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October 2015

CISA & CoCoRaHS Condition Monitoring Newsletter

Dear CoCoRaHS Observer,

Our team would like to express our deepest sympathy for those who have been affected by the flooding in the Carolinas. We were hit by an extreme rainfall event that resulted in massive flooding, leading to loss of life and property in many communities. We thank you for your continued commitment to submitting condition monitoring reports and precipitation measurements despite all that has happened!

In light of this rainy month, this newsletter focuses on how rainfall affects the Carolinas. In the Climate Update, we see that rainfall has relieved the Carolinas from the summer drought. We also discuss the historic rainfall and major flooding that devastated many communities in South Carolina earlier this month.

To discuss the impacts of recent extreme rainfall and share tips about reporting wet conditions, we are hosting our **next observer conference call on October 29, 2015 from 10 am to 11 am**. We would also like to hear your feedback about our second phase of the Condition Monitoring project discussed in last month's newsletter. To be a part of the conversation next week, **call 605-477-2200 and enter the access code 736549** (note: this is not a toll-free number).

Extreme precipitation can also affect some of our favorite

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seasonal items if it occurs during a critical growing period for the crop as highlighted in our article about pumpkins. Finally, our Conditioning Monitoring Star of the Month, Carl Cole, does a great job of showing how condition monitoring reports can be used beyond drought monitoring to also understand the impacts and recovery from extreme precipitation.

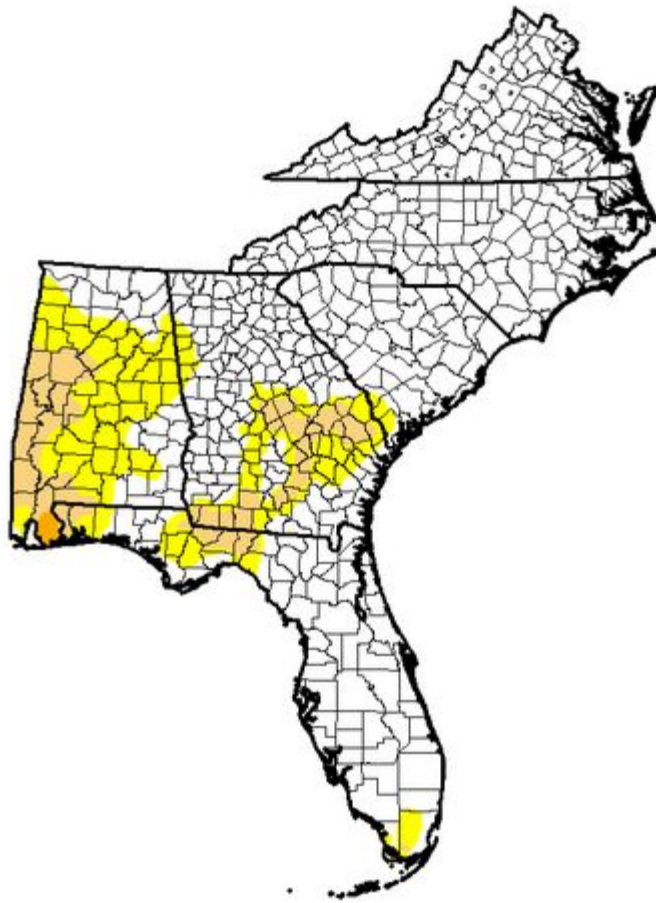
We hope you enjoy this newsletter, and as always, please email us if you have any questions or concerns that you would like to share with us.

Sincerely,

The CISA Team - Amanda, David, Kirsten,
Kirstin, and Sumi


Climate Update for the Carolinas



After months of being in some category of drought according to the [U.S. Drought Monitor \(USDM\)](#), most counties in North and South Carolina have no drought classification, possibly the only silver lining from the historic rainfall totals that caused devastating floods throughout the region. Rainfall totals in South Carolina and a few areas in North Carolina exceeded over 20 inches during a four-day period from October 2nd-5th.



