

Drive-output-38

Parameter	Value	Parameter	Value
Batch_size	16	Nz (embedded space channels)	32
Number of samples	8192	Lambda_AE_X & Y	8
Lr (learning rate)	5e-5	Lambda_rg	16
Number of epochs	150	Sigma list	[1.0, 2.0, 4.0, 8.0, 16.0]
Optimizer	rmsprop	Minimum variance estimated	1e-30
Dist_ae (reconstruction loss function for autoencoding)	L2	Left_clamp	-0.01
Gen_iterations_limit	25	Right_clamp	0.01
Diter_1	100	Redshift_raw_file	fields_z=0.0.hdf5
Giter_1	1	Redshift_file	redshift0_4th_root.h5
Diter_2	5	Inverse transform	4_root
Giter_2	1		
Sampled Cube Edge	128		
Test Cube Edge	512	Slurm	10201178

Architectures

– Changes in bold & italic

• Encoder

```
netD: NetD(  
    (encoder): Encoder(  
        (conv_net): Sequential(  
            (Conv_1): Conv3d(1, 2, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
            (BatchNorm_1): BatchNorm3d(2, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
            (leakyrelu_1): LeakyReLU(negative_slope=0.01, inplace)  
            (Conv_2): Conv3d(2, 4, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
            (BatchNorm_2): BatchNorm3d(4, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
            (leakyrelu_2): LeakyReLU(negative_slope=0.01, inplace)  
            (Conv_3): Conv3d(4, 8, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
            (BatchNorm_3): BatchNorm3d(8, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
            (leakyrelu_3): LeakyReLU(negative_slope=0.01, inplace)  
            (Conv_4): Conv3d(8, 16, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
            (BatchNorm_4): BatchNorm3d(16, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
            (leakyrelu_4): LeakyReLU(negative_slope=0.01, inplace)  
            (Conv_5): Conv3d(16, 32, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        )  
        (fc_net): Sequential(  
            (Linear_1): Linear(in_features=2048, out_features=1024, bias=False)  
            (Linear_2): Linear(in_features=1024, out_features=512, bias=False)  
        )  
    )  
)
```

