**25 Years After… Hurricane Andrew, August 1992, A bibliography and (video) Interview**

Producer/editor/interviewer: Gloria Aversano

Interview Guest: Sandy Delgado, NOAA Affiliate and member of the National Hurricane Center Hurricane Reanalysis Project.

Video interview took place at the NOAA National Hurricane Center (NHC) Library, 11691 S.W. 17th St. Miami, Florida 33165

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**Video Transcript –** total run time 13:59

[00:00.00 – 0:00:29] Behind title page and credits:

Audio track 1: (radio announcer recorded August 23, 1992) We are not alarming anyone in an alarmist manor by saying that we are in for some serious trouble here in South Florida and it will be happening in the next 20 hours at the most in the predawn hours of tomorrow we should have Andrew making land with winds now at a 150 miles per hour.

Audio track 2: sound of a plane flying overhead.

{0:00:29 – 00:31] Library sign – no audio

[00:31 – 1:34 Gloria Aversano, National Hurricane Center Librarian, Introduction:

Gloria: In recognition of the 25 year anniversary of Hurricane Andrew, myself and my intern, Chrissy Cockrell, have compiled a bibliography of 186 title, it features 145 articles that we collected from Web of Science, a large database the Library subscribes to and makes available to all of the staff. We are also featuring books and reports held here physically in this library and other NOAA libraries across the country. To supplement our bibliography we are going to have an interview today with NOAA affiliate, Sandy Delgado. Sandy has worked for NOAA for seven years and has been placed here in the Library.

He’s going to talk to us today about some of the special features related to Hurricane Andrew.

We are also going to refer to some actual live footage taken by local resident, Steve Watchholder, and we want to thank him for making that available to us.

[01:34 – 2:16] Footage during Hurricane Andrew making landfall August 24, 1992, in South Florida.

Audio behind video: Sound of strong, category 5, wind from Hurricane Andrew.

[2:17 – 3:59] Question 1 – What made Hurricane Andrew significant to South Florida?

Video: Guest, Sandy Delgado and interviewer, Gloria Aversano, sitting at table in NHC library.

Gloria: Hi Sandy, thanks for being with us today.

Sandy: My pleasure.

Gloria: We’ve just watched a few minutes of footage taken by local resident, Steve Watchholder, and he was here during Hurricane Andrew, can you talk about some of the characteristics that made that storm so significant?

[ 2:34] Question 1 – What made H. Andrew significant – response.

Sandy: Well, what is interesting about H. Andrew is that, it was a very compact storm, very intense and it was moving at a very quick forward speed. Which means that what cause most of the damage was the intensity of the wind. In other storms we see the storm surge and the flooding is what causes most of the damage. With Hurricane Andrew it was characterized with the winds. H. Andrew hit south Florida after a 27 years drought of major hurricanes impacting the area. We had not been affected since Hurricane Betsy (3:04 video b-roll: Costliest U.S. Hurricanes) and since from 1965 to 1992 there was also a substantial increase in population in south Florida which lead to some of the significant damage (3:15 video b-roll: Dade County Populations – 1990 Census) we had from this hurricane. Andrew was also so significant to the United States because it was (3:25 video b-roll Dade County Property Tax Values – 1990) the largest or the costliest hurricane to impact the area at the time (03:29 video of costliest U.S. hurricanes) much more than the previous H. Hugo that cost about 7 billion dollars. Hurricane Andrew was over 20 billion dollar, so that is a significant increase. And what was interesting also is that even though there was such a lot of damage not a lot of people died (video 3:55 Holiday Inn damage) and that is very important for today too, it shows that people are very resilient.

[3:59 – 4:19] Question two – Conditions of early forecast.

Gloria: one of the books we have here in the library is called Hurricane Watch :forecasting the deadliest storms on earth by Bob Sheets and Jack Williams. Uhmm, as you know Bob Sheets was the director (of the National Hurricane Center) at the time of Hurricane Andrew. We’ll watch a little bit of video of him forecasting during that storm.

[4:20 -4:52] 1992 footage of Bob Sheets, then director of the National Hurricane Center, speaking to local media and forecasting about Hurricane Andrew.