USDM Southeast Region map published on
October 20, 2015

Intensity:

 D0 - Abnormally Dry
 D1 - Moderate Drought
 D2 - Severe Drought

 D3 - Extreme Drought
 D4 - Exceptional Drought

Historic Rainfall and Flooding in South Carolina

The historic amounts of rainfall received earlier this month caused extreme flooding that destroyed homes and roads and caused billions of dollars of damage, based on early estimates by experts. The heavy precipitation was the result of a stalled low pressure system that accumulated additional moisture from Hurricane Joaquin--all of which intersected to create a strong rain band in South Carolina, as seen in Figure 1 below and in this [video by the National Oceanic Atmospheric Administration](#).

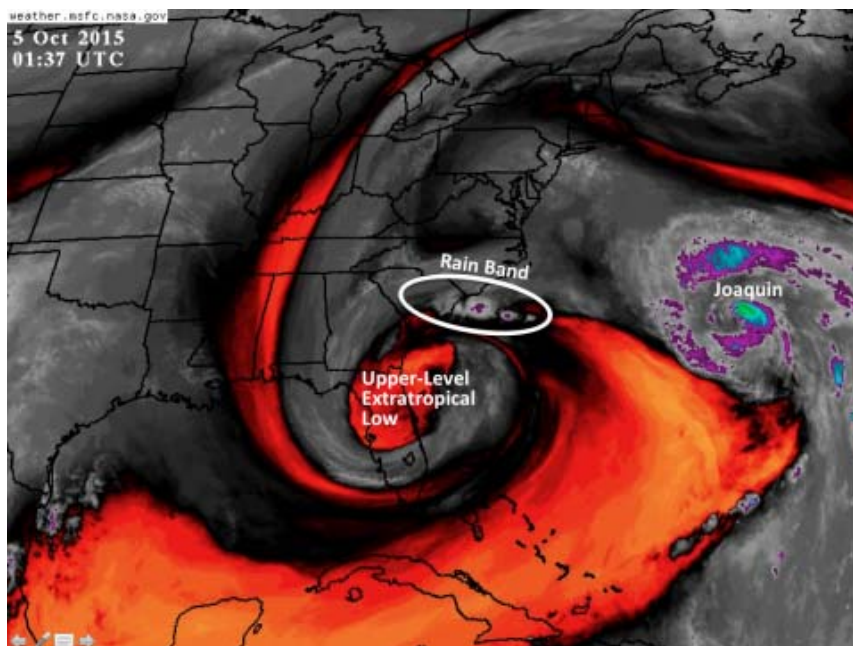


Figure 1. NASA satellite imagery showing water vapor pressure systems contributing to South Carolina's extreme rainfall on October 5th. Originally published in [The Washington Post](#)

Many locations received historic rainfall amounts, with totals above 20" in some areas (Figure 2). In some parts of South Carolina, dams failed and rivers overflowed causing major flooding and severe damage. Coastal areas, in addition to rainfall, had higher tides due to storm surge created by the winds from Hurricane Joaquin, which contributed to local flooding. Some of these coastal areas were also under a flood watch for several days after the rainfall event as waters flowed downstream. Hundreds of roads and bridges have been closed due to flood damages, many of which have still not been reopened. For more information on the status of roads and bridges in South Carolina, visit the [South Carolina Department of Transportation's Getting Around in SC](#) to identify closings by either county or interstate.

