Vs30 R code to Python

It was found to be necessary to convert the velocity model generation code to Python because:

- R code was using too much RAM.
- R code was slow.
- Using less RAM was taking too much effort and freeing RAM is slow.
- Looping over smaller subsets was too slow, difficult to work with.
- Everything is global, wasting RAM and messy.
- Libraries duplicating RAM of input data, not releasing it.
- Combining a 3GB dataframe after splitting it made it use 16GB RAM.
- Taking the first 20 million elements from a dataframe took ages and RAM usage blew up.

Outcomes

- Most if not all code runs in Python, mostly using numpy and gdal.
- Code runs in minutes instead of days.
- Can run on a machine with 32GB RAM (16GB should be enough too).
- Can run with larger input datasets.
- Can create finer resolutions than 100m.
- Results easily viewed/interrogated in QGIS project. Easily shared.

Currently all processing elements have had Python algorithms/process found/investigated except MVN.

Steps

- ☑ **s65** Terrain model interpolation given values (core completed).

- ☑ **s65/s66** Geology model polygon interpolation (algorithm found 10,000s times faster).

- ☑ **s66** Rest of geology model datasets, eg store slope as TIFF.

- ☑ **s66** Rest of geology model processing rules.

- ☑ **s66** Synchronise outputs between geology and terrain (run with same parameters).

- ☑ **s66** Combination of geology/terrain.

- ☑ **s66** Store all outputs.

- ☑ **s66** Argument version for running complete workflow.

- ☑ **s66** Create QGIS project including outputs as layers, open street map.

- ☑ **s66** Convert VSPR to Python (loading and pre-processing measured sites).

- ☑ **s66** Posterior model modification to Python using already available clustering code.

- ☑ **s66** Run at 50m, 10m resolution.

- ☑ **s66** Compare results.

- ☑ **s67** Look into converting MVN code to Python (find main algorithms/ processes required).

- ☑ **s67** Convert if algorithms/processes found and reasonable in Python.

- ☑ **s67** Implement MVN in Python.

- ☑ **s67** Point based calculation as well as raster based.

- ☑ **s67** Investigate sources of differences (Vs30 Data Reproducibility/Verification).