6.2 PREDICTIONS OF STORM SURGE FLOODING WITH THE USE OF HURRICANE CLIMATOLOGY

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1. INTRODUCTION

Many coastal residents do not currently appreciate the risks posed by hurricane storm-surge flooding, which in turn affects their decision making, as well as the decision making of local policy makers. Our team is investigating an alternative approach to standard NWS hurricane warnings of storm surge. The first phase of our research surveyed the ability of the public to understand current warnings, as well as several alternatives. The second phase will address some of the issues we have identified by developing an interactive database based in part on hurricane climatology. Our hope is that a better presentation of the risks associated with hurricane storm-surge flooding will result in a decrease in death and injury and will improve decision making as regards evacuations, insurance and home building.

2. SURVEYS

Surveys of the public were administered in the Charleston, South Carolina region to better understand their knowledge of the physics behind hurricane storm surge, and how best to convey the risks associated with hurricane storm surge in National Weather Service advisories. The survey had 45 questions which allowed us to determine the understanding and comprehension of 202 subjects, and also allowed us to examine the comprehension of various ethnic, gender and income level groups. 93% of our subjects had experienced hurricane effects sometime in their life, two-thirds had evacuated during prior hurricane warnings, and 70% lived in buildings which had sustained some property damage.

Surprisingly, despite their obvious awareness of hurricanes, over 57% of our sample did not know the definition of hurricane warning. 55% of our sample did not realize the main threat from a hurricane in coastal areas was from storm surge and 53% did not understand that a decrease in the forward speed of a hurricane would increase the time spent by a hurricane over their location causing an increase in the amount of rainfall experienced. Additionally, over 32% did not understand that errors by NWS in forecasting the forward speed and direction of hurricanes would affect the time available for evacuation (i.e. increase or decrease). These results support our hypothesis that the public often does not understand basic scientific principles and this lack of understanding could cause them to ignore, misinterpret or underestimate the threat. These misunderstandings were most prevalent among the poor, among minority groups and among those with no college education.

We also found the use of references, whether text or pictorial, aided in the dissemination of warnings of hurricane storm surge. 63.89% expressed a preference for an advisory containing specific text informing the public of storm surge heights in relation to landmarks such Charleston's city hall. Pictorial references accompanied the text. These references can help increase the perceived risk by the people who reside in close proximity to the reference points. In contrast 12.83% preferred a copy of an NWS advisory that contained no reference points, either textual or pictorial. Although local weather service offices are currently limited to

text-based warnings such as the Hurricane Local Statement, a combination of text and pictorial references seems most effective. Perhaps as an interim measure NWS personnel could make pictorial references available on the local NWS web site so that media could cut and paste these references into their weather forecasts. This would personalize the information, increase the perceived risk, and confirm the urgency for taking self-protective action.

3. NEXT PHASE

These results from the first phase of our research led to the second phase, namely the exploration of effective ways to present graphical images of potential storm-surge impact. An interactive internet-based approach is being developed which will simulate hurricane storm-surge flooding at local landmarks for a variety of hurricane scenarios based in part on hurricane climatology. Figure 1 shows the type of imagery we intend to provide, although there will be thousands of landmarks, so that local residents can select one close to their homes. Once completed, a randomly-selected group of local residents will be surveyed after they have had the opportunity to explore this new approach. This will allow the determination of how this new approach benefits the public, as well as the determination of how this new approach could be improved.

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Storm Surge: Brunswick, GA

Category 2 Storm Surge Map

Category 4 Storm Surge Map

Category 3 Storm Surge Map

Category 5 Storm Surge Map