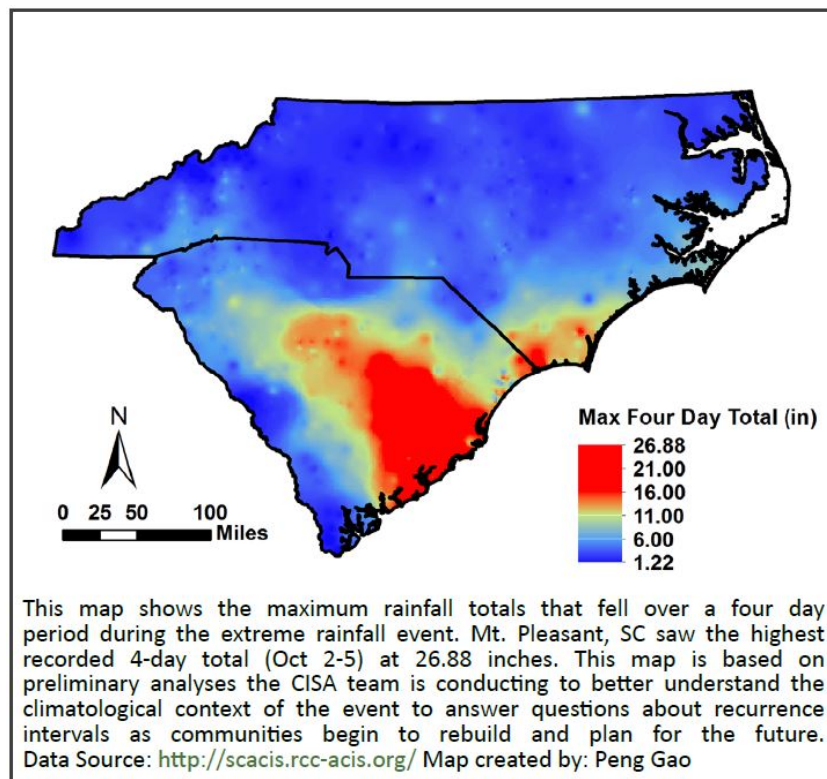


Figure 2.

Was this a 1,000-year event?

If you've been paying attention to the news, most references call what happened either a 1,000-year flood or 1,000-year rainfall event. But what does this mean? A 1,000-year event does not mean that such an event happens every 1,000 years. We do not have enough historical rainfall and flood data to even know if that is true. A 1,000-year flood or rain storm actually represents the probability of an event of a certain magnitude happening in a year based on previously observed data. The magnitude of a flood event is determined by the flood discharge while the magnitude of a rainfall event is determined by the rainfall total for a specific amount of time. So a 1,000-year event means that particular amount of flooding or rainfall has a 0.1% chance of happening each year. Although a 1,000-year event is extremely rare, there is the chance that this type of event could happen each year. Similarly, there is a 0.2% chance of a 500-year event happening or a 1.0% chance of a 100-year event happening in any given year. These calculations are very important for flood events since FEMA uses these to determine flood insurance rates. For any individual that lives in an area that is considered a 100-year flood zone, then they must purchase flood insurance if they have a home mortgage backed by the federal government.

So while the flooding was really bad in South Carolina, scientist [Dr. Robert Holmes at the United States Geological Survey \(USGS\)](#) says that a preliminary analysis of flood discharges measured by USGS stream gauges indicates no 1,000-year floods occurred in South Carolina as part of this event. Some sites did experience a 500-year flood, such as Black River in Kingstree, SC and Smith Branch in Columbia, SC. The National Oceanic and Atmospheric Administration (NOAA) did determine precipitation totals collected at some areas in Charleston and Columbia to be worse than a 1,000-year rain storm event:

"A three-day, 1,000-year rainfall event for Charleston County would have been 17.1 inches. A four-day, 1,000-year event would have been 17.5 inches. Boone Hall Plantation, just north of Mount Pleasant, in Charleston County, reported more than 24 inches of rain through Sunday morning, which essentially blows NOAA's 1,000-year events scale out of the water."
Source: [The Washington Post's Capital Weather Gang](#)

The probabilities for flooding events and rainfall events can change over time as scientists collect more data. Additionally, other factors outside of climate variability, such as land-use change and construction of reservoirs and dams, also influence the type of flooding possible at a specific area. For more information on the 1,000-year flood, check out the [USGS handout](#) created by Dr. Robert Holmes.

What does rainfall have to do with pumpkin pie?

If you are one of the many folks who purchase canned pumpkin every year around this time to make a variety of food items, such as pumpkin pie, be sure to stock up. Major news outlets such as [CNN Money](#) and the [Associated Press](#) report a possible canned pumpkin shortage occurring by Thanksgiving based on estimates by pumpkin crop experts and canned pumpkin producers (although kudos to you if you make your own fresh puree). Do not be fooled by the huge boxes of pumpkins outside of stores and various patches because those pumpkins used for carving differ from the pumpkin varieties used for canning.



