Storm Surge Flood Modeling for Lake Charles and Surrounding Areas

Zhang, Kaylee (School: Alfred M. Barbe High School)

The City of Lake Charles is located about 20 miles north of the Gulf Coast and is named after the lake to its west. The city is the hub of a major petrochemical industry. The lake is connected to several water bodies in the south and to the Gulf through a wide, deep ship channel, the Calcasieu Ship Channel. Although the city is not very close to the Gulf, the significant water exchange through the channel allows storm surges to easily reach the area. The prevalent flood damages that occurred due to several severe floods during 2020–21 (especially from Hurricane Laura in August 2020) prove that the city is vulnerable to flooding. In this research, flood modeling for Lake Charles and its surrounding areas were conducted. A software called HEC-RAS was used as the modeling tool. There are four water level monitoring stations near Lake Charles that were used in this research to provide data from Hurricane Laura; three were used for boundary conditions, and one was used to confirm the validation of the model. Then, an elevated surge condition was used in the test to identify flood coverage and potential damage under a more extreme storm surge than Hurricane Laura. The results from this test show a wider inundation area than what was reported for previous hurricanes. The research also demonstrates the effectiveness of a potential flood-reduction design.

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