HURRICANE ANDREW IMPACT ON THE ISLES DERNIERES BARRIER ISLAND ARC

Terrebonne Parish, Louisiana

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INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with the Department of Geology and Geophysics at the University of New Orleans (UNO) and the Coastal Geology Laboratory at Louisiana State University (LSU), has been conducting a long-term study of the geologic evolution and processes of sandy coastal and barrier island environments (Penland and others, 1985; Schwab and Williams, 1988; Penland and others, 1992). In 1992 and 1993, the study focused on the Isles Dernieres barrier island arc, located in southwestern Terrebonne and Lafourche Parishes, Louisiana (figure 1). Hurricane Andrew (Saffir-Simpson Scale, Category 4) made landfall in the Isles Dernieres barrier island arc on August 24, 1992. The purpose of this report is to describe the storm's impact on the Isles Dernieres barrier island arc, using data collected before and after the storm. The data collected before the storm are from a series of topographic and bathymetric surveys, and from a series of aerial photographs taken between 1887 and 1989. The data collected after the storm are from a series of topographic and bathymetric surveys, and from a series of aerial photographs taken on August 31, 1992.

The Isles Dernieres are located about 25 km southwest of New Orleans (figure 1). This barrier island arc is composed of four islands: Raccoon Island, Whiskey Island, Trinity Island, and Timbalier Island (figure 2). The Isles Dernieres are a mixed sand and mud system, with a sand-to-mud ratio of about 1:1 (Penland and others, 1985). The Isles Dernieres are about 35 km long, and are bounded on the west by the Atchafalaya Bay ebb-tidal delta, and on the east by the Caminada-Moreau ebb-tidal delta (figure 3). The Isles Dernieres are a tide-dominated, wave-modified barrier island system (Penland and others, 1985). The average tidal range is about 0.5 m (Wright and others, 1986), and the average significant wave height is about 0.5 m (Wang and others, 1992). The Isles Dernieres are composed of Holocene-age sediments, which overlie Pleistocene-age sediments (Penland and others, 1985). The Isles Dernieres are a mixed energy system, with a wave-to-tide energy ratio of 1:1 (Penland and others, 1985).

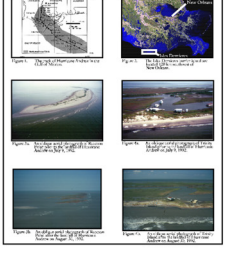

Figure 1. The Isles of Dernieres barrier island chain, Louisiana.

Figure 2. The Isles Dernieres barrier island arc, Terrebonne Parish, Louisiana, showing the four islands.

Figure 3a. Pre-Andrew oblique aerial photograph of the Isles Dernieres, taken on August 18, 1992.

Figure 3b. Post-Andrew oblique aerial photograph of the Isles Dernieres, taken on August 31, 1992.

Figure 3c. Post-Andrew oblique aerial photograph of the Isles Dernieres, taken on September 30, 1992.

Figure 3d. Post-Andrew oblique aerial photograph of the Isles Dernieres, taken on October 27, 1992.

HURRICANE ANDREW

Hurricane Andrew developed from an easterly wave which moved off the west coast of Africa on August 14, 1992. Andrew moved west-northwest, and was a tropical depression on August 16, 1992 approximately 1500 kilometers (km) east of the Lesser Antilles and moved over Florida in less than a week with no change in intensity. Significantly warmer than normal water temperatures in the Gulf of Mexico allowed Andrew to intensify on its way to Louisiana. Category 4 hurricane force winds (130 to 209 km/hour (km/h) sustained) with gusts of 250 km/h (Saffir-Simpson Scale, Category 4) hit the Louisiana coast at approximately 4:00 a.m. on August 24, 1992. Andrew made its first landfall in southeastern Louisiana, with the eye of the hurricane passing over the Isles Dernieres barrier island arc (figure 4). Hurricane Andrew made its first landfall in Louisiana at Point Chevreuil, approximately 20 km to the west of the Isles Dernieres, with sustained winds of 230 km/h (Lawrence, 1992). The eye of the hurricane moved across Timbalier Bay, Timbalier Island, and Terrebonne Bay, and then made its second landfall in Louisiana approximately 40 km to the east of the Isles Dernieres, near Cocodrie, Louisiana (figure 4). Hurricane Andrew then crossed the Gulf of Mexico and made its third landfall in Florida near Homestead, Florida, as a Category 4 hurricane (Lawrence, 1992). Hurricane Andrew caused 19 deaths in Florida and 9 deaths in Louisiana (Lawrence, 1992). Hurricane Andrew caused $15.5 billion in damage in Louisiana, and $20 billion in damage in Florida (Insurance Information Institute, 1993). Hurricane Andrew was the most expensive natural disaster in the history of the United States, and was the first natural disaster to cost the insurance industry more than $1 billion (Insurance Information Institute, 1993).

Hurricane Andrew was the largest storm to impact the coastal zone of the United States in the 20th century. The storm was a Category 4 hurricane when it made landfall in Louisiana, and affected more than a million people. The storm caused approximately 26.5 billion dollars (in 1992 dollars) in damage in Louisiana, Florida, and Bermuda. Hurricane Andrew affected the Louisiana coastal zone from the Atchafalaya Bay ebb-tide delta, on the western end of the Isles Dernieres barrier island arc, to the Caminada-Moreau ebb-tide delta, on the eastern end of the Isles Dernieres barrier island arc (figure 3). The storm surge was estimated at 4.6 m at Grand Isle, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Point Chevreuil, approximately 20 km to the west of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Cocodrie, approximately 20 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Pecan Island, approximately 40 km to the west of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Morgan City, approximately 40 km to the west of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Houma, approximately 40 km to the north of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Chauvin, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Dulac, approximately 20 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Lake Charles, approximately 200 km to the west of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Sorrel, approximately 40 km to the north of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Lafourche, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Boeuf, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Chene, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Cocodrie, approximately 40 km to the east of the Isles Dernieres (Lawrence, 1992). The storm surge was also estimated at 4.6 m at Bayou Terrebonne, approximately 40 km to the east