**Forgot
ReLUs**

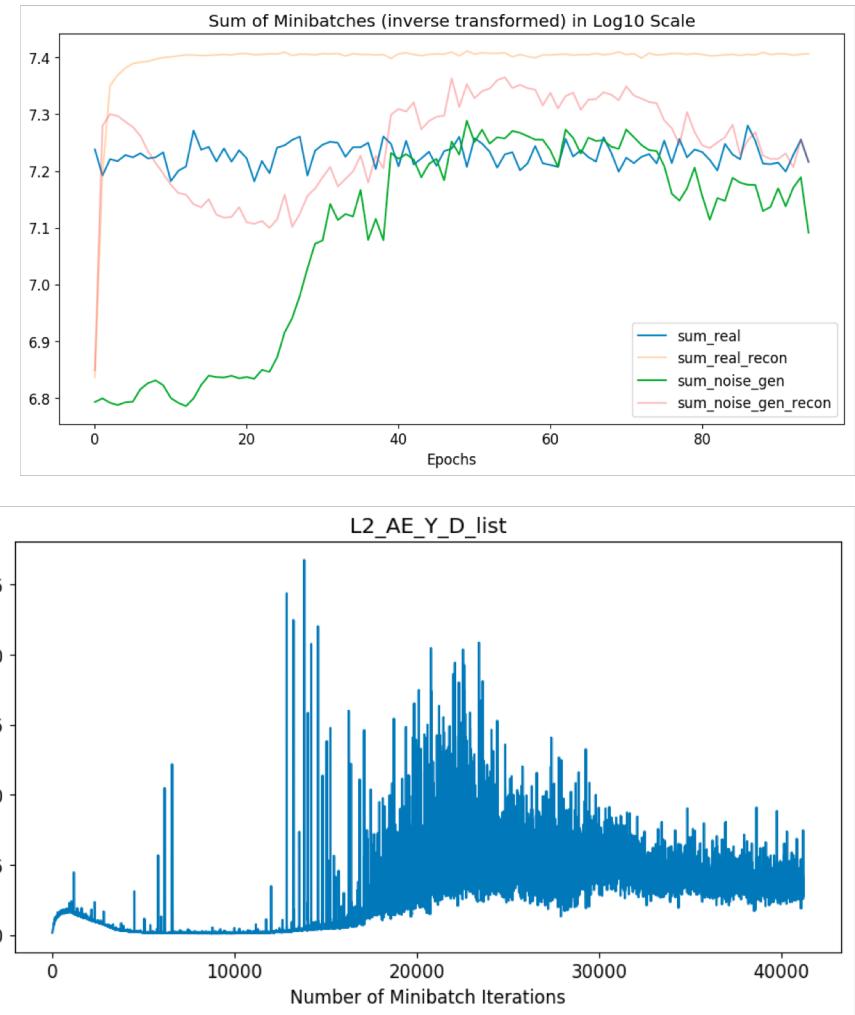
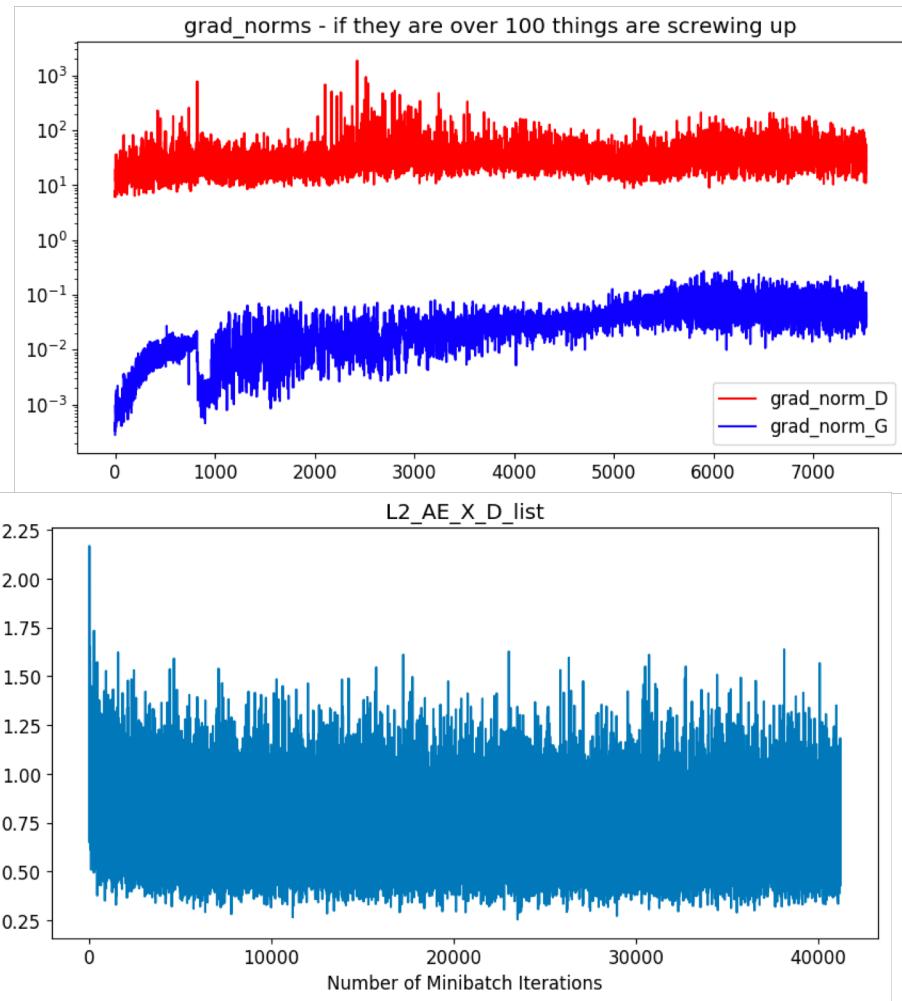
• Decoder

```
(decoder): Decoder(  
    (fc_net): Sequential(  
        (Linear_1): Linear(in_features=512, out_features=1024, bias=False)  
        (Linear_2): Linear(in_features=1024, out_features=2048, bias=False)  
    )  
    (deconv_net): Sequential(  
        (DeConv_1): ConvTranspose3d(32, 16, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        (BatchNorm_1): BatchNorm3d(16, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
        (leakyrelu_1): LeakyReLU(negative_slope=0.01, inplace)  
        (DeConv_2): ConvTranspose3d(16, 8, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        (BatchNorm_2): BatchNorm3d(8, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
        (leakyrelu_2): LeakyReLU(negative_slope=0.01, inplace)  
        (DeConv_3): ConvTranspose3d(8, 4, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        (BatchNorm_3): BatchNorm3d(4, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
        (leakyrelu_3): LeakyReLU(negative_slope=0.01, inplace)  
        (DeConv_4): ConvTranspose3d(4, 2, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        (BatchNorm_4): BatchNorm3d(2, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)  
        (leakyrelu_4): LeakyReLU(negative_slope=0.01, inplace)  
        (DeConv_5): ConvTranspose3d(2, 1, kernel_size=(4, 4, 4), stride=(2, 2, 2), padding=(1, 1, 1), bias=False)  
        (relu_5): ReLU(inplace)  
    )  
)  
)
```

