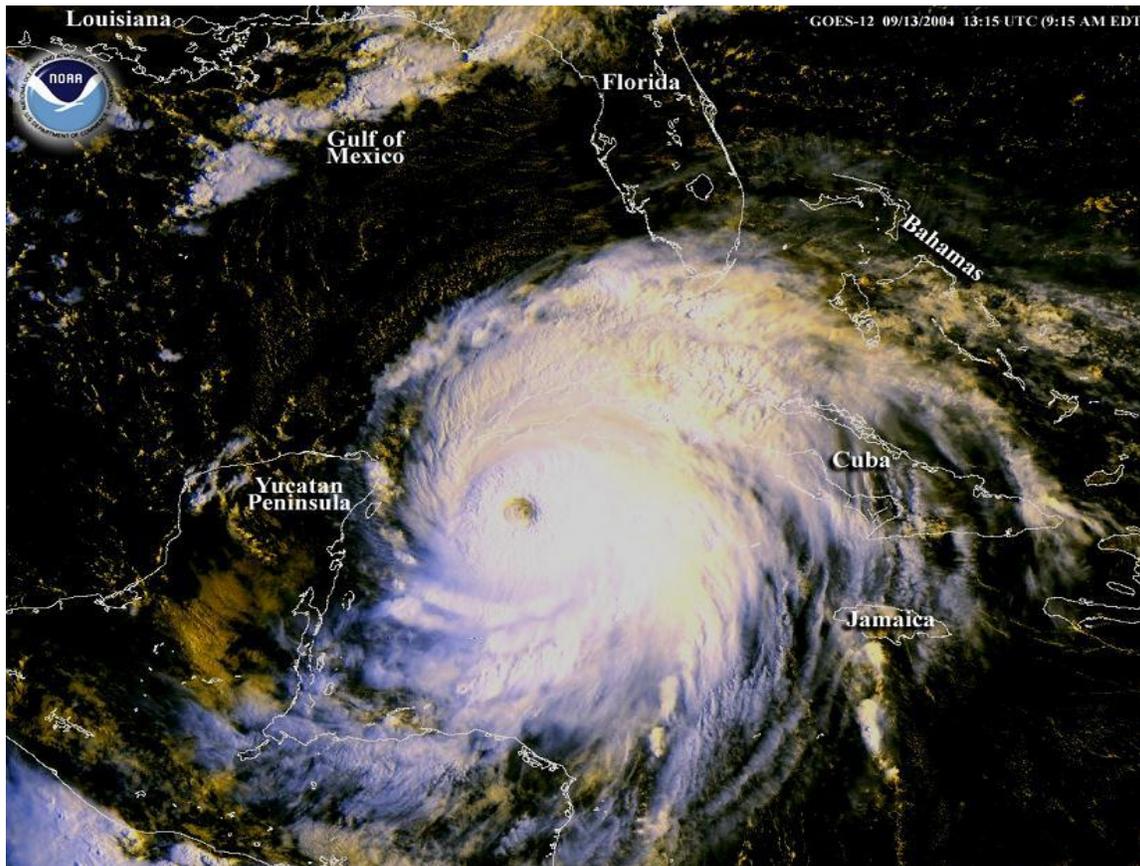


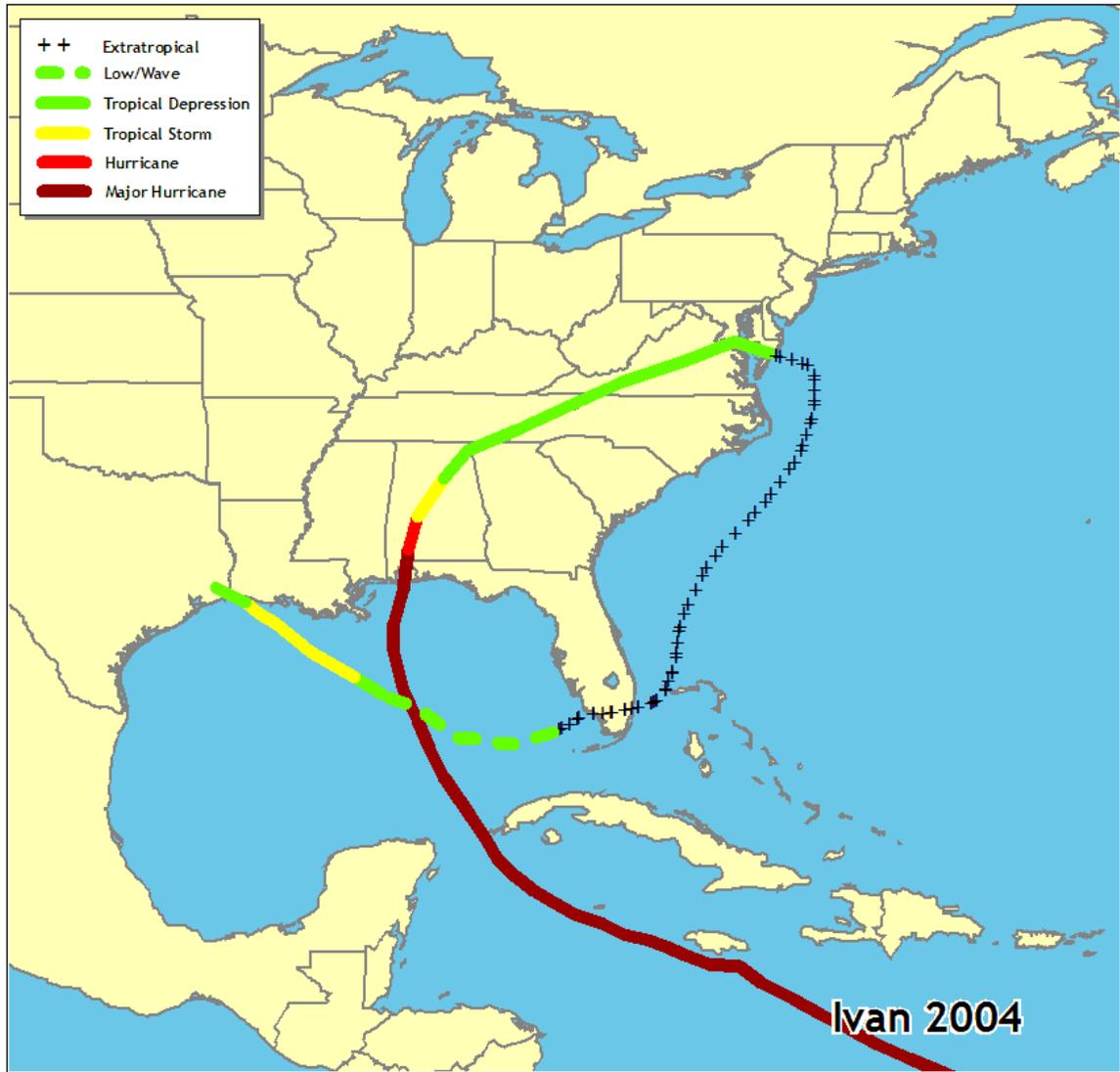


Hurricane Ivan's Tornadoes: 10 years ago (September 17, 2004) National Weather Service, Blacksburg, VA



