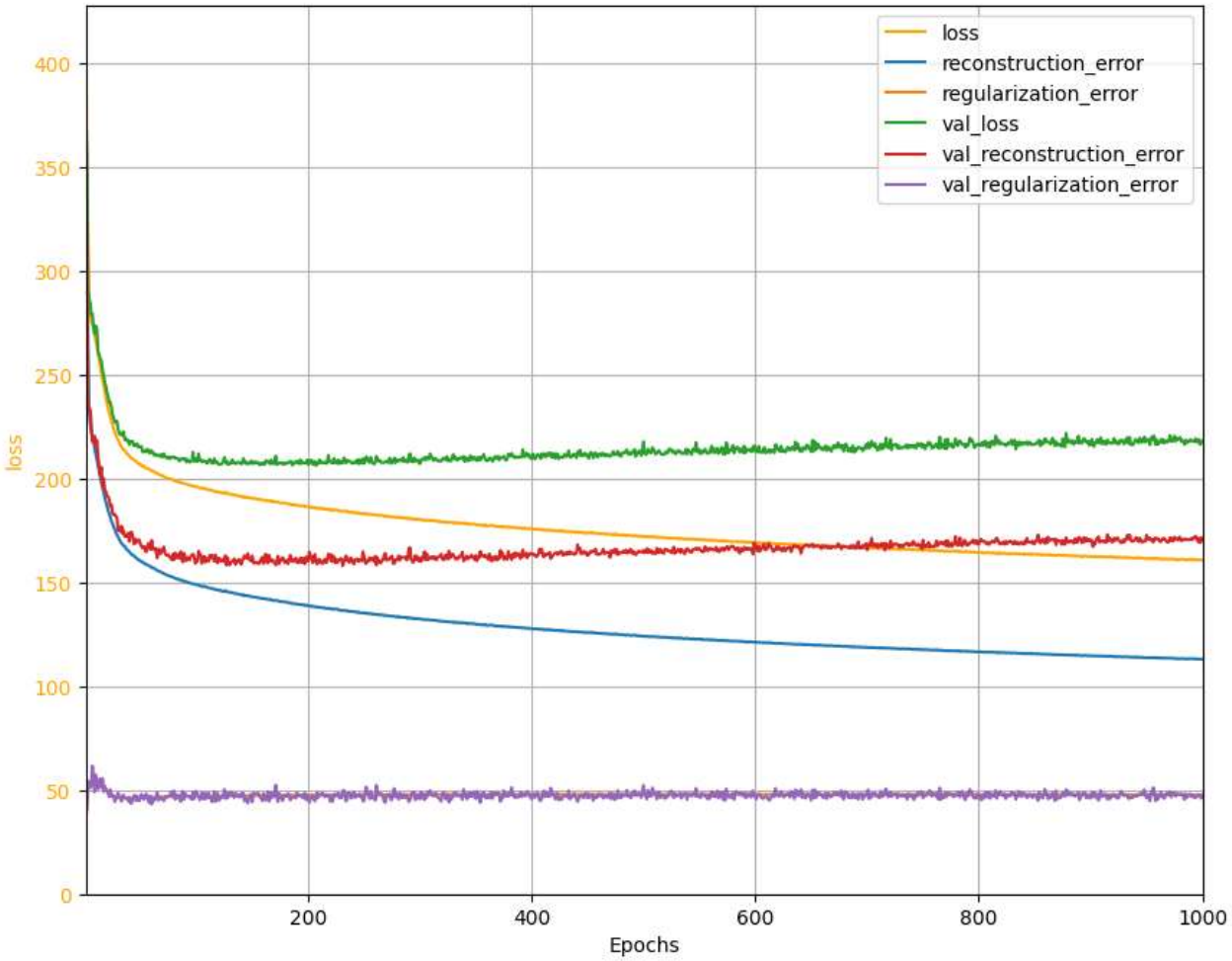
Total params: 202473667 (772.38 MB)
Trainable params: 202473667 (772.38 MB)
Non-trainable params: 0 (0.00 Byte)

