

LESSONS LEARNED FROM RAPID DEPLOYMENT OF WAVE GAGES AND CAMERAS DURING HURRICANE IRMA

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INTRODUCTION

Hurricane Irma was a category 5 hurricane on the Saffir-Simpson hurricane wind scale. Irma developed from a tropical wave around the Cape Verde Islands. The National Hurricane Center started monitoring it on August 26, and it was classified as a tropical storm named Irma on August 30. Moving across the Atlantic Ocean, Irma increased in strength. On September 5, Irma was classified as a category 5 hurricane with wind speeds up to 175 mph (280 km/h). Irma made landfall in the U.S. on Cudjoe Key (near Big Pine and Summerland Keys) in the morning of September 10, still being a category 4 hurricane, and made a second landfall on Marco Island, south of Naples, on the same day as a category 3 hurricane. This paper describes the lessons learned by the authors when deploying wave gages and cameras to observe the wave run-up.

METHODS

In response to Hurricane Irma, a team from Louisiana State University mobilized to deploy instruments in Lake Okeechobee, Florida. As the path of Hurricane Irma shifted from Miami to the west, we decided on the Herbert Hoover Dike (HHD) because of the potential for wind-driven waves to be generated at the north shore and due to the severe lake side wave attack and erosion during Hurricane Wilma in 2006. The final decision to deploy was made around 5:00 PM CST on September 8th. The NOAA National Hurricane Center predicted tropical storm winds would arrive by 8:00 PM EST on Saturday 9th. This meant we had a little over 24 hours to mobilize, from calibrating the equipment, drive to Lake Okeechobee, deploying the instruments, and drive out of the Irma's path. The team set off from the LSU campus late Friday evening and drove through the night to arrive to HHD by 3:00 PM EST. The two deployment locations are shown in Fig. 1. Port Mayaca is located on the east side of the lake and was chosen because of the practicality of driving to the crest of the levee and deploying the gages. The second location is located farther north (Nubbits Slough) and was selected because of the likelihood of higher surge levels.

In total, four (4) wave gages and two (2) cameras were deployed on the HHD. In particular, two wave gages and the two cameras were deployed at Port Mayaca, on the south end of the flood gate. The initial placement of the gages was planned for several feet in the water, but the close proximity of alligators prevented us from implementing this plan. Therefore, the wave gages were placed along the water line, which was at an elevation of 13.5 ft. The USACE operations team had reduced the water levels in preparation for the hurricane rainfall and storm surge and delayed infilling from bayous. Both cameras were installed on a mailbox at the crest of the levee. They were directed towards the lakeside toe and programmed to capture images at the maximum interval of 10 seconds. The second deployment location was Nubbits Slough. Two wave gages were deployed near the

flood gate. In both locations, hobos were attached to structural objects to obtain the atmospheric pressure.



Fig. 1. Locations of wave gage and camera deployments.

RESULTS

The LSU team retrieved the wave gages and cameras on Friday October 20th with the help of the USACE Port St. Lucie park ranger. In particular, the USACE operations division removed the hobo and cameras at Port Mayaca as they were performing reconnaissance immediately after Irma. Once the wave gages were located beneath the water, their GPS coordinates and elevations were obtained. Elevation cross-sections of the levee were also obtained for post-processing of the camera and wave gage data.

CONCLUSIONS

The data analysis from wave gage and camera deployment is still ongoing. Of particular interest is the results from the cameras, which were installed with the objective of identifying the water level and wave run up on the lake side of the levee. Photogrammetry will be used to extract out this information. The paper and presentation will detail the lessons learned during rapid deployment of instrumentation prior to a hurricane and discuss results from the wave gages and cameras.