Homework 9: Erosion Simulation of a Landscape You Created

For this homework, you will use an existing landscape evolution code that differs from the computer lab's version by the presence of an ocean and the absence of uplifting forces. In the first part of the assignment you will be asked to interpret the provided simulation code, and in the second part, you will be asked to erode a landscape that you created yourself.

(1) Download the four provide Matlab files:

calculate_collection_area2.m *initial_conditions_add_hill.m*
pool_check10.m *erosion_ocean07.m*

and execute the last file. Describe in your own words, how the initial conditions are chosen and what geological features they represent.

Give an interpretation of the variable '`oceanLevelParameter`'.

Run the code several times, describe the resulting evolution. Say how the geological features change with time. What happens to the ocean?

(2) Now please modify the existing code by replacing the section where the initial conditions are set with your own code. (Please do not use random numbers anywhere because we may not be able to grade your homework properly.) Creating your own landscape model can be difficult and several approaches were discussed in lecture. Please feel free to use and combine them. Part of the homework grade will be given for ***creativity.*** Say exactly what geological features you are trying to model even if their presentation is not perfect.

Without changing the simulation parameters, erode your landscape with the provided code. Submit a GIF file and describe in detail how your landscape evolved. Identify missing effects in the simulation if there are any.

(3) Now change the simulation parameters including K, D, n, m, the ocean level, and maybe dt and also the spatial resolution in order to erode you own landscape in a different way. Say what effect the parameter changes had. We will assign points for good descriptions. See if you find some interesting effects. Again, we give points for creativity. Submit your code with all subroutines and an animated GIF file to represent you best landscape evolution model.