Out[79]:

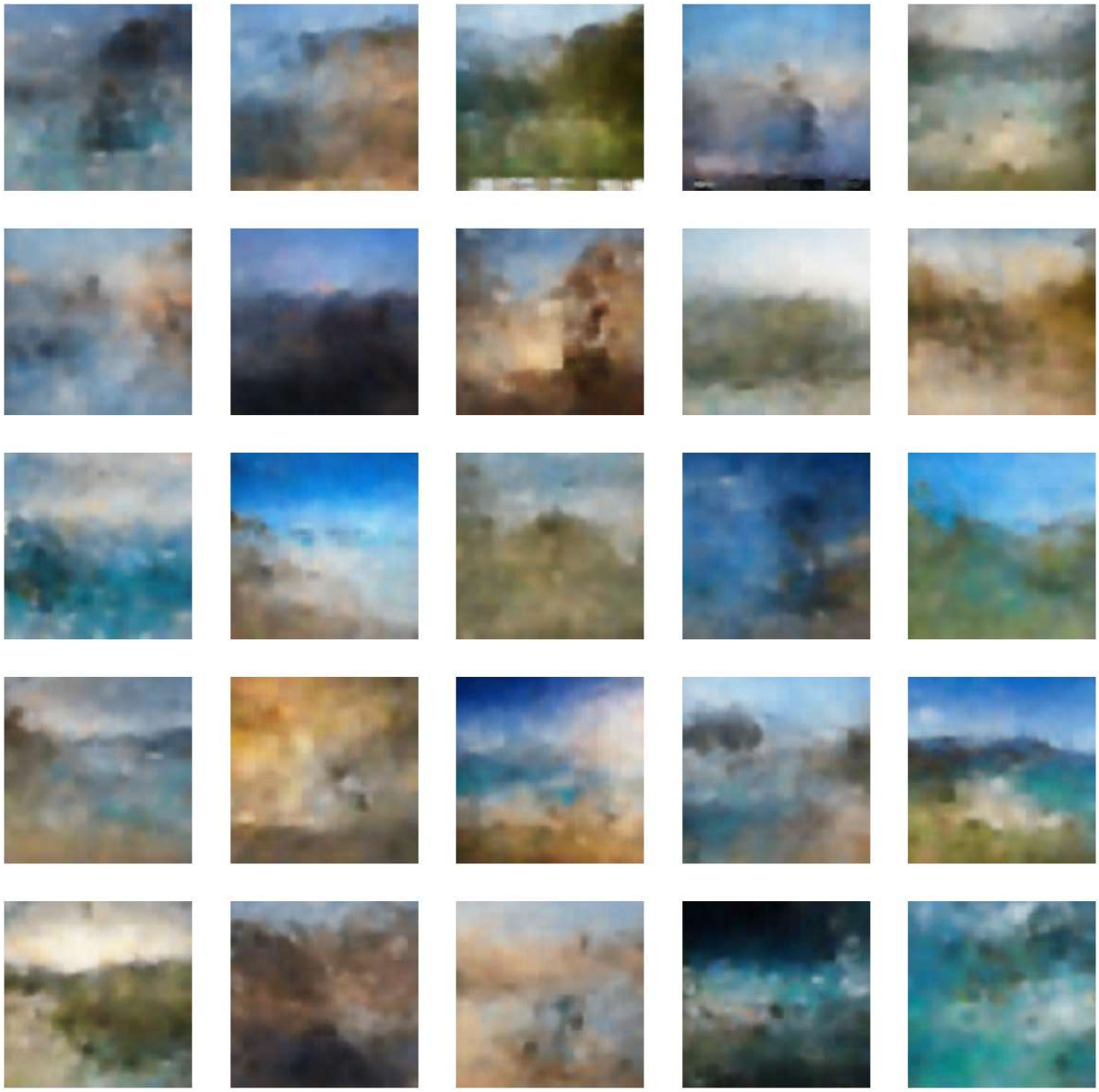

Condition | input: | [(None, 5)]
InputLayer | output: | [(None, 5)]
ImageCondition_Flatten | input: | (None, 5)
Dense | output: | (None, 16384)
ImageCondition | input: | (None, 16384)
Reshape | output: | (None, 128, 128, 1)
OriginalImage | input: | [(None, 128, 128, 3)]
InputLayer | output: | [(None, 128, 128, 3)]
E_Input | input: | [(None, 128, 128, 3), (None, 128, 128, 1)]
Concatenate | output: | (None, 128, 128, 4)
Encoder_Core
EC_Convolution1_input | input: | [(None, 128, 128, 4)]
InputLayer | output: | [(None, 128, 128, 4)]
EC_Convolution1 | input: | (None, 128, 128, 4)
Conv2D | output: | (None, 128, 128, 16)
EC_Convolution2 | input: | (None, 128, 128, 16)
Conv2D | output: | (None, 64, 64, 32)
EC_Convolution3 | input: | (None, 64, 64, 32)
Conv2D | output: | (None, 32, 32, 64)
EC_Convolution4 | input: | (None, 32, 32, 64)
Conv2D | output: | (None, 16, 16, 128)
EC_Convolution5 | input: | (None, 16, 16, 128)
Conv2D | output: | (None, 16, 16, 256)
OriginalImage_Features | input: | (None, 16, 16, 256)
Flatten | output: | (None, 65536)
Mean | input: | (None, 65536)
Dense | output: | (None, 1024)
LogVariance | input: | (None, 65536)
Dense | output: | (None, 1024)
Sampling | input: | [(None, 1024), (None, 1024)]