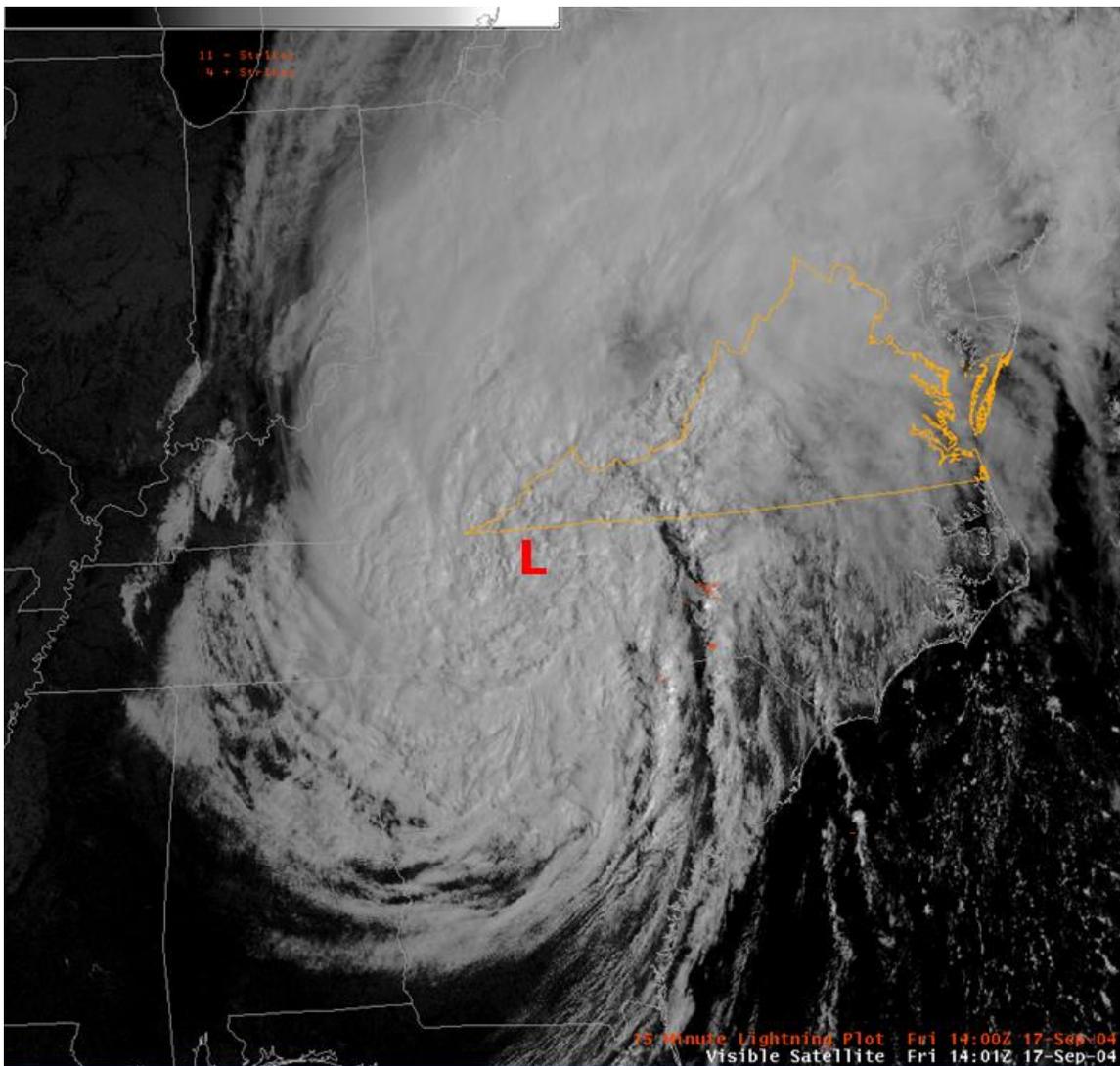
Visible satellite image of Ivan as a Category 5 hurricane in the Caribbean on September 13, 2004.

Hurricane Ivan was one of the most destructive storms in Atlantic Basin history, reaching Category 5 status in the Caribbean where it caused incredible damage and a number of casualties especially in Grenada, Jamaica, and Grand Cayman. It then came ashore along the U.S. Gulf Coast near Mobile, Alabama early in the morning of September 16, still as a Category 3 major hurricane, where it resulted in extensive damage to buildings and roads along the coast of Alabama and Florida from storm surge, winds, and inland coastal flooding. However, its impacts were far from over.



Track of Ivan showing intensity evolution.

