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GEOG 493/593 Digital Terrain Analysis
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"Quantifying and Investigating Coastal Erosion in the Cannon Beach Littoral Cell:
 a Volumetric Change Analysis"

Coastal erosion poses a serious threat to human life, property and is an agent of habitat degradation. Coastal erosion is sensitive to many changes in the natural and anthropogenic environment and the effects of coastal erosion are predicted to worsen with anthropogenic climate change. Much literature regarding coastal erosion involves detailed ground measurements or focuses on coastline migration, therefore the use of LiDAR data in the study of coastal erosion may provide a more feasible means to accurately model this phenomenon whilst also revealing very fine spatial and temporal patterns. This analysis focuses on quantifying the processes of erosion and deposition in a 15 mile stretch of the Oregon coast, the Cannon Beach littoral cell. Seven lidar-based digital terrain models were constructed and compared in six separate volumetric change analyses, ranging over a time interval of 19 years (1997-2016). This report outlines the methods and best practices developed for performing these analyses as well as a method of quantifying the RMSE error for the models. The total erosion, deposition and net volume change within the Cannon Beach littoral cell are described for these 6 time intervals as well as the rates of these processes for each interval (normalized across the study areas). Additionally, estimates of the long-term rates of coastal erosion or accretion are provided via 3 separate regression analyses.

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