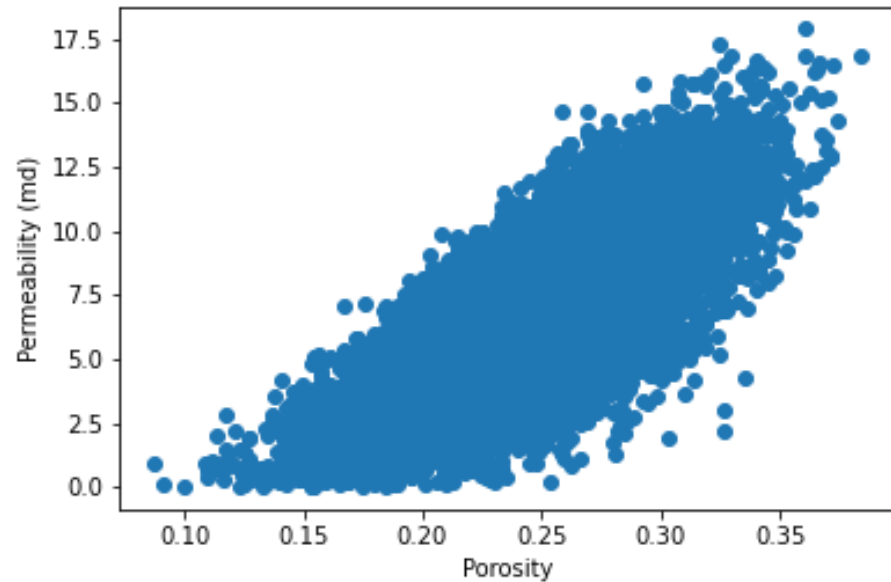
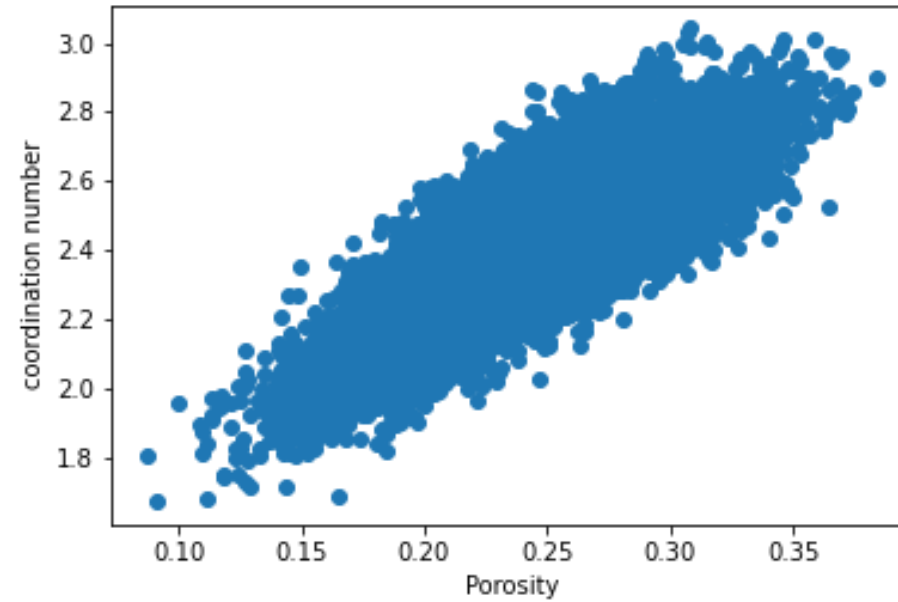
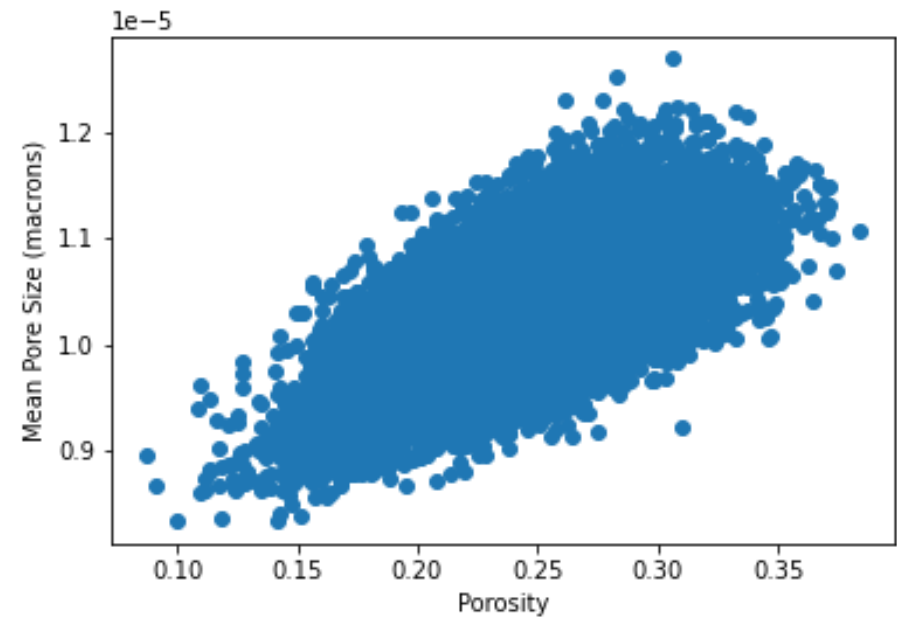