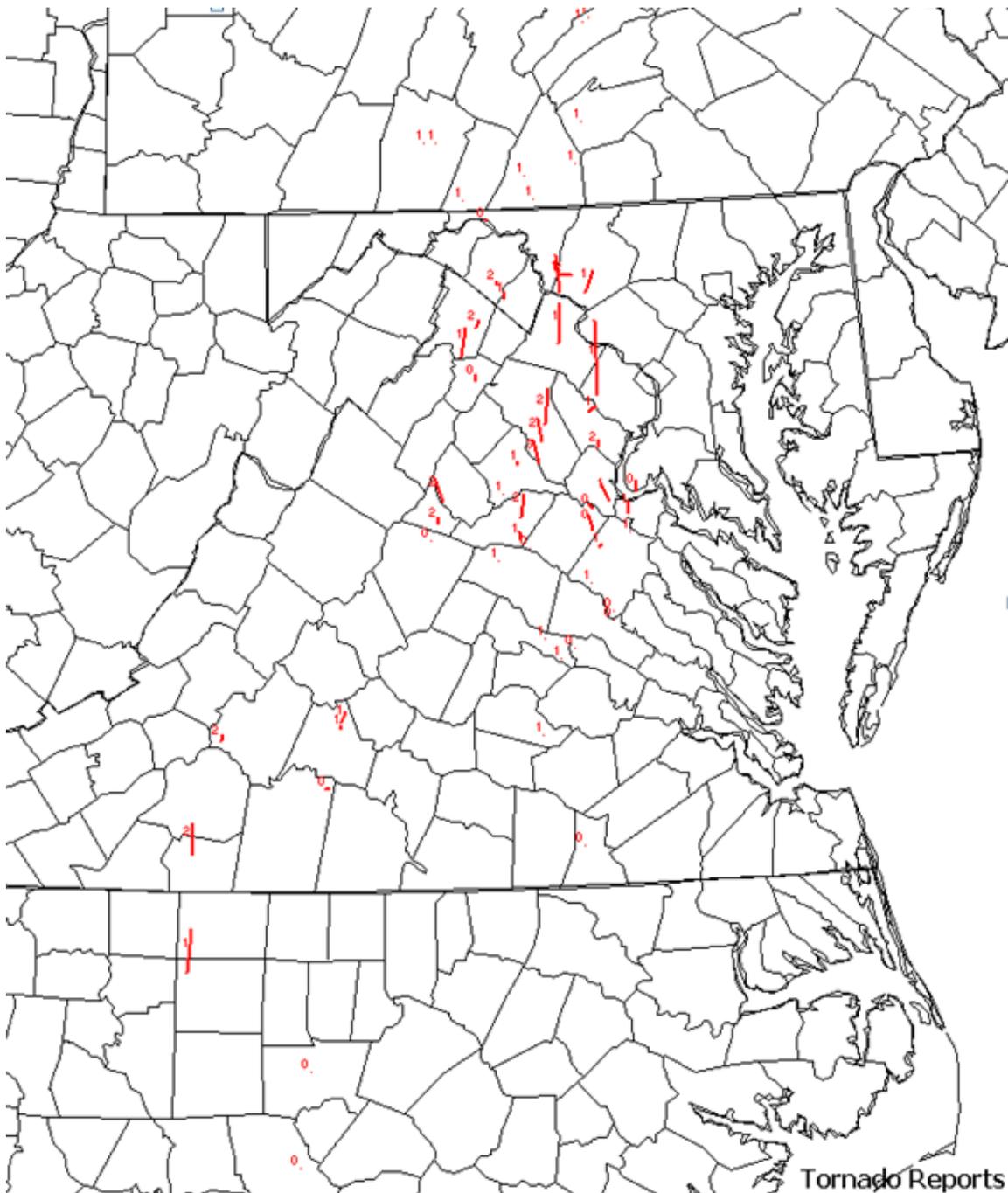
As Ivan weakened to a tropical depression on the 17th moving northeast up the Appalachian spine, it began to draw in some drier air from the west which rotated around the counter-clockwise circulation to the south and east side of the low center. The timing was such that this drying, and consequential partial clearing, occurred in the middle of the day on the 17th allowing for more efficient heating of the ground, and thus increasing instability. The satellite photo below shows the developing thunderstorms across central North Carolina by late morning on the 17th, with the center of the circulation shown by the red "L" near Boone, North Carolina.



Visible satellite image at 10am EDT on September 17, 2004, with lightning strikes plotted in red, as well as the surface low pressure center ("L").