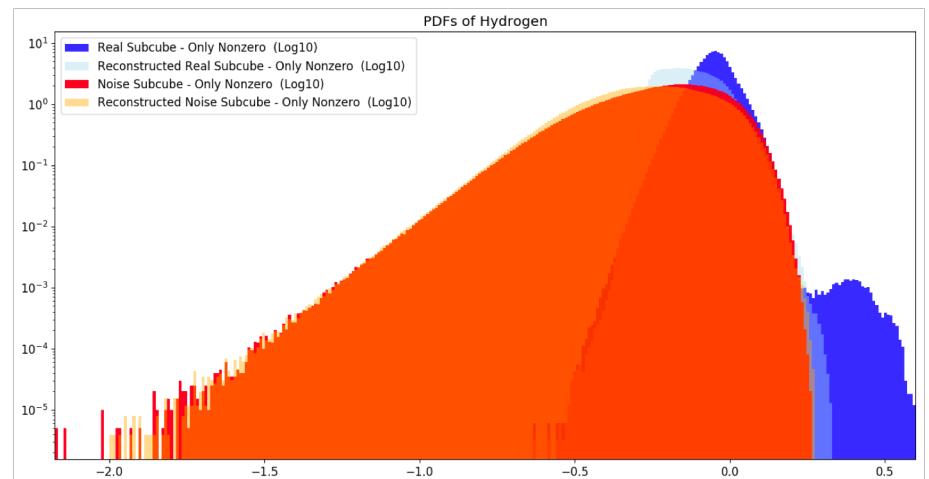
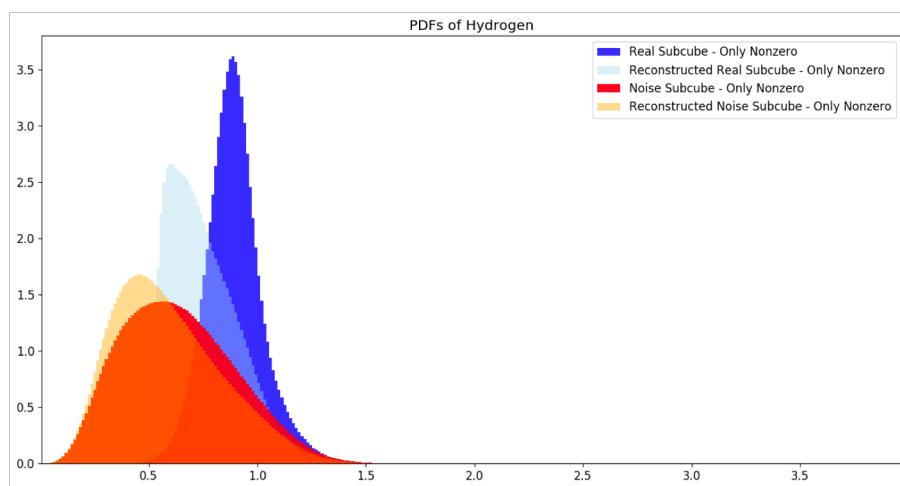
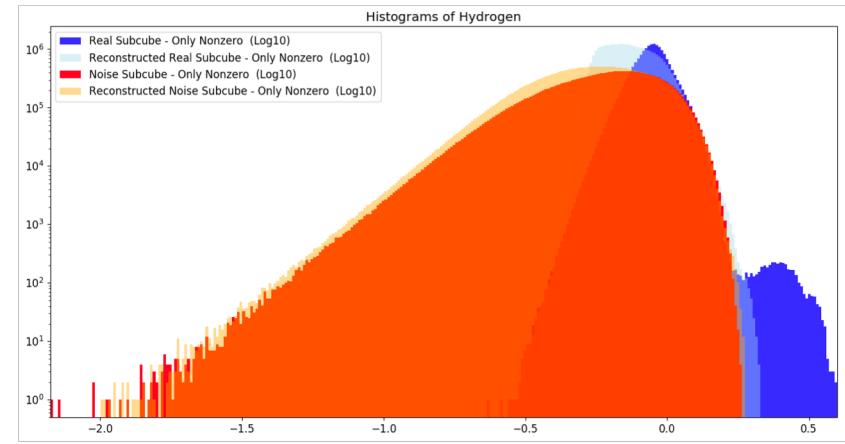
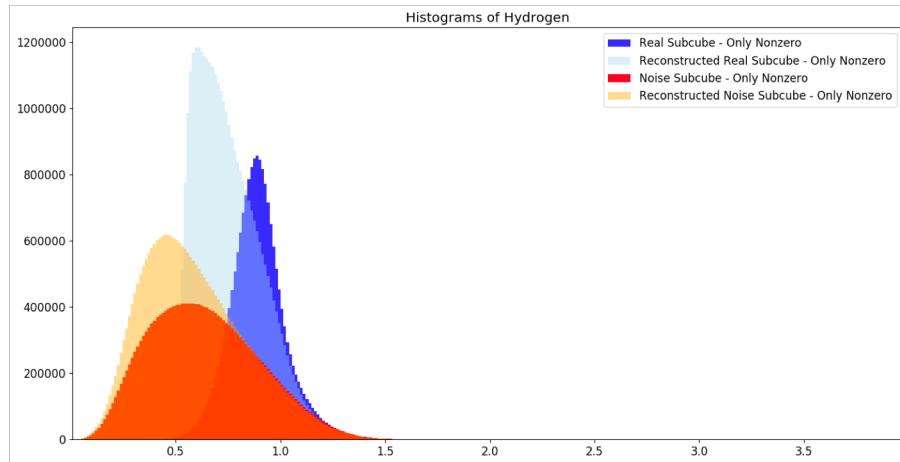
**Forgot
ReLUs**