3D development

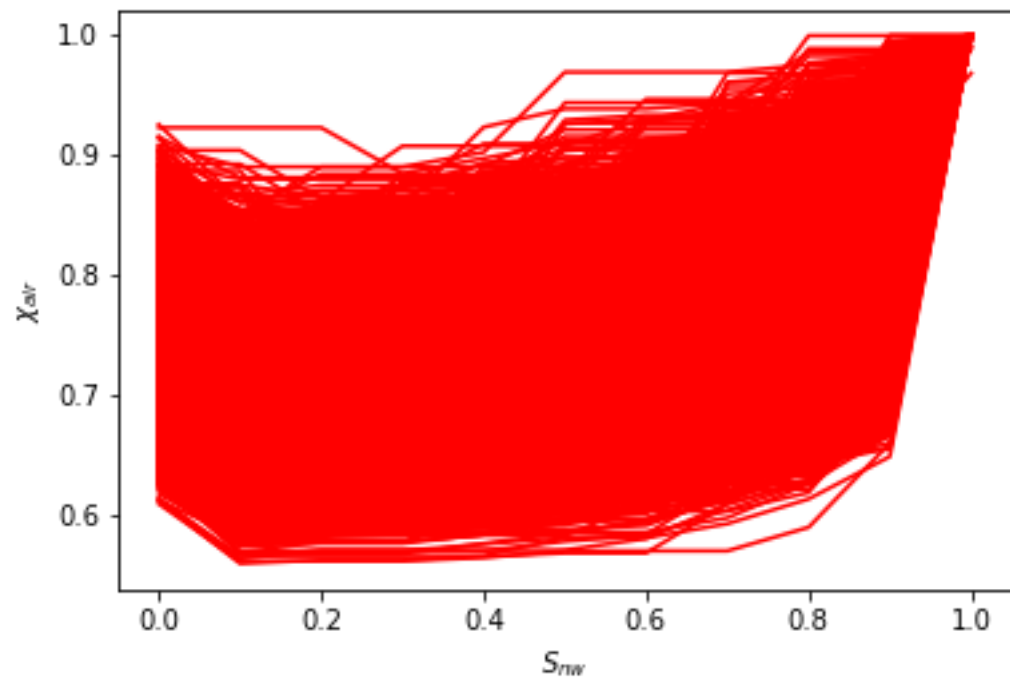
- Database preparation
 - 23000 128^3 voxels (resolution: $2.25e - 06$) sampled from 1000³ *macrons* Berea sandstone
 - Build pore network models and perform stokes flow simulation for each 128^3 subsamples and calculate $\phi, k_{abs}, \chi_s, D, k_w, k_{nw}, kr_w, kr_{nw}$
 - χ_s : phase connectivity; k_w, k_{nw} : effective permeability of wetting and non-wetting phase; D : mean pore size parameters;
- 3D GAN development:
 - Replace 2D Convolutional layers with 3D convolutional layers
 - Add check in points to save training progress at every epoch



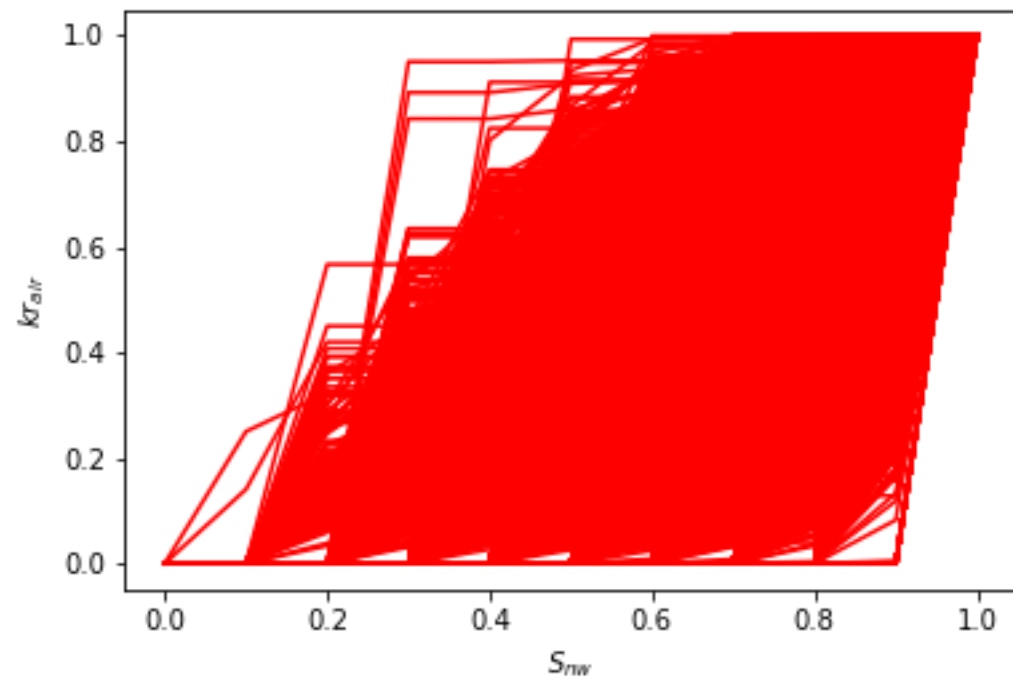
Correlation table

	phi	kabs	coord	psd
phi	1	0.77843526	0.81036771	0.66078823
kabs	0.77843526	1	0.67175128	0.56338504
coord	0.81036771	0.67175128	1	0.69415659
psd	0.66078823	0.56338504	0.69415659	1

- Porosity, permeability, coordination number and mean pore size are linearly correlated with each other
- The scale of absolute permeability is small: just realized a tiny mistake in calculating absolute perm after simulation. I'll fix this in next week.



Collection of phase connectivity curves



Collection of relative perm curves

Improvement thoughts

- Preprocess geological features as PCA components
- The generation process may still be dominated by porosity instead of multi modal features unless we add our own physical loss functions