GLY 5705 – Quantitative Geomorphology
Fall 2008
Problem Set 3 – Hillslopes

*Mature Hillslopes*

(1) On a hillslope with regolith 1.2 m thick, and regolith production rate of 8 µm/yr, what is the mean residence time of regolith on the hillslope?

*Biogenic Processes*

(2) How much strain does a soil sustain from the growth of tree roots? Assume that the tree roots are 10 cm in diameter, are simple vertical tap roots, and are spaced at 1.5 m spacing. (Obviously this is a very simple model of roots!) How much ought the soil to inflate vertically due merely to this tap root growth if the soil is 1 m thick?

*Landsliding*

(3) A large landslide deposit is discovered on a valley wall across from its obvious source (scar) on the opposite valley wall (see figure). Both valley walls are steep, sloping 30 degrees from the horizontal. The landslide deposit is 250 m above the valley floor, while the scar on the opposite side is 1500 m above the valley floor. Using this information, place bounds on the velocity with which the landslide mass must have been traveling as it crossed the valley floor. Be sure to provide the formula you are using before you plug in numbers.

If the slide mass had been seen to fail by some fortunate (?) observer on the valley floor directly in the path of the slide, roughly how long would the observer have had to get out of the way?