Discriminator = Encoder + Decoder | Generator = Decoder

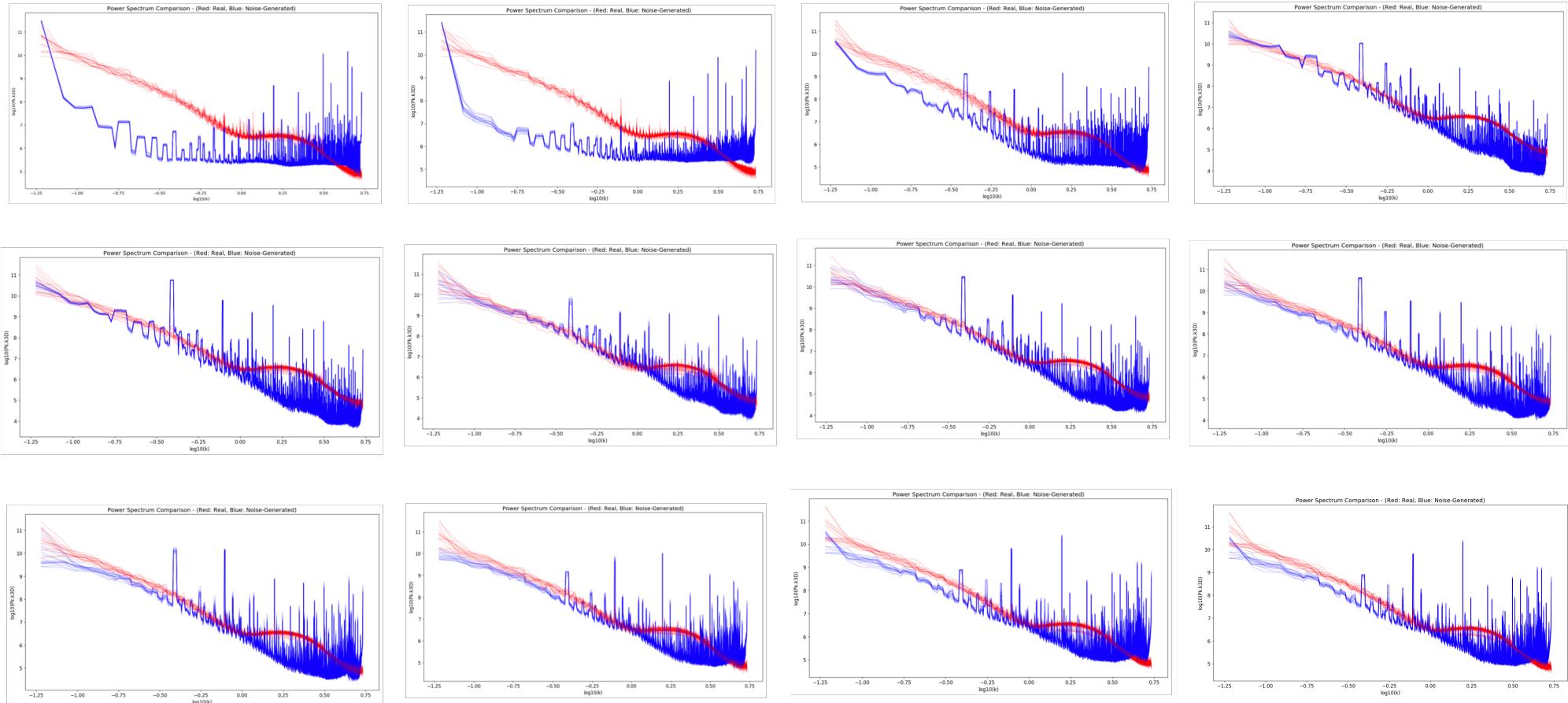
Plots - Training



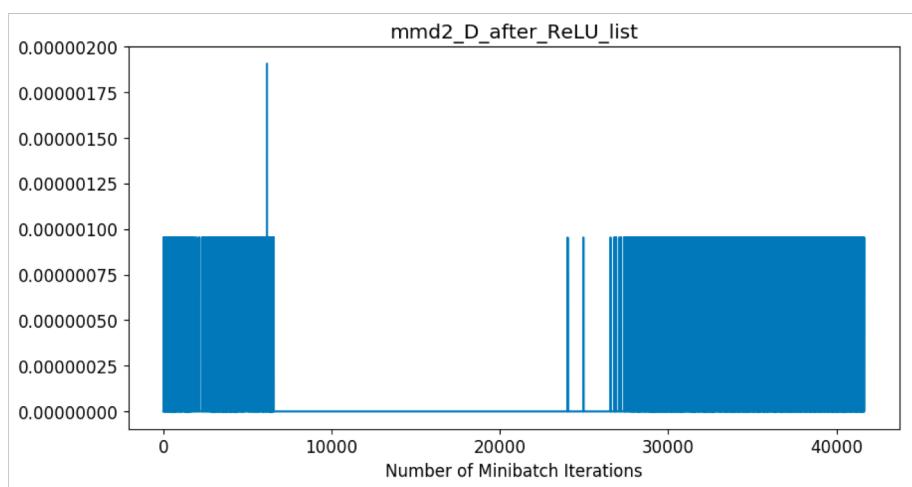