MultinormalSamplingLayer | output: | (None, 1024)
CVAE_Decoder
Condition | input: | [(None, 5)]
InputLayer | output: | [(None, 5)]
Code | input: | [(None, 1024)]
InputLayer | output: | [(None, 1024)]
D_Input | input: | [(None, 1024), (None, 5)]
Concatenate | output: | (None, 1029)
GeneratedImage_Features | input: | (None, 1029)
Dense | output: | (None, 65536)


Decoder_Core
DC_Reshape_input | input: | [(None, 65536)]
InputLayer | output: | [(None, 65536)]
DC_Reshape | input: | (None, 65536)
Reshape | output: | (None, 16, 16, 256)
DC_TranConvolution1 | input: | (None, 16, 16, 256)
Conv2DTranspose | output: | (None, 32, 32, 128)
DC_Convolution1 | input: | (None, 32, 32, 128)
Conv2D | output: | (None, 32, 32, 128)
DC_TranConvolution2 | input: | (None, 32, 32, 128)
Conv2DTranspose | output: | (None, 64, 64, 64)
DC_Convolution2 | input: | (None, 64, 64, 64)
Conv2D | output: | (None, 64, 64, 64)
DC_TranConvolution3 | input: | (None, 64, 64, 64)
Conv2DTranspose | output: | (None, 128, 128, 32)
DC_Convolution3 | input: | (None, 128, 128, 32)
Conv2D | output: | (None, 128, 128, 32)
DC_TranConvolution4 | input: | (None, 128, 128, 32)
Conv2DTranspose | output: | (None, 128, 128, 16)
GeneratedImage | input: | (None, 128, 128, 16)
Conv2D | output: | (None, 128, 128, 3)

