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Sands of Time: a Renourished Beach vs. a Non-renourished Beach

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Sands of Time: a Renourished Beach vs. a Non-renourished Beach

Tania Kilcullen

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ABSTRACT: The effects of beach renourishment were examined at two different beaches located in Brevard County, Florida: Avenue B and Ponce Landing. Two profiles were taken the summer of 2015 at Avenue B and one profile was taken at Ponce Landing. These profiles were then compared to previous years at the same beaches. Avenue B, a renourished beach, and Ponce Landing, a non-renourished beach, showed variability in the elevation, volume, and mean elevation difference between the years 2010-2015. The results indicated that beach renourishment has a significant difference in the mean elevation difference. Even though a renourished beach will have a net gain in sand after renourishment however, the erosion rate is higher than at a non-renourished beach. Avenue B was more susceptible to meteorological effects such as Hurricane Sandy, resulting in a greater net sand loss compared to Ponce Landing.

INTRODUCTION

The Florida coastline, dividing the land and the water, has been studied for years due to the natural and anthropogenic processes that change the coastline constantly. Naturally, coastlines change due to wave energy, and other meteorological effects such as thunderstorms and hurricanes (Houser, 2008). Anthropogenic changes, better known as beach nourishment, is "the process of mechanically or hydraulically placing sand directly on an eroding shore to restore or form, and subsequently maintain, an adequate protective or desired recreational beach" (Speybroeck, 2006). This study is being conducted to show the historical comparisons of two Florida beaches located in Brevard County; Avenue B and Ponce Landing. Avenue B is a renourished beach while Ponce Landing is a non-renourished beach. The objective was to show the elevation, volume, and mean difference changes throughout the years being investigated, understand what and why these changes occurred by completing beach profiles, and be able to determine the significance of renourishment.

METHODS

Three beach profiles were completed during the summer, two at Avenue B and once at Ponce Landing. This process was completed using the differential leveling method. The first profile was taken at Avenue B. The stadia rod was moved every 10 feet along the measuring tape and continued to move every 10 feet until it reached the stairs, and then a turning point took place to move the stadia rod to the beach. The profile continued to the waterline and then we completed the loop back to the benchmark to check the accuracy of the survey.