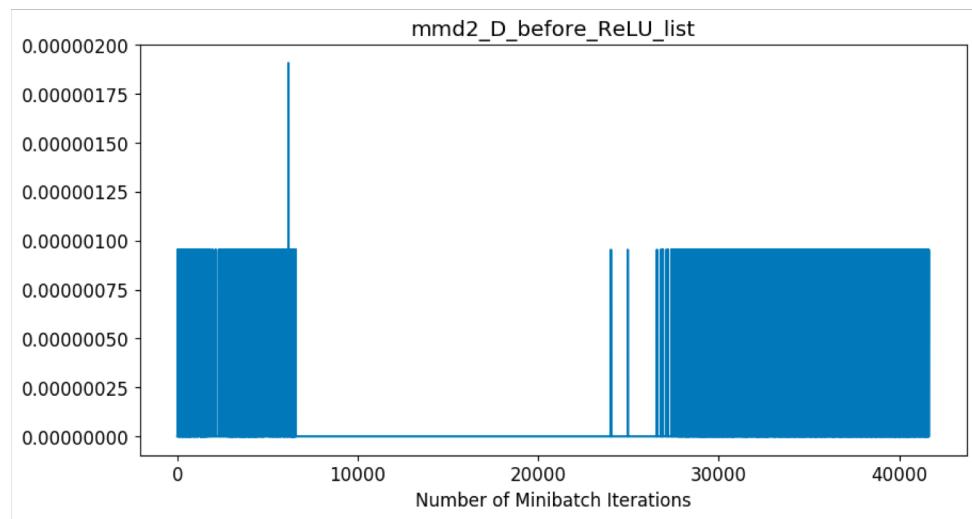
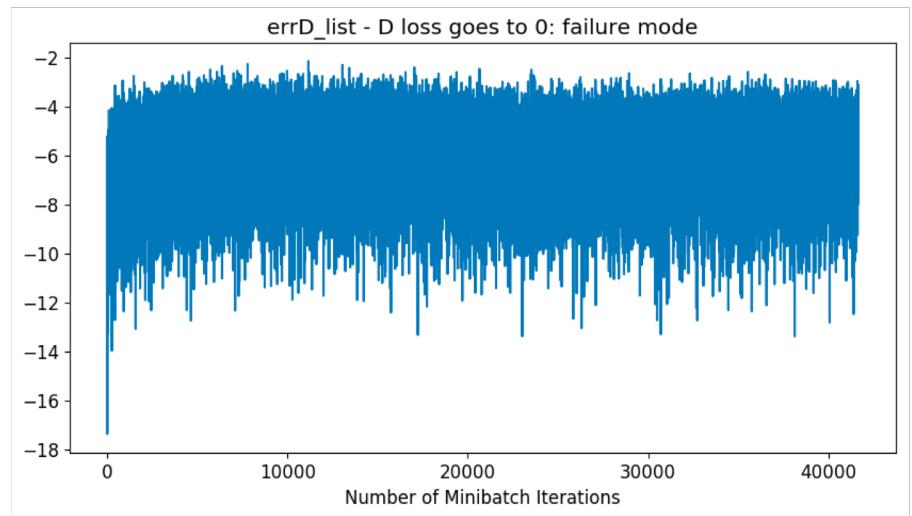
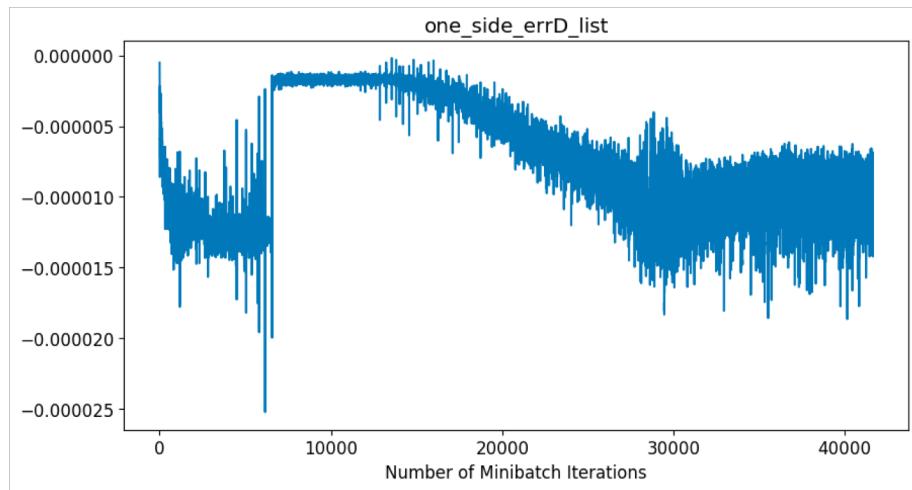
Plots – Matter Distributions