Carving pumpkin (left) vs. a canning type pumpkin (right). Source: PumpkinPatchesandMore.Org

Many sources cite that heavy June rainfall in Illinois, which produces over 90% of canning pumpkins in the US, resulted in extensive crop damage and approximately a 1/3 decline in pumpkin yields for the state. According to the [State Climatologist Office for Illinois](#), the total statewide rainfall average during June 2015 for Illinois exceeded normal monthly averages by 5.33 inches and broke the record for the wettest June. Some areas known for pumpkin production, such as Morton, Illinois, received over 7" above their monthly average rainfall in June and had a rainfall total of over two feet during a three month period from May to July. According to [Illinois Cooperative Extension](#), pumpkin farmers face challenges when heavy rainfall occurs during these late spring and early summer months because planting during these months is critical in order to avoid the chance of frost damaging recently planted pumpkin seedlings. Additionally, if farmers plant pumpkins earlier in the year, they risk their crop rotting or softening prior to Halloween. The lower amounts of processing pumpkins harvested this year results in fewer canned pumpkin reserves available for the remainder of this year, which means that many stores might not be restocked once they run out of canned pumpkin.

Rainfall Impacts to Crops in the Carolinas

While rainfall in June appears to be the main culprit for the possible canned pumpkin shortage six months later, it will be interesting to see how the heavy rainfall in the Carolinas will impact crops here. Farmers have already been notified to start looking into farmers insurance, and a report by [The State](#) expects that the USDA will declare an agriculture

disaster soon to help farmers who were impacted by flooding. However, as with the pumpkin situation, the operations of processing and selling different crops might influence availability and any possible shortages. With pumpkin, the shortage seems to be linked with how manufacturers store and use canned pumpkin reserves, and also possibly the shelf life of pumpkins. Things might be different for other crops.

Condition Monitoring Star of the Month

We have selected Carl Cole from Charleston County, SC as our October Condition Monitoring Star of the Month for his dedicated and detailed reporting about conditions in his area. Even during this rainy month, Carl has continued to submit reports regularly, like the ones below:

- 9/28/2015 - *The ground is saturated so that recent heavy rains overwhelmed the storm water drainage ditches, flooding the area around the vegetable garden and much of the area around the house. At one point, it overwhelmed sand bags at an outside door so that I had to vacuum over 200 gallons of water from a utility room.*
- 10/4/2015
- 10/5/2015 - *Soil in the vegetable garden and in the general area continues to be saturated with, for example, water standing in the storm water drainage ditches. However, a few days midweek of sun with no rain has allowed greens in the vegetable garden (lettuce, mustard, et al) to begin to recover from being badly bruised by the previous weekend's record rainfall.*
- 10/11/2015
- 10/12/2015 - *Soil in the vegetable garden and elsewhere is no longer quite saturated but soil moisture remains high. A few days without rainfall means that I've been able to keep BT on the greens in the garden to suppress caterpillar damage. That, combined with recovering from being beaten down by heavy rainfall, has those vegetables doing well again.*
- 10/18/2015

Carl's regular submissions help us understand how conditions change over time when there has been a lot of water. He provides specific examples such as the "overwhelmed storm water drainage ditches" to describe the impacts and

magnitude of the flooding rather than just simply saying there was a lot of rain and flooding. Additionally, since Carl continues to report about his local conditions using the same reference points, such as the soil in his vegetable garden, we can see the progression of how his area slowly recovered from the heavy precipitation during the following weeks.

Although our condition monitoring project is part of a larger project to develop a drought early warning system, our decision makers are also interested in overall conditions, including the impacts of above average rainfall. We hope that you are able to gain some ideas about how to include information in your condition monitoring reports even when it's wet outside from Carl's excellent reports. Thanks again, Carl, for your consistent reporting and hard work!

See the [List of Drought Impacts Reports](#) on the CoCoRaHS website to search for and view more reports from fellow observers.

Feel free to contact us with any questions.

Carolinas Integrated Sciences & Assessments
803-777-6875

cisa@sc.edu | www.cisa.sc.edu
University of South Carolina
Department of Geography
709 Bull Street
Columbia, SC 29208

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