Training

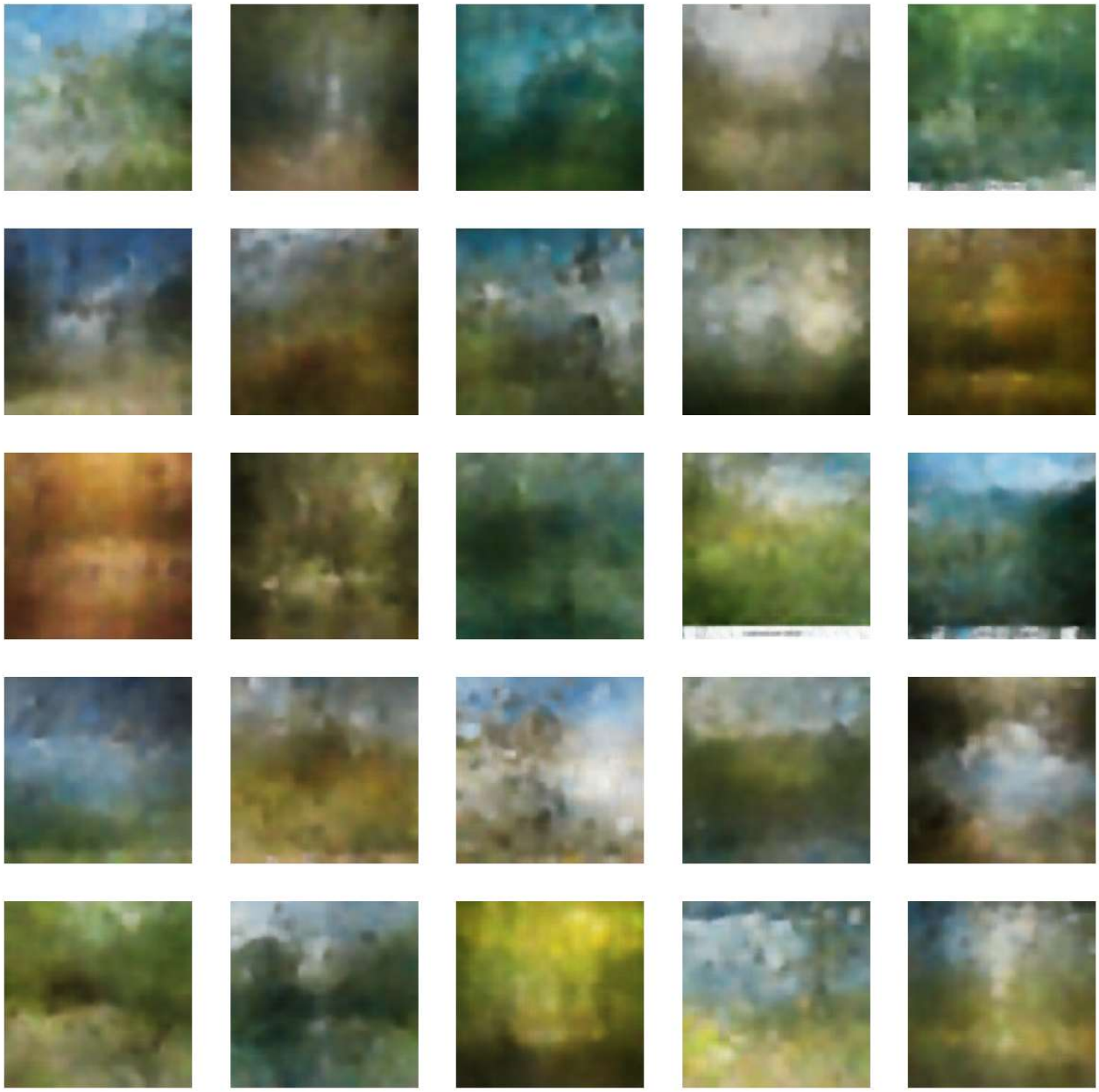

loss
reconstruction_error
regularization_error
val_loss
val_reconstruction_error
val_regularization_error
400
350
300
250
200
150
100
50
0
loss
200
400
600
800
1000
Epochs

