**­­G131: Oceans & Our Global Environment**

**Final Exam Group Activity Fall 2015**

**Part B: Atlantic Hurricanes**

**Group: 1**  **2** X **3**  **4** 

(Replace the box for your group with this X)

**Group Members:**

(Please collate details of the group members and complete the listing below)

**Name Login (email)**

Student 1: Kyle Nealy knealy@indiana.edu

Student 2: Claire Strohl

Student 3: Alexander Brewers

Student 4: Tara Donahue

**The aim is to complete this worksheet, providing answers to each component that comprise the two tasks and submit a final version of this document**

**Please upload your final group document using the following filename: FEPtBSubgroupX-AFInal**

(Replace the X in this filename with your group letter. Both .doc and .pdf file types are acceptable for the final document.)

**Tasks:**

There is a single Task divided into three parts (10 points each part) to complete:

1. What path did Hurricane Sandy follow in 2012 and how extensive was its storm surge?

**Task:**

**Hypothesis: What path did Hurricane Sandy follow in 2012 and how extensive was its storm surge?**

**Guidelines:**

The first task (a) is to explore the resources on hurricanes to track the path of Hurricane Sandy and assess how the predictions matched with the actual observations. Part (b) requires assessment of the observed storm surge measured by higher water levels (i.e. the differences between verified and predicted levels) at a number of tidal stations in the path of the hurricane. Part (c) asks for a brief assessment (~30-50 words) of the magnitude of the storm surge along the coast.

a. **Track of** **Hurricane Sandy** (10 points)

Describe the path of Hurricane Sandy, and its strength (hurricane category) along its track. Did the 3-day cone and advisories for Hurricane Sandy reflect the path it followed?

*(A strong answer will describe Hurricane Sandy’s track, its strength and proximity to the East coast, where it made landfall, and the accuracy of the predictions of its path shown by the 3-day cone.)*

Hurricane Sandy formed from a tropical wave in the western Caribbean Sea, just East of Nicaragua, with a wind speed of approximately 40 miles per hour on October 22nd of 2012. Sandy quickly gained momentum over the next 6 hours and became a Tropical Storm heading North toward the Greater Antilles. As the hurricane approached the shoreline of Jamaica, Sandy became a category 1 hurricane with speeds over 75 miles per hour. Sandy’s wind speed continued to increment after making landfall in Jamaica and was strengthened into a category 2 hurricane as it returned into the Caribbean Sea North of Jamaica. Wind speeds were once again magnified as Sandy touched down over Cuba, and its wind speeds approached that of a category-3 hurricane (110 mph). Finally, the hurricane began to lose momentum as it traveled over the Bahamas, degrading back into a category-1 hurricane a few hundred miles to the East of Florida. Sandy continued north as a category-1 hurricane, following a path parallel to the U.S. East coastline, maintaining a steady proximity to the U.S. coast (< 350 miles), before it turned west. Sandy proceeded to move straight toward the East coast, and made a final landfall in New Jersey before losing energy and dissipating in western Pennsylvania. The three-day cone and advisories for Hurricane Sandy seemed to reflect the actual path it followed for the most part. In the cone and advisory, hurricane Sandy was predicted to travel further North after curving into New Jersey and Pennsylvania, heading north into New York and Canada before dispersing.

b. **Storm Surge Data** (10 points)

Compile data from water level records at the tidal stations recommended to determine the magnitude of the peak storm surge associated with Hurricane Sandy at a series of locations along the East Coast.

*(A strong answer will complete details for at least five tidal stations on the East Coast, identifying the surge as the maximum difference between predicted and verified water levels, determining its timing and calculating its magnitude.)*

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Name of Tidal Station** | **Station ID** | **Date**  **(mm/dd)** | **Time**  **(GMT)** | **Predicted (ft)** | **Verified (ft)** | **Surge**  **(ft)** |
| 1 | I-295 Bridge | 8720357 | 10/28 | 15:24 | 1.087 | 2.582 | 1.495 |
| 2 | Kiptopeke VA | 8632200 | 10/29 | 12:42 | 3.213 | 6.714 | 3.501 |
| 3 | Lewes DE | 8557380 | 10/29 | 19:54 | 0.301 | 5.184 | 4.883 |
| 4 | Atlantic City NJ | 8534720 | 10/29 | 23:36 | 4.074 | 8.848 | 4.774 |
| 5 | Beaufort NC | 8656483 | 10/30 | 00:42 | 3.301 | 4.958 | 1.657 |

c. **Storm Surge Assessment** (10 points)

How did the storm surge from Hurricane Sandy vary among locations along the East Coast? Where did it reach a maximum? Did the surge match its proximity to the coast as observed in part (a)?

*(A strong answer will describe the data presented in part (b), reporting on the variations in the storm surge among locations, and comparing the surge with the location of Hurricane Sandy as it moved northward.)*

The effects of the storm surge from Hurricane Sandy varied among different sites along the U.S. East Coast. The areas of the U.S. that experienced the smallest surges are sites that hurricane Sandy passed either near the beginning or middle of its duration, while Sandy’s proximity was several hundred miles offshore. Hurricane Sandy traveled past the sites located on the eastern coasts of both Florida and North Carolina while roughly 350 miles off shore, resulting in smaller (around 1.5 ft.) storm surges. Near the end of its duration, Hurricane Sandy turned and traveled directly over New Jersey, Delaware, and Pennsylvania, causing much larger (3-5 ft.) surges, despite the fact that the hurricane’s wind speeds were much faster as it passed by Florida and North Carolina. Thus, the relative proximity to the hurricane may have a greater influence on the level of surges than the hurricane’s magnitude.