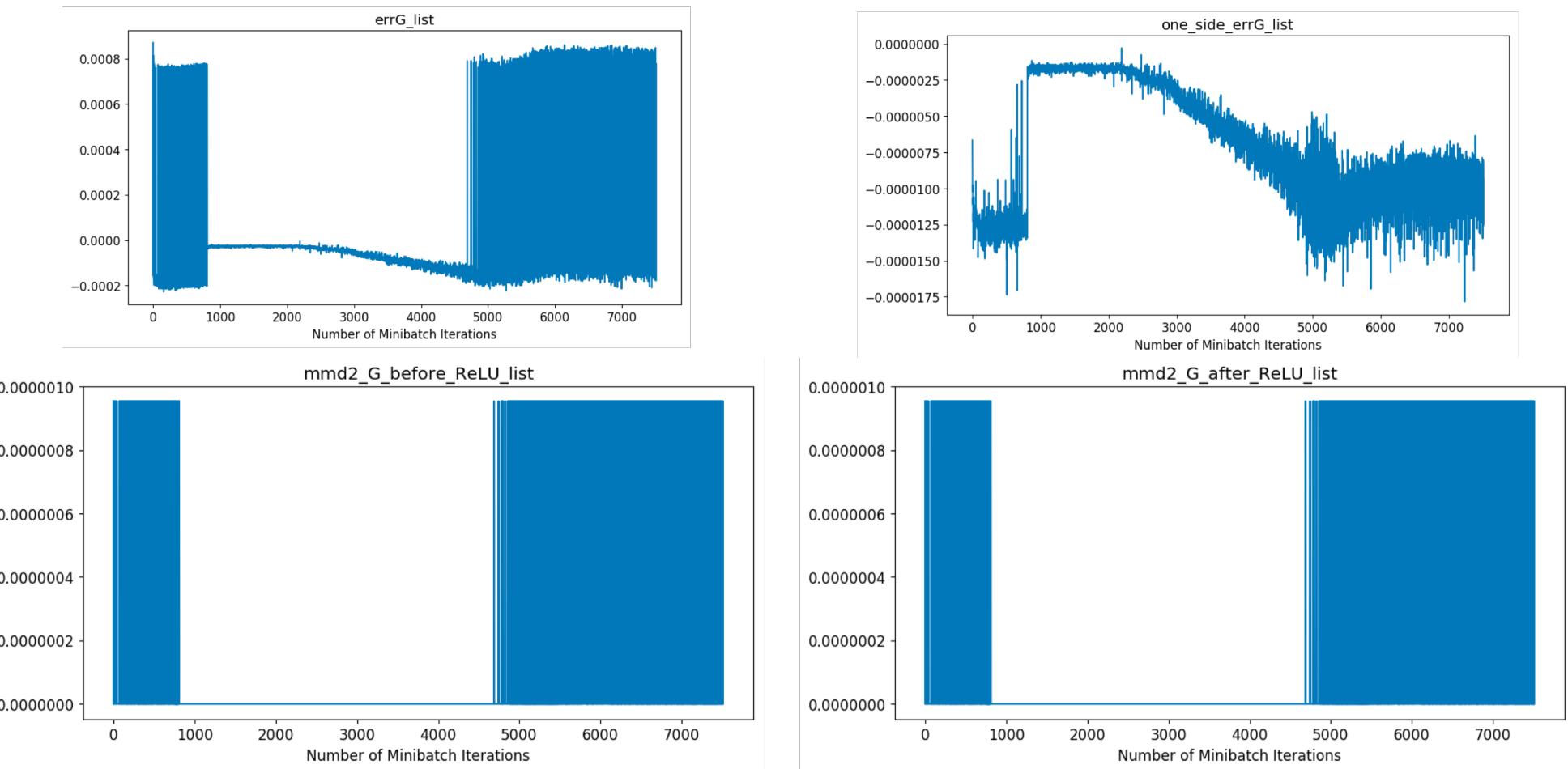
Progression of Power Spectrums – Epoch 0, 15,30,45,60,75,90,105,120,135,150