Figure 1: Avenue B and Ponce Landing located in Brevard County, Florida

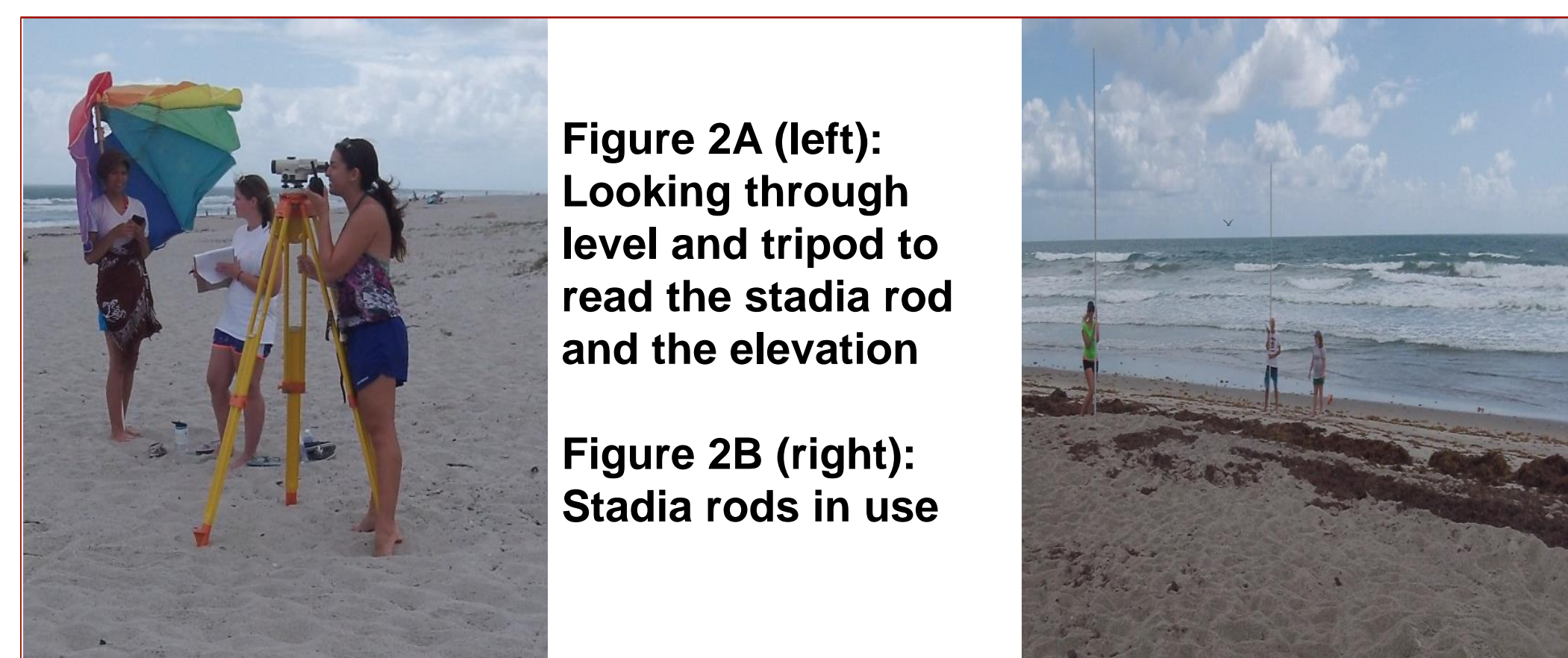


Figure 2A (left): Looking through level and tripod to read the stadia rod and the elevation

Figure 2B (right): Stadia rods in use

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Two weeks later, the same group went to Ponce Landing which is 4.5 miles south of Avenue B. Two groups were formed; however one group completed a survey along the sidewalk while the other group did a beach profile. The purpose of the survey on the sidewalk was to find the elevation of a "temporary benchmark" where the beach profile group would start. A nail was put into the ground by Dr. Maul to be used as the temporary benchmark, and the benchmark elevation was determined to be 18.07 feet. While the group doing the profile found the elevation of the nail, the beach profile group started their own profile. We started at the nail, crossed the road, and from there went in 10 foot increments over the land, down the dune, and to the water.