Coasts

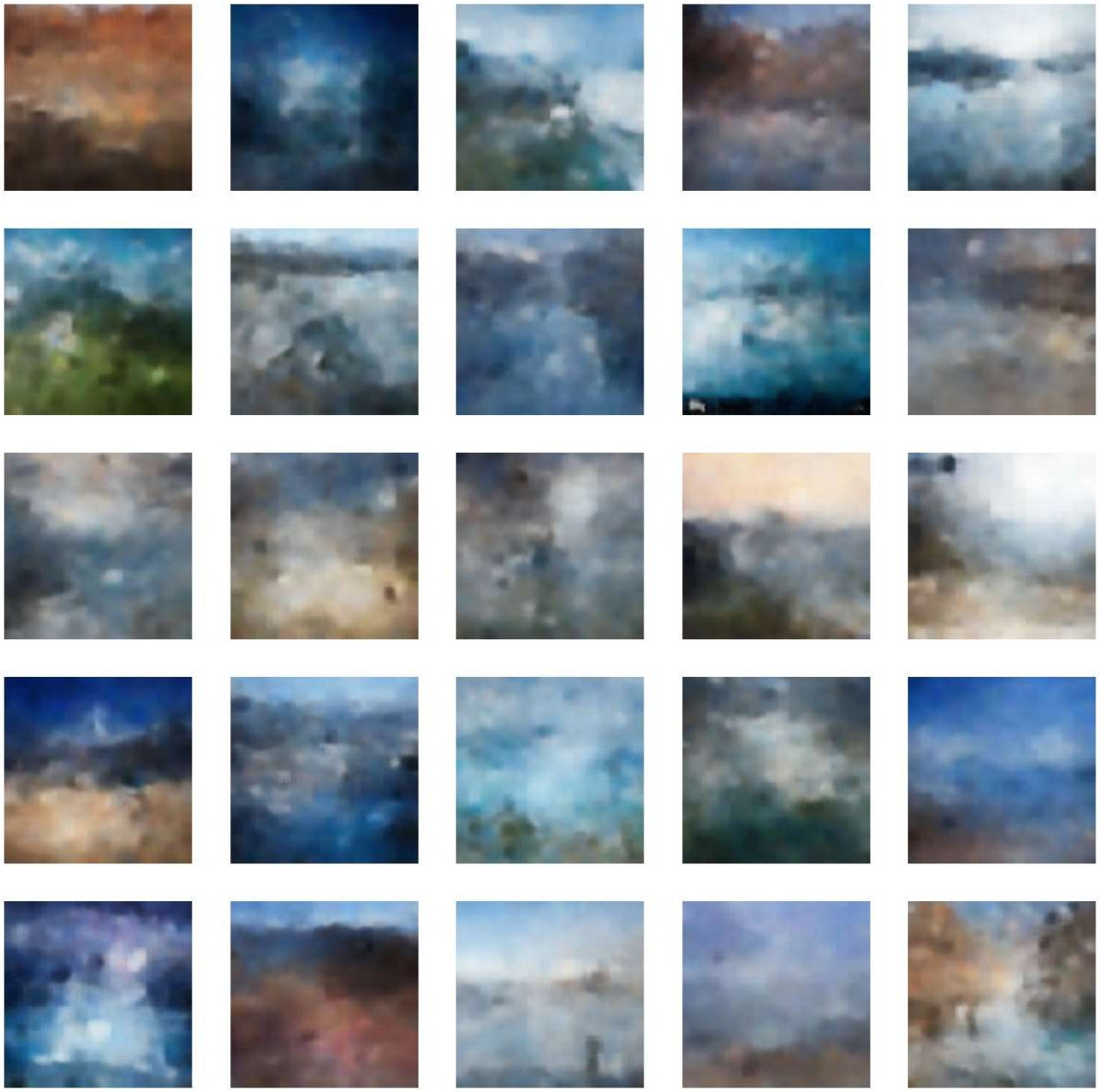


Deserts

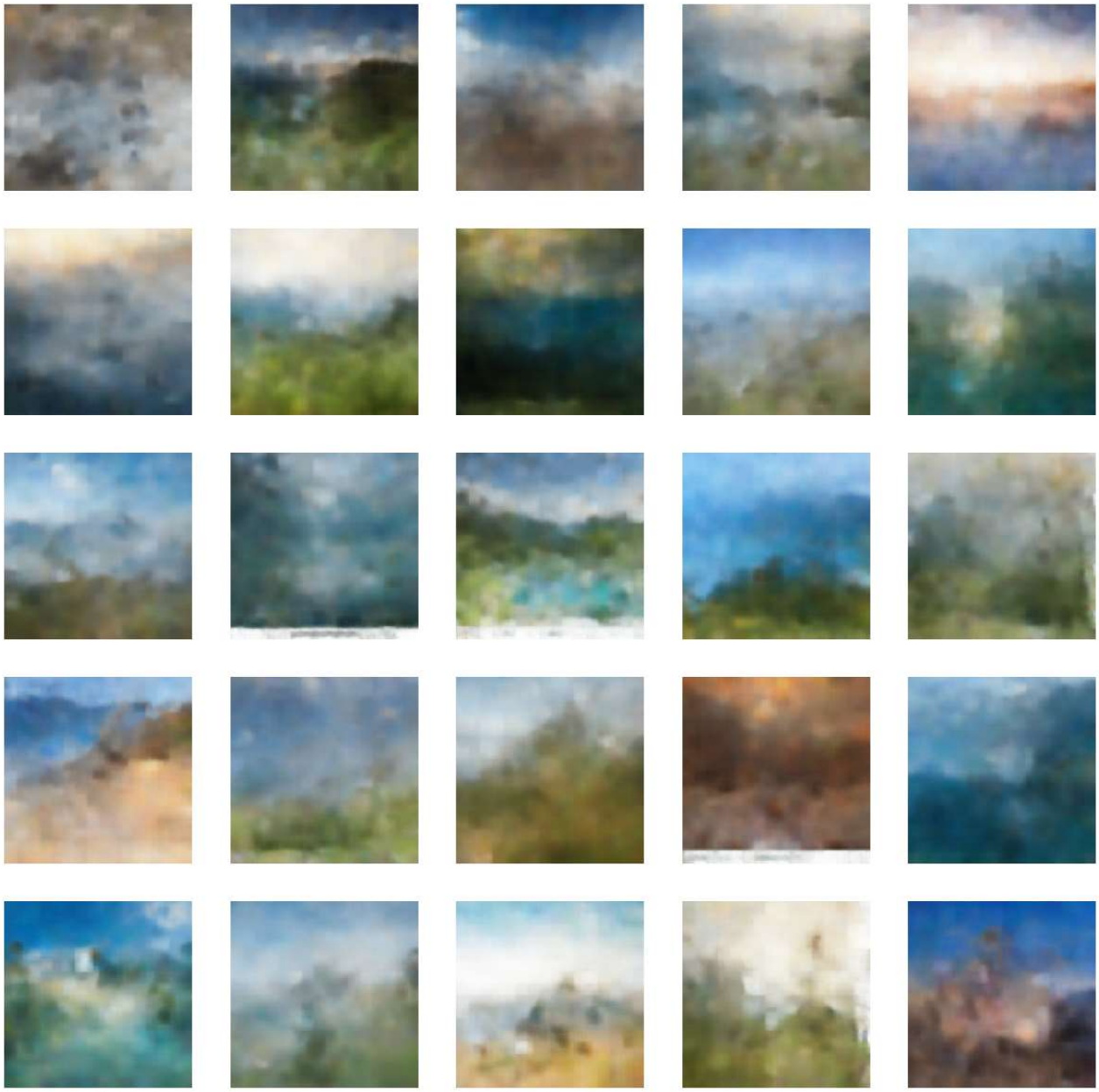
Forests



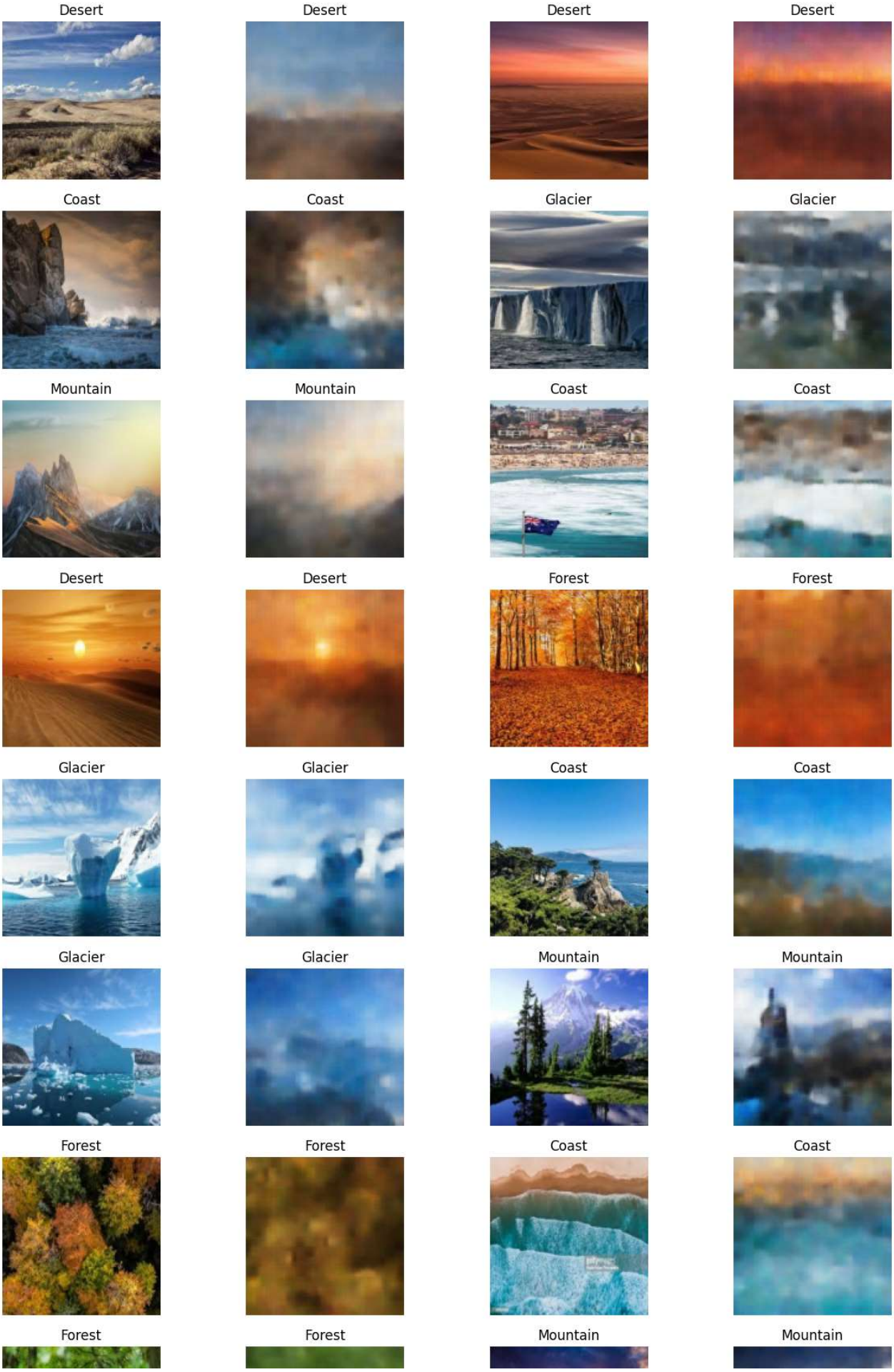
Glaciers



Mountains



Reconstruction


Desert
Desert
Desert
Desert
Coast
Coast
Glacier
Glacier
Mountain
Mountain
Coast
Coast
Desert
Desert
Forest
Forest
Glacier
Glacier
Coast
Coast
Glacier
Glacier
Mountain
Mountain
Forest
Forest
Coast
Coast
Forest
Forest
Mountain
Mountain