Plots - Discriminator

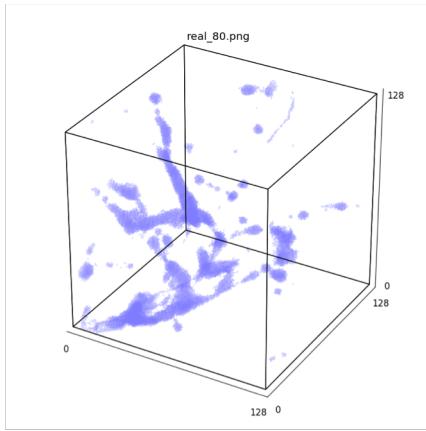
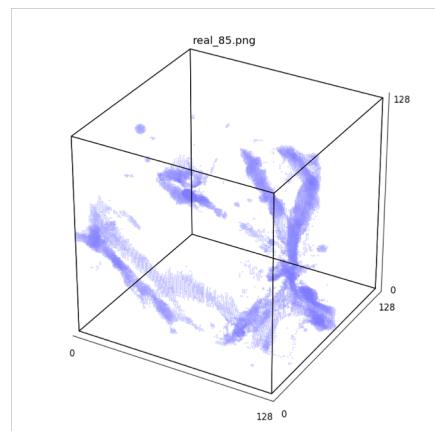
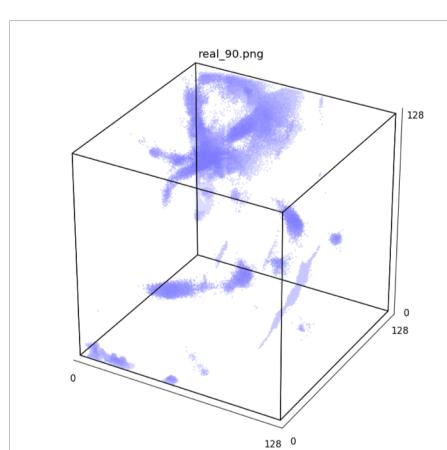
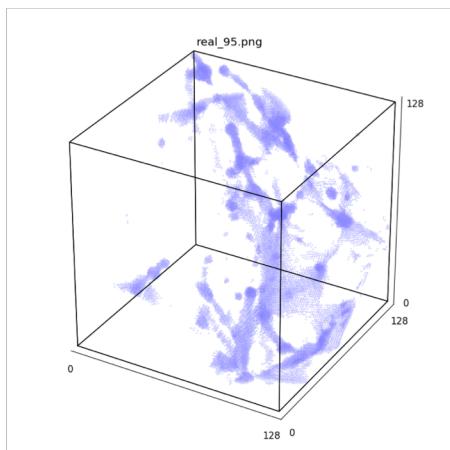


Plots - Generator

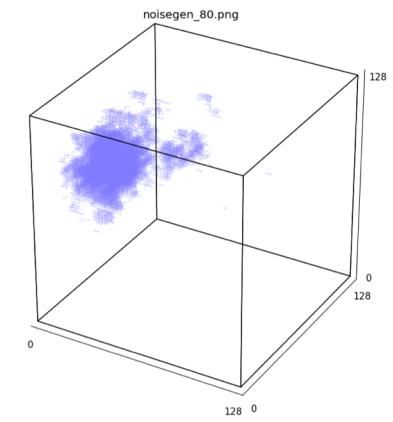
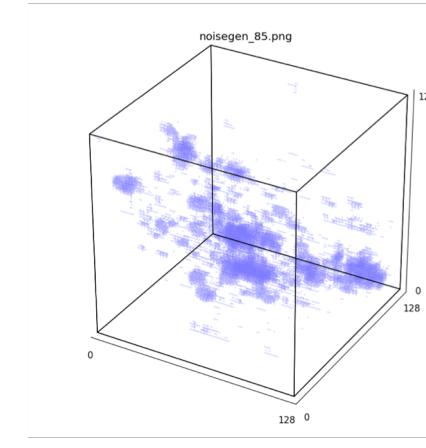
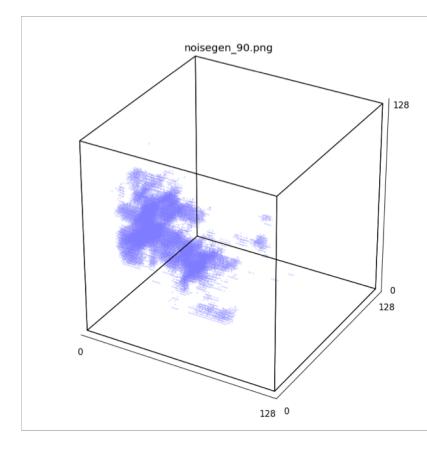
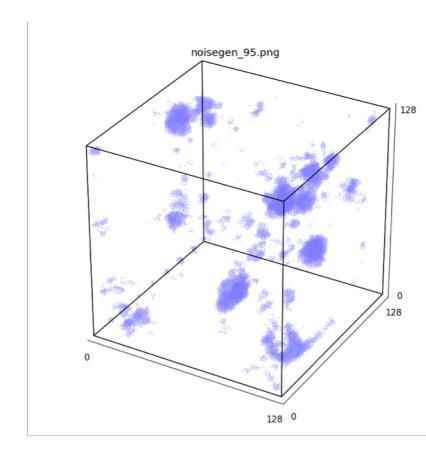


3D Plots of Real / Noise Input / AE Real / AE Noise

REAL



NOISE-INPUT GENERATED



Progression of Fixed Noise-Input Generations