RESULTS

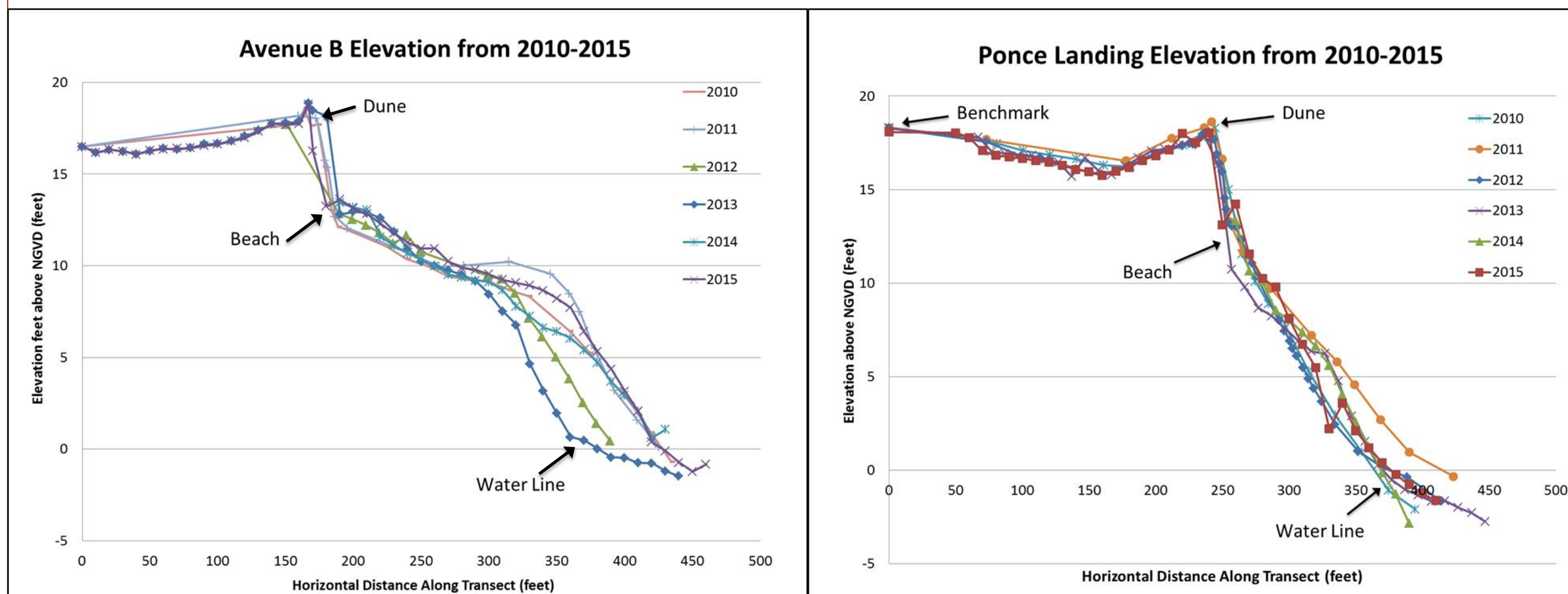


Figure 3: Comparison of elevation above National Geodetic Vertical Datum (NGVD) in feet versus horizontal distance in feet along Avenue B from 2010-2015.