Audio track 1: Bob Sheets – unclear audio (sitting to the left of a large monitor with a satellite image of H. Andrew approaching south Florida) the lower region is most concerning …now again the core , that’s his region right in here, right around the eye itself, could wobble, that’s a substantial and could be a problem with that wind, so that’s the biggest area that could impact …continues 5 seconds unclear.

Audio fades out.

Audio track 2: Background noise from other people (NHC staff and media) in the National Hurricane Center operations center on US.1 Coral Gables, Florida

[4:52 – 4:59 ] Question two – Conditions of early forecast continued…

Gloria: And in that book he talks about some of the features they were watching, they watched it from the time it was a wave off of Africa and in the beginning, it did not seem like it was going to be that intense. Can you talk about some of the characteristics early on?

[4:59 -6:15 ] Question two – Conditions of early forecast – response.

Sandy: The tropical wave that later developed into Hurricane Andrew was a typical wave in August, a favorable month for tropical cyclones formation. But in 1992 was characterized by a strong El Nino, and that causes a lot of wind shear in the Atlantic. Wind shear is what… is the difference in the winds between the upper and lower atmosphere. [5:37 – b-roll Effects of Vertical Wind Shear] Hurricanes typically become stronger when the wind shear is low or there is no wind shear because they need a vertical profile to intensify. In the case of Hurricane Andrew, the tropical wave that developed over Africa and moved to the eastern Atlantic ahh, experienced wind shear as it moved towards the Leeward Islands. And for a period of time it was uncertain if this disturbance was going to survive the intense wind shear that was experiencing. So, it was difficult to determine if the system was going to have a favorable environment later on or it was going to dissipate.

[6:15 – 6:55 ] Question 3 – Later forecast.

Gloria: As the storm progressed over a number of days the forecasters began to see signs of rapid intensification. In an article written by Dr. Hugh Willoughby and Peter Black, both previous NOAA employees, this article was written in 1995 and published in, *BAMS, the Bulletin of the American Meteorological* (stumbles over the word society) excuse me *Society*, it’s named, “Hurricane Andrew in Florida: Dynamics of a Disaster”, and he reviews in very technical terms, some of the features of that event, that storm event, that develop. (Sandy: uhh) Can you comment on some of those?

[6:55 -8:59 ] Question 3 – Later forecast – response.

Sandy: In the article they mention the term deepening and ahh intensification. And, In this case a deepening is associated with when a hurricane experiences a lowering of central pressure. When the central pressure, when it lowers usually leads to intensification of the storm. So in this case to Hurricane Andrew and other storms, a decrease in central pressure is characterized by an increase in the, in the winds. As the hurricane moved towards the Bahamas, ahh, it experienced an eyewall replacement cycle. [7:29-7:35 video b-roll eyewall structure] And this is seen in many major hurricanes, ahh, which means that, when you have the the eyewall, a secondary eyewall forms outside the original eyewall and that leads to the inner eyewall to collapse and the secondary eyewall to take over the circulation and contract. (Gloria: uhuh)

Sandy continues, in small hurricanes, compact hurricanes like Hurricane Andrew, this process can be rather quick and lead to another burst of intensification. So, even though that we normally see a weakening during this event, in storms like Andrew we tend to see a reintensification of the hurricane. And that basically lead the hurricane to reintensify as it was approaching south Florida. And ahh, that was very bad for South Florida because it was a strengthening storm rather than a regular or weakening one. Ahh, another thing that is mentioned in the article is the intensification induced downdrafts. [8:23 video b-roll thunderstorm structure] And, this is very interesting because as we have seen in the damage produced by Andrew there were areas that had more ahh, significant damage than other areas. And that created almost like a streak that some people attributed to tornados ahh, but in the eyewall we don’t usually see tornados. [8:34 video b-roll photo example of ‘wind streak’] So what happened here was ahh, that severe thunderstorms they collapsed and the the winds we see aloft ahh, reached the surface and created these streaks that caused more significant damage more than the normal winds that the hurricane were producing.

[8:59 to 9:29 ] Question 4: Storm Surge .