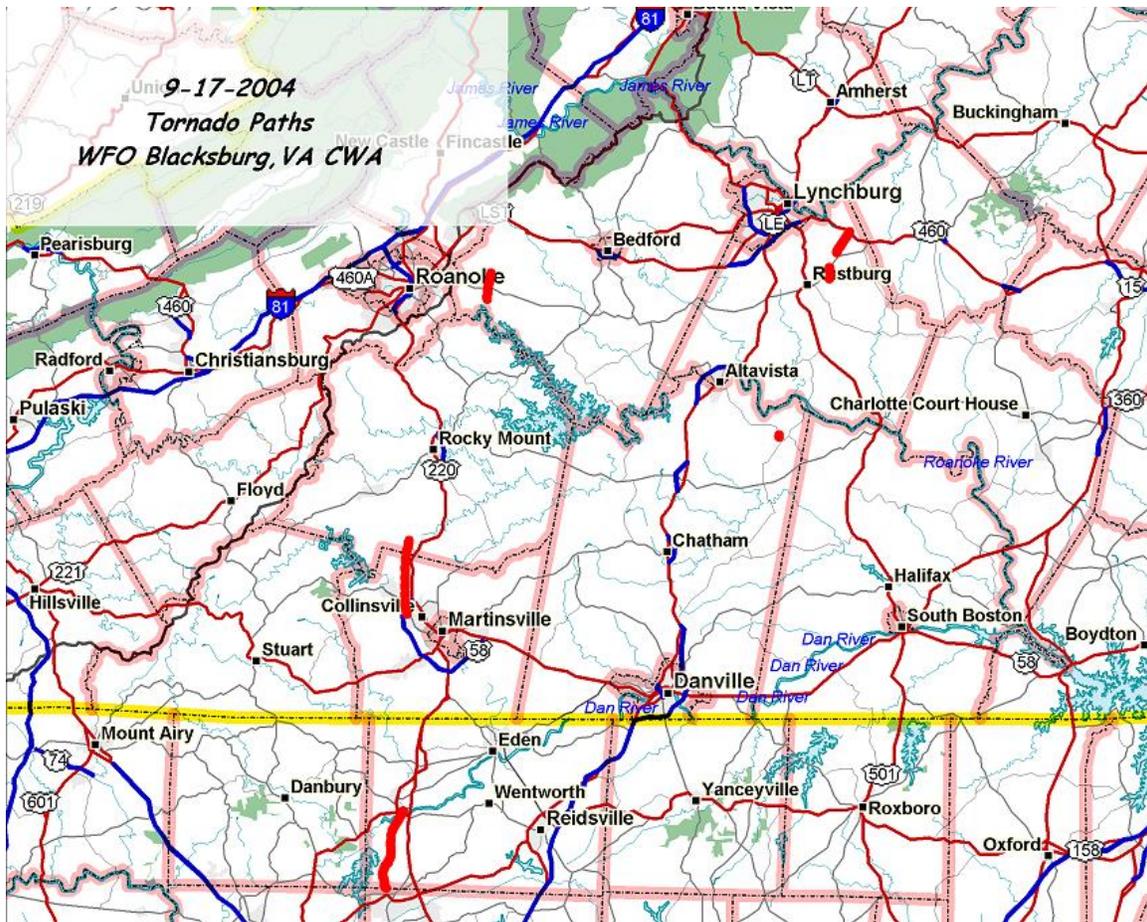
The combination of developing instability from daytime heating, as well as substantial spin from the storm system (which meteorologists refer to as "vorticity") and associated wind shear, resulted in an environment very favorable for tornadoes. In fact, an outbreak of tornadoes had already begun across the deep south on the east side of the circulation right about the time of landfall, but these developing conditions on the 17th made the atmosphere even more volatile for tornadoes.

The map below shows the tornado touchdowns and tracks that occurred on the 17th alone, from North Carolina to Pennsylvania. In the Commonwealth of Virginia the outbreak of tornadoes added up to 38, which is by far the largest ever one-day total not only for Virginia, but for any state east of the Appalachians north of South Carolina. A grand total of 118 tornadoes were associated with Ivan from Florida to Pennsylvania, which is more than any other tropical system since modern day tornado records have been kept starting in 1950.



Map of tornado touchdowns and tracks in the mid-Atlantic region on September 17, 2004, with F-scale value plotted next to track.

In the Blacksburg County Warning area, there were six confirmed tornado touchdowns (five in Virginia and one in North Carolina), and we suspect there may have been a couple more in remote areas that we could never find. Two of these produced F2 damage, one on the high end of the scale with winds of up to about 150 mph (Henry County, VA), and another on the low end with winds around 120 mph (Bedford Co, VA). Three other tornadoes produced F1 damage, and one brief touchdown produced F0 damage. The map below shows a close-up of the tornado tracks in our area.



Tracks of six separate confirmed tornado touchdowns in the NWS Blacksburg, Virginia County Warning Area, on September 17, 2004.

Damage from the tornadoes was extensive in some areas, with 4 injuries reported with the F2 tornado in Fieldale, Virginia (just northwest of Martinsville), but no direct fatalities. Below are a few photos of some of the destruction left by these tornadoes. This was an event that many in Virginia and the mid-Atlantic region will never forget, including the meteorologists and support staff who worked this day.



This F1 tornado tracked very close to the Goodview Elementary School in Bedford County near Stewartville, Virginia. A swath of downed trees in the nearby woods can be seen within the red oval area, where there was also some damage done to homes. Soon after this, it produced some low-end F2 damage off to the right of this image.



Some of the damage from the F1 tornado near Stewartville, Virginia



Around 40 vehicles were flipped over and destroyed in this high-end F2 tornado that hit the CP films plant in Fieldale, Virginia (Henry County), which also experienced significant damage.



Aerial view of some of the F1 damage to homes and trees (note the white arrow on left side of photo) in southwestern Rockingham County, North Carolina.