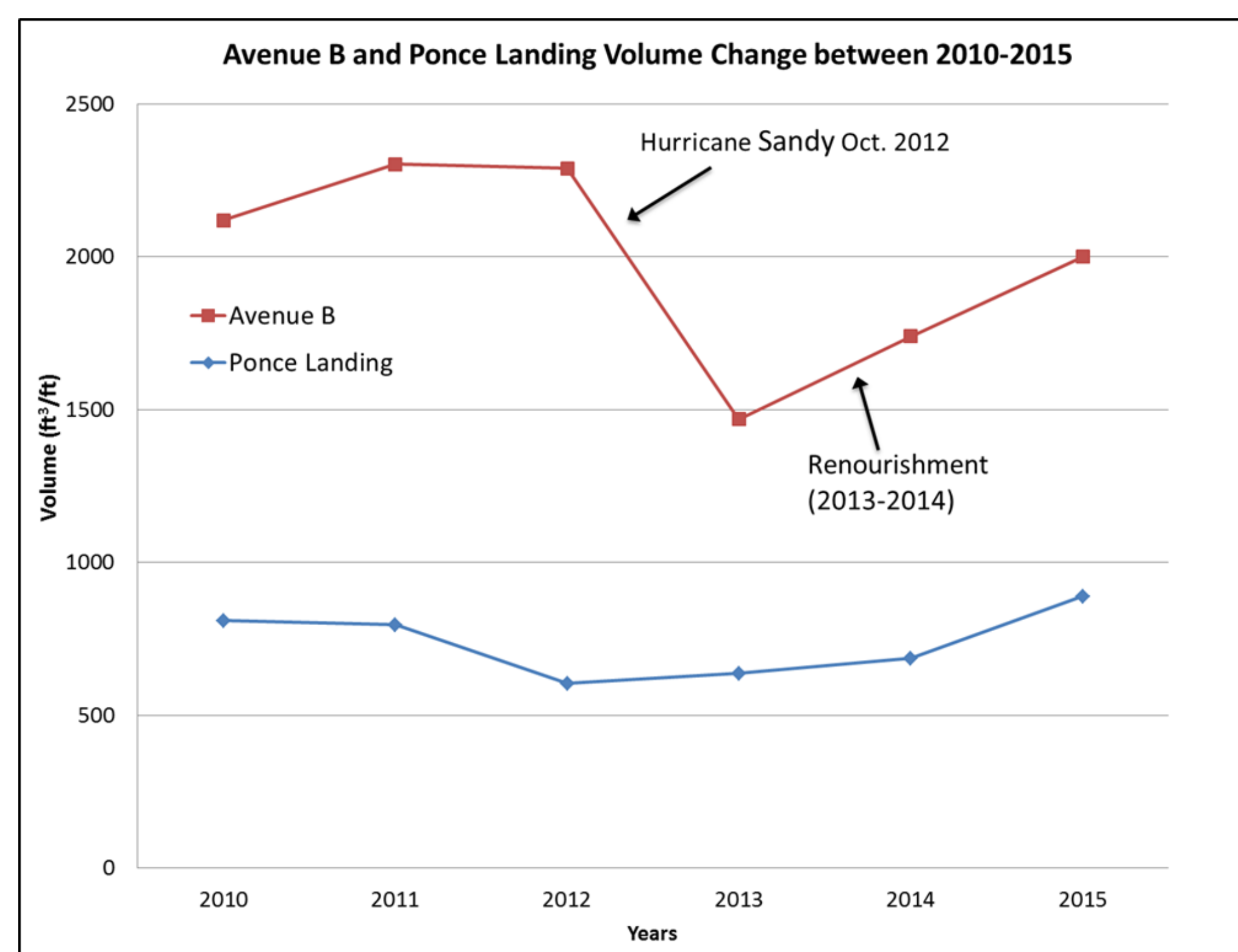


Figure 4: Comparison of elevation above National Geodetic Vertical Datum (NGVD) in feet versus horizontal distance in feet along Avenue B from 2010-2015.

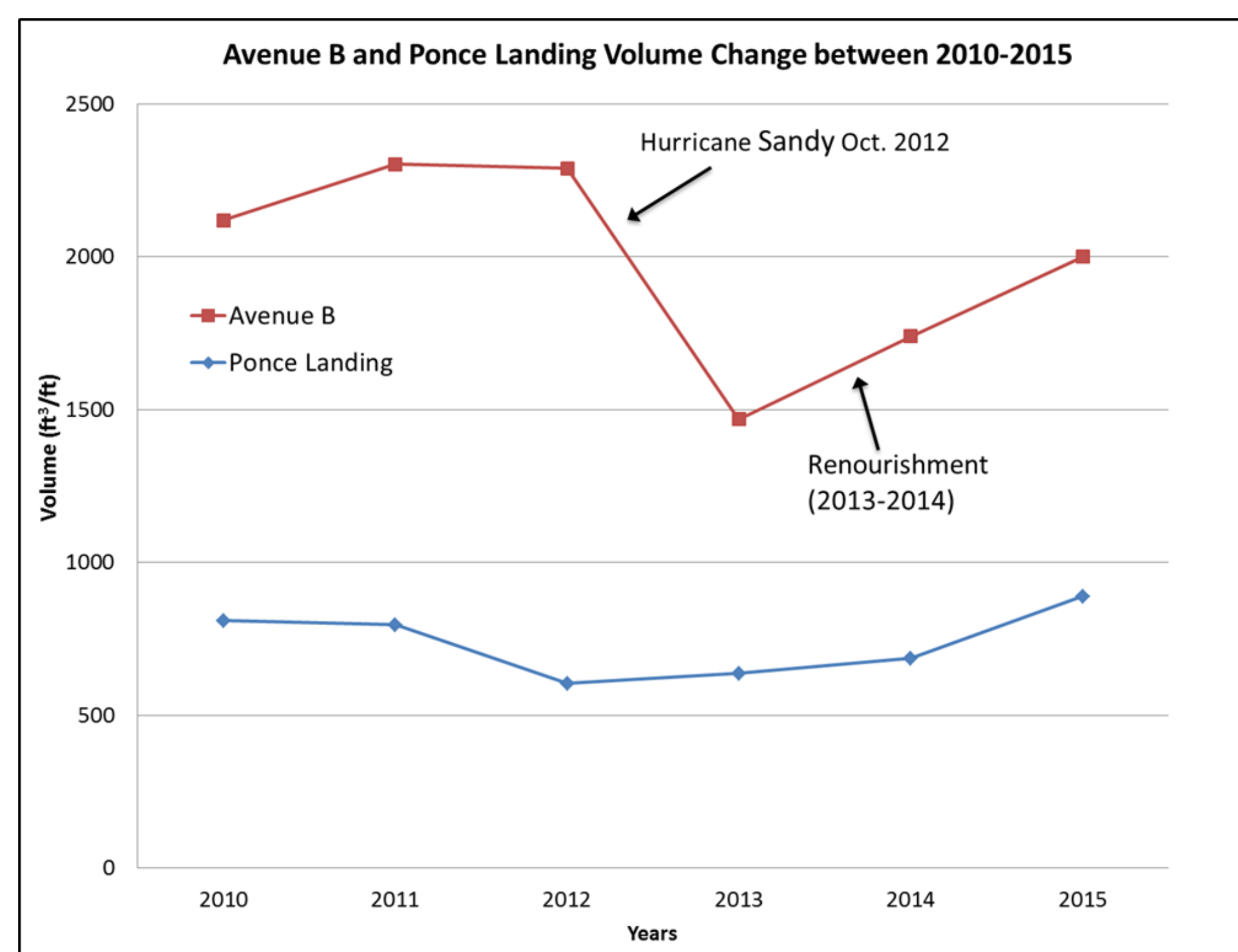


Figure 5: Comparison of the volumetric sand change at Ponce Landing and Avenue Beach from 2010-2015