Gloria: Sandy another important factor of a hurricane is storm surge. People in South Florida are becoming more aware of that situation but in 1993 people weren’t quite as knowledgeable about it. At the time uhmm, two NHC staff forecasters, Max Mayfield and Lixion Avilla, wrote an article in *Weatherwise*, talking about the storm surge that impacted Bicayne Bay. Can you talk about that and can you touch on the difference between storm tide and storm surge?

[9:30 to 10:51] Question 4: Storm Surge - response

Sandy: well the impact of storm surge on the Biscayne Bay area was rather significant it reached about 16.9. And this is due in part because Biscayne Bay is very (9:40 video b-roll Hurricane Andrew storm surge map shows Biscayne Bay) shallow and that allows the water from the hurricane to blow over and pile up and to move ahh, move inland. If the storm had moved a little northward than where it made landfall then the impact would not have been that significant as the winds would have been blown offshore. Ahh what’s interesting too about South Florida is that outside of Biscayne Bay the impact of the storm surge is not that significant because we have a channel between Florida and ahh, the Bahamas that basically allows the water to escape before having to move inland. The difference between a storm tide and storm surge is that storm tide is a combination of the storm surge and the astrological tide. [10:23 video b-roll storm surge vs. storm tide] The impact of the moon and the sun have on the earth. In the case of storm surge it’s basically, ahh the wind from the hurricane blowing over the ocean and as the water moves forward it piles up and (stumbles) it starts to impact the land it has nowhere to go but to go inland. And in most hurricanes that’s one of the most significant factors but in the case of Hurricane Andrew it was the winds was the most important factor.

[10:51 to 11:20 ] Question 5: Reanalysis part A and B.

Gloria: Sandy the last thing I want to talk about today is the reanalysis of Hurricane Andrew. In a book that we have here in the Library called, *Hurricanes of 1992,* written by the American Society of Civil Engineers, they talk about people’s, ahh, their personal testimony of people impacted by Hurricane Andrew. And they thought the winds were much higher than the reported 145. Can you tell me how much personal testimony is factored into a reanalysis?

[11:20 to 11:59] Question 5 part A: Reanalysis – response.

Sandy: It is difficult even for a trained person to determine the intensity of the hurricane simply because ahh, there is a difference, for example, between sustained one mile per hour winds and gusts. Therefore a person, a regular person it is almost impossible to distinguish. And in Hurricane Andrew you also have these wind streaks, [11:40 video b-roll photo of wind streak example 2] that affected some areas in South Florida that the residents in those areas probably thought that the winds were much stronger than that the forecasters were saying. And therefore verbal testiments of these hurricanes, for eample, are not nessesarily taken into account for the reanalysis when you have verifiable sources of data.

[11:59 to 12:26] Question 5 part B: Reanalysis – response.

Gloria: Sandy there is another topic I wanted you to touch on if you can, uhmm, I was reviewing this book called by Mike Smith, it’s call, Warnings : The True Story of How Science Tamed the Weather. And he refers to a concept in here called, Wind Force and how wind force is not a square, (correction) *it is* a square function not a linear function. Can you relate that to the upgrade of Hurricane Andrew?

[12:25 to 13:15 ] Question 5 part b: Reanalysis – response

Sandy: At the time that Hurricane Andrew occurred the intensity of the hurricane was estimated to be around 145 miles per hour, a category 4 hurricane on the Saffir Simpson scale. The reanalysis was conducted based on the (word is unclear) data and found out the system was actually a category 5 155 miles per hour at the time of landfall. As the book suggests, the power force of the storm or ahh, or wind, for example, is not necessarily linear but square. Which means that a 75 mile per hour wind hurricane when it becomes 150 is not twice as strong but 4 times as strong and as a result as we saw with hurricane Andrew the damage it caused, ahh is made, better ties in to the new reanalysis as a category 5 hurricane.

[13:15 ] Close.

Gloria: Sandy thank you very much for this interview and giving me this information today.

Sandy: My pleasure

[13:31- 13:56] Credits

Audio: sound of strong Hurricane Andrew winds – no speaking.