GLY 4734/6932 - Coastal Morphology and Processes
Alongshore Sediment Transport

March 14, 2019

Names: _____ Group: _____

1. Describe how each of the following changes as wave angle changes:

   (a) Alongshore component of wave energy density (E_y)

   (b) The ratio of distance between wave rays at breaking to distance between wave rays when they reach the shore (W_{break}/W_{shore})

   (c) Sediment flux

2. Describe how each of the following changes as wave height changes:

   (a) Alongshore component of wave energy density (E_y)

   (b) The ratio of distance between wave rays at breaking to distance between wave rays when they reach the shore (W_{break}/W_{shore})

   (c) Sediment flux

3. How much alongshore sediment transport potential exists when wave angle is 0? Why is this?

4. How much alongshore sediment transport potential exists when wave angle is 90? Why is this?

5. What wave angle would you expect to yield the highest alongshore sediment transport? Why?

6. Recall that alongshore sediment transport is primarily driven by wave-generated alongshore currents. Komar (1971) used this relationship to define the volumetric alongshore sediment transport potential (Q_s) as follows:

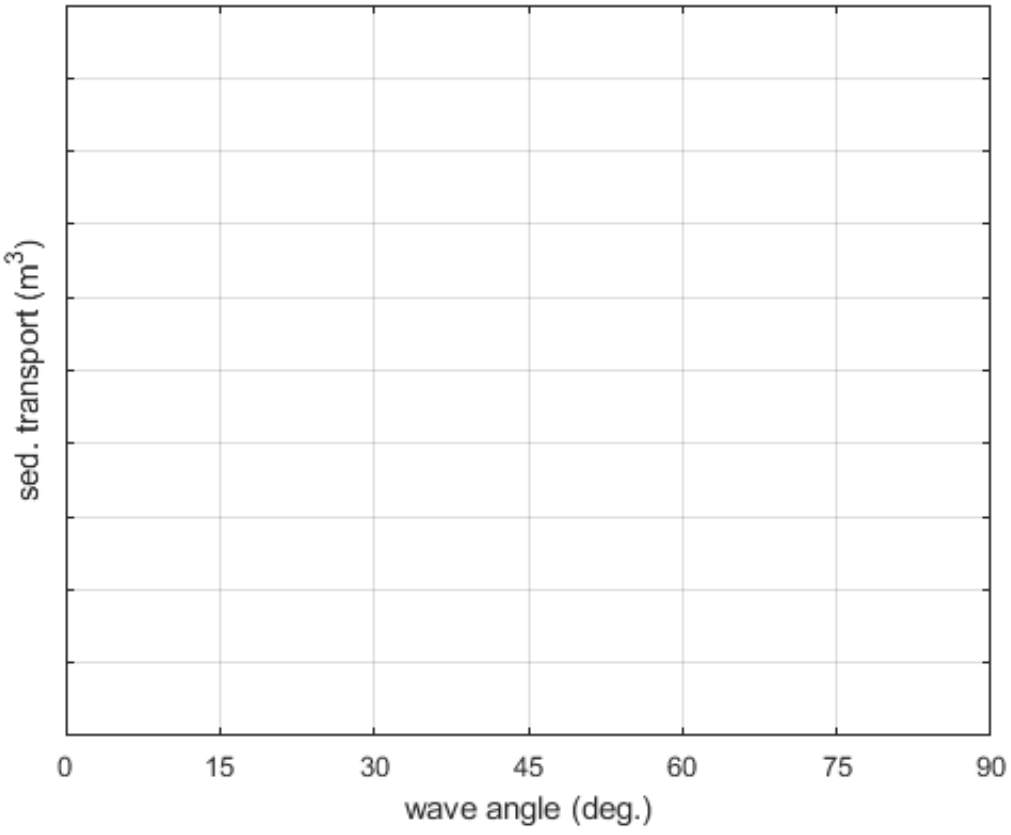
$$Q_s = K_1 H_b^{5/2} \cos(\alpha) \sin(\alpha)$$

where K_1 is an empirical constant, H_b is the breaking wave height, and α is the angle of the wave crest relative to the shoreline.

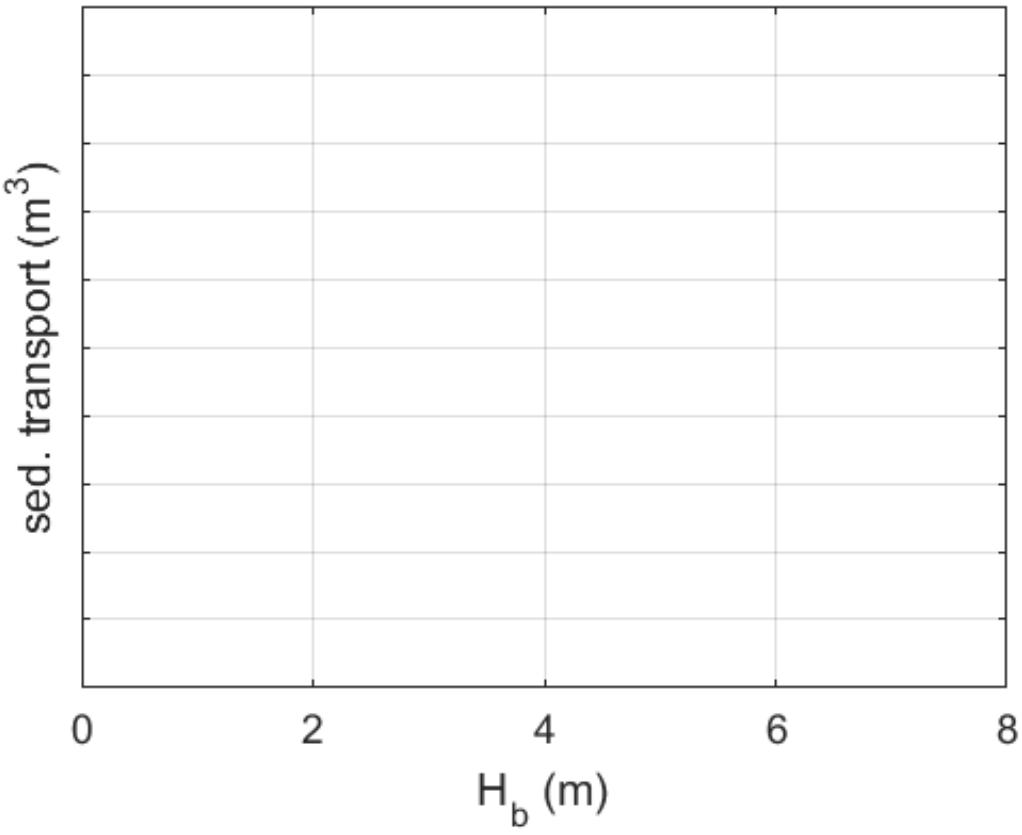
(a) What does $\cos(\alpha)$ represent in this formula?

(b) What does $\sin(\alpha)$ represent in this formula?

7. Use the diagram below to illustrate the relationship between alongshore sediment transport potential and wave angle when all other variables are held constant.



8. Use the diagram below to illustrate the relationship between alongshore sediment transport potential and breaking wave height when all other variables are held constant.



References

1. Ashton, A., Murray, A. B., & Arnoult,. O. (2001). Formation of coastline features by large-scale instabilities induced by high-angle waves. Nature, 414(6861), 296.

2. Komar, P. D. (1971), The mechanics of sand transport on beaches,J. Geophys. Res.,76, 713721.