Realistic models of landscapes are frequently needed for 3D renderings, VFX work or video games. However, modelling landscapes can be a complicated and labour-intensive task, and for this reason many algorithms have been proposed to automate the process.
Among the many possible ways to create a synthetic landscape, the most common one is to simulate the various types of erosions (e.g. erosion caused by glaciers and rivers) that create real eroded landscapes, like the Grand Canyon.
Many solutions have been published to simulate such terrain erosion processes in computer graphics. However the authors usually only focus on recreating a landscape at geometry level, and ignore the shading level. But surface colours and textures that match the coarse geometric features created by the erosion simulation are also essential ingredients for a believable result. And obtaining detailed surface textures by running a simulation that is able to catch all the micro-details involved is usually technically infeasible due to the involved complexity.
The method that we propose attempts to get around this barrier by applying suitable detail shaders to the results of a coarse-grid erosion simulation. Specifically, we will work with a dictionary of pre-generated shaders for landscape appearance: these will be both "plain" colour shaders, such as patterns for rock colour, as well as displacement maps, e.g. for gravel and shingle, or rock-faces. For these shaders, we will develop a principled way to apply them to the coarse result mesh of the erosion simulation in such a way that they are applied in locations where they are most suitable. This process will be mainly driven by pertinent information that is retained from the erosion simulation, e.g. on the amount of erosion that a given polygon has been subjected to, or its proximity to water flow.
We will demonstrate the principle of such a threefold geometry-displacement map-colour shader approach for a particular erosion simulation. In such a controlled setting we plan, with a comparatively small set of sample shaders, to show that the basic approach of basing shader application on extra data retained from the erosion simulation has merit.