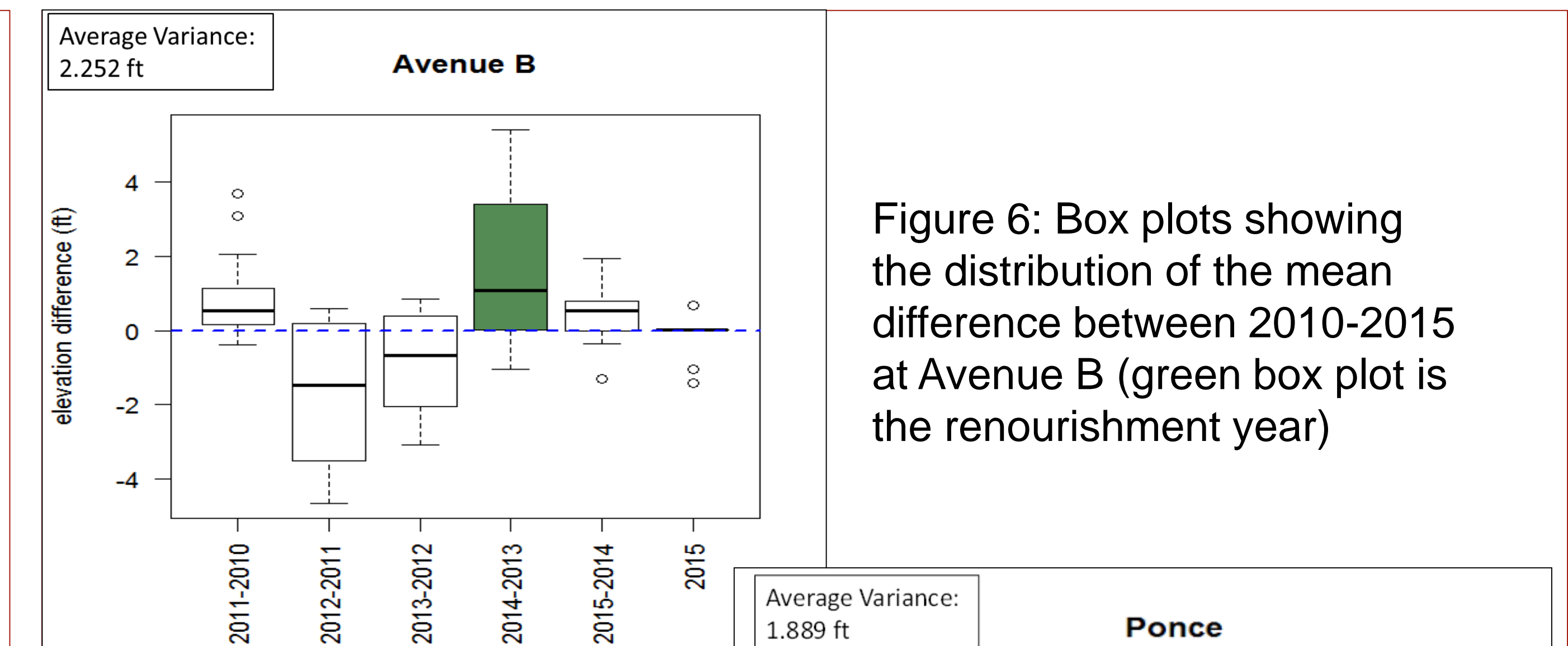


Figure 6: Box plots showing the distribution of the mean difference between 2010-2015 at Avenue B (green box plot is the renourishment year)

