



Use of Coastal Morphometrics for Determination of Spatial Changes and Damages from Tsunami of 2004 on Southern Coastal Area of Sri Lanka

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Abstract

Morphometric features are important to differentiate the tsunami process and the damages due to tsunami waves. Three specific parameters affect such changes and they can be categorized as indentedness, plan curvature of the coastline and orientation of the coast. The indentedness of a coast basically forms various kinds of coastal features such as, pocket beaches, baylets, lagoons, estuaries, Islands, headlands and sea cliffs. Depending on these natural features, the force of waves is refracted or reflected. Natural shape of a coastline may be arcuate, straight or irregular where there are bed rocks or other interferences. Arcuate may be concave or convex. Convexity and concavity can be recognized spatially, in the indentedness coastlines. According to the location of morphological features such as, bedrocks, headlands, sand dunes, sea cliffs and estuaries, the plan curvature would be different, and it was concave, convex or straight. These morphological features influence the function of tsunami waves as well as normal sea waves. Orientation is significant in terms of the direction of a wave that approach. This can be determined by measuring the direction in which perpendicular seaward to a straight line that link adjacent headlands or coastline protuberances is aligned. Coastal orientation affects the directional incidence of tsunami waves as well as normal sea waves and winds. Therefore, approaching waves are refracted or reflected depending on the angle of waves, that is created by the orientation of the coastline and it causes to change direction of wave refraction approaching by various directions. The function of these three factors caused to change the tsunami process and the impacts have been analyzed using IKONOS Satellite Images and GIS Techniques. "I" index is used to measure indentedness value, which is the main morphometric characteristic that influence to change the tsunami process quantitatively. It was determined by using the formula $I=(L/D \times 100)-100$ (Swan, 1974;1983). Beach plan curvature values in most beaches in the Southern coastal areas range from 10 to over 100 and, it has been described using the same formula as for indentedness or in terms of L/D alone. The changes of coastal orientation have been measured in degrees in order to investigate the behavior of tsunami waves on coastal areas. On the basis of these analyses, the level of damages and changes of tsunami were identified and according to them the level of the damages or changes, have been classified as high, moderate, low, not affected or not damaged.

Key words: *Morphometrics, tsunami, plan curvature, indentedness, orientation*

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