Performance Summary

```
[2023-12-08 01:54:08.933102]: Configuration
[2023-12-08 01:54:08.933159]: - Preprocessing:
[2023-12-08 01:54:08.933190]:   - Dataset Size: 12000
[2023-12-08 01:54:08.933223]:   - Dataset Labels: {'Coast': 0, 'Desert': 1, 'Forest': 2, 'Glacier': 3, 'Mount
ain': 4}
[2023-12-08 01:54:09.077378]:   - Image Size: (128, 128, 3)
[2023-12-08 01:54:09.209828]:   - Label Size: (5,)
[2023-12-08 01:54:09.210191]: - Augmentations:
[2023-12-08 01:54:09.210297]:   - Grayscale: No
[2023-12-08 01:54:09.210381]:   - Cut Out: No
[2023-12-08 01:54:09.212637]: - Architecture:
[2023-12-08 01:54:09.212743]:   - Condition Size: 5
[2023-12-08 01:54:09.212856]:   - Code Size: 1024
[2023-12-08 01:54:09.212978]:   - CNN Activation: relu
[2023-12-08 01:54:09.213107]:   - Latent Activation: None
[2023-12-08 01:54:09.213351]:   - Output Activation: sigmoid
[2023-12-08 01:54:09.213477]: - Training:
[2023-12-08 01:54:09.213565]:   - Training Set Size: 9600
[2023-12-08 01:54:09.213684]:   - Validation Size: 1200
[2023-12-08 01:54:09.213803]:   - Test Size: 1200
[2023-12-08 01:54:09.213922]:   - Shuffle Size: 1024
[2023-12-08 01:54:09.214040]:   - Batch Size: 16
[2023-12-08 01:54:09.214080]:   - Max Epochs: 1000
[2023-12-08 01:54:09.214115]:   - Patience: 200
[2023-12-08 01:54:09.214148]:   - KL Coefficient: 1
[2023-12-08 01:54:09.224202]:   - Optimizer: <keras.src.optimizers.adam.Adam object at 0x7f8f201fd570>
[2023-12-08 01:54:09.225030]:   - Learning Rate: 0.001
[2023-12-08 01:54:09.225188]:   - Pre-trained: No

[2023-12-08 01:54:09.225349]: Reconstruction & Regularization
[2023-12-08 01:54:09.225453]: Training loss:   160.434921
[2023-12-08 01:54:09.225548]: - Reconstruction Error:   112.570549
[2023-12-08 01:54:09.225642]: - Regularization Error:   47.864513
[2023-12-08 01:54:09.225738]: Validation loss:   218.525909
[2023-12-08 01:54:09.225832]: - Reconstruction Error:   170.861343
[2023-12-08 01:54:09.225927]: - Regularization Error:   47.664597
[2023-12-08 01:54:09.226000]: Test loss:   216.977966
[2023-12-08 01:54:09.226051]: - Reconstruction Error:   169.508408
[2023-12-08 01:54:09.226144]: - Regularization Error:   47.469563

[2023-12-08 01:54:09.226267]: Generation Quality
[2023-12-08 01:54:09.226309]: Coast      | accuracy:      11.72% | loss:     18.747
[2023-12-08 01:54:09.226342]: Desert     | accuracy:      95.31% | loss:      0.230
[2023-12-08 01:54:09.226372]: Forest     | accuracy:      79.69% | loss:      1.306
[2023-12-08 01:54:09.226459]: Glacier    | accuracy:       9.38% | loss:     21.399
[2023-12-08 01:54:09.226549]: Mountain   | accuracy:      10.94% | loss:     16.586
[2023-12-08 01:54:09.226637]: ---------------------------------------------------
[2023-12-08 01:54:09.226733]: Average    | accuracy:      41.41% | loss:     11.653
```