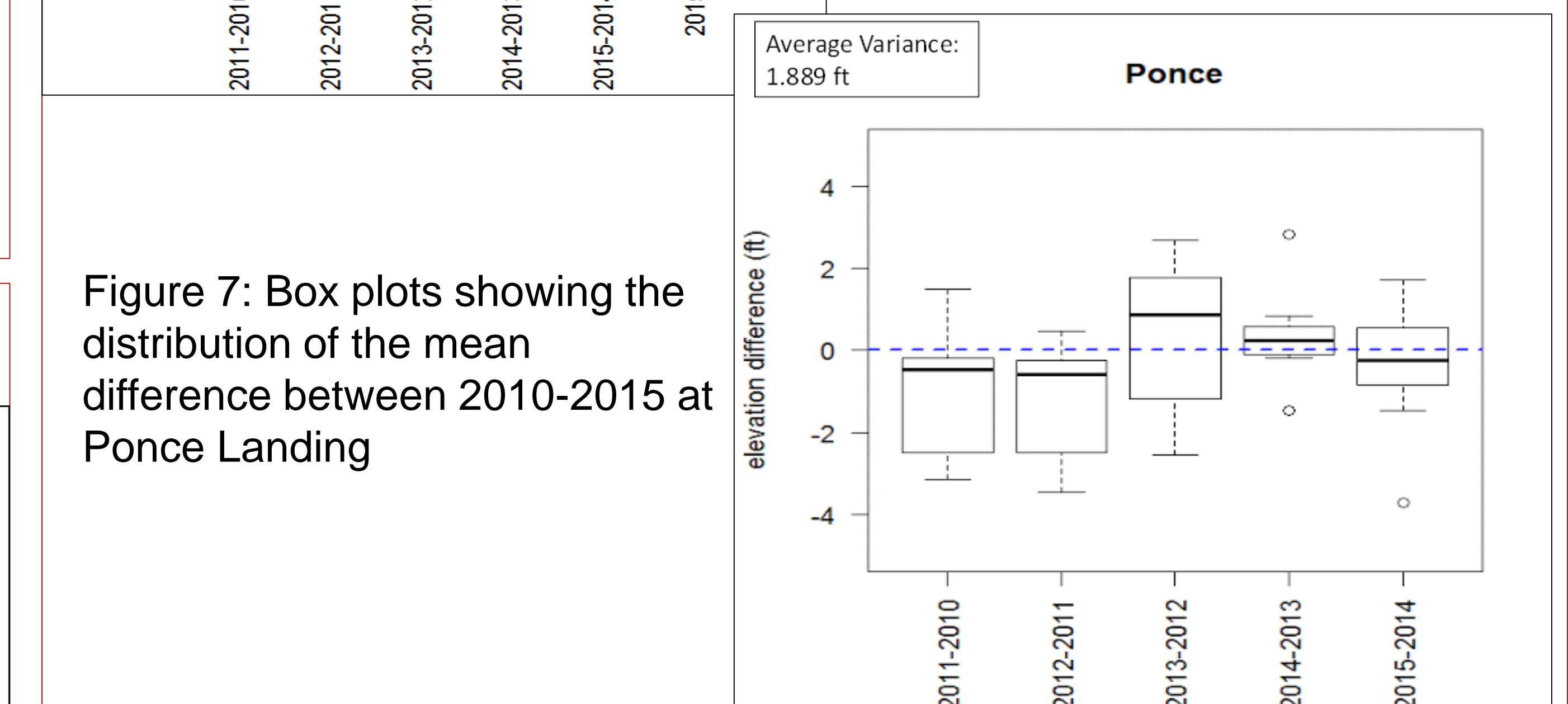


Figure 7: Box plots showing the distribution of the mean difference between 2010-2015 at Ponce Landing

DISCUSSION and CONCLUSIONS

Beach renourishment plays a vital role in coastal erosion. Avenue B, the renourished beach, had a greater sand loss than Ponce Landing, non-renourished beach, from Hurricane Sandy. After Hurricane Sandy a renourishment occurred between November 2013 and February 2014 which resulted in a net sand gain along the horizontal transect at Avenue B. This trend continued into the following year. The years prior to the renourishment were a loss in net sand. The significance tests show that the years surrounding the renourishment are different. In 2017, Brevard County plans on another renourishment that will cost 73 million dollars over the next five years (Waymer, 2015). Results from future studies should be interesting to show the elevation and the mean elevation difference between these years due to the renourishment and perhaps any other future significant meteorological occurrences that can affect these beaches.

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