Accurate quantification of coastal hazards remains a crucial issue in light of predicted global sea level rise resulting from climate change. Current predictions, for the year 2100, propose a global mean sea level ~1 m above pre-industrial levels, which will exacerbate coastal impacts, especially along vulnerable coastlines of developing countries [1, 2]. Recent studies have predicted a future coastline retreat ~110 m between 2009 and 2024 along the soft-cliffs of Minuto de Dios, a sector near Arboletes municipality on the Caribbean coast of Colombia [3]. The aim of this study is to improve upon previous results by including a more accurate quantification of local mean sea level rise and a digital terrain model derived from light detection and ranging data [4, 5].

Future cliff-top positions were calculated for a ~1 km alongshore reach of coast located at the Minuto de Dios sector (MD) by means of a validated, simple model that relates retreat rates to sea-level rise [6, 7]. Mean end-point retreat at MD between 1938 and 2010 was 1.7±0.4 m/yr, which would increase to 2.6±0.6 m/yr between 2010 and 2046 due to accelerated global mean sea level rise, implying a future coastline recession of 92.5±20 m with a cumulative release of ~625,000 m$^3$ of rock. The calculated coastal retreat, presented herein, implies significant impacts on local infrastructure, including the loss of approximately 100 urban constructions of MD. In addition, the 2046 coastline would be located ca. 50 m from the main road that connects Arboletes with Montería city. As observed in this study, climate change-driven sea level rise may exacerbate already important coastal hazards along the littoral zone of MD. These results will help inform policy makers and enable improved local coastal management solutions.

**References**


**Accuracy of Sea Level Rise**

Figure 1. Study area showing the location of Minuto de Dios sector in the context of South America (A) and Caribbean of Colombia (B). Double black circles in A and B highlight the location of Southeast Caribbean and Arboletes, respectively. Map in C shows geomorphological information of the littoral of Arboletes as in 2009. Notice position of 1938 coastline, coastal structures, and diapiric dome associated to the mud volcano [8, 9].

Figure 2. Physiography of Minuto de Dios coastline evidences recent, human-related coastline retreat. Historical cartography and aerial photos show Punta Rey peninsula in 1789 (A) and 1938 (B) that disappeared entirely by 2009 (C) [9, 10]. Aerial view of MD littoral is characterized by irregular, erosional contours (D) with presence of stacks, caves, mass movements, and notches (E). Urban constructions suggest an acceleration in coastline retreat since 2009 ~8 m in 2012 (F) and ~40 m in 2015 (G), cf. Fig. 4.