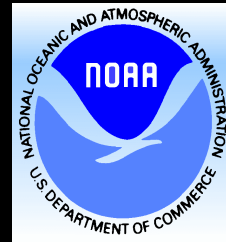




# The Spotter's Page



Volume 9, Issue 1

Winter 2003/Spring 2004

## Earthquake Hits Central Virginia

**A**t 3:59 PM EST on Tuesday December 9<sup>th</sup>, 2003, a 4.5 magnitude earthquake occurred at Latitude 39.9 North, Longitude 77.9 West. These coordinates are located in Powhatan County just east of the town of Provost. (Figure 1).

Seismic tremors were felt over much of Virginia and parts of Maryland and North Carolina. Only minor damage was reported across the area. Figure 2 shows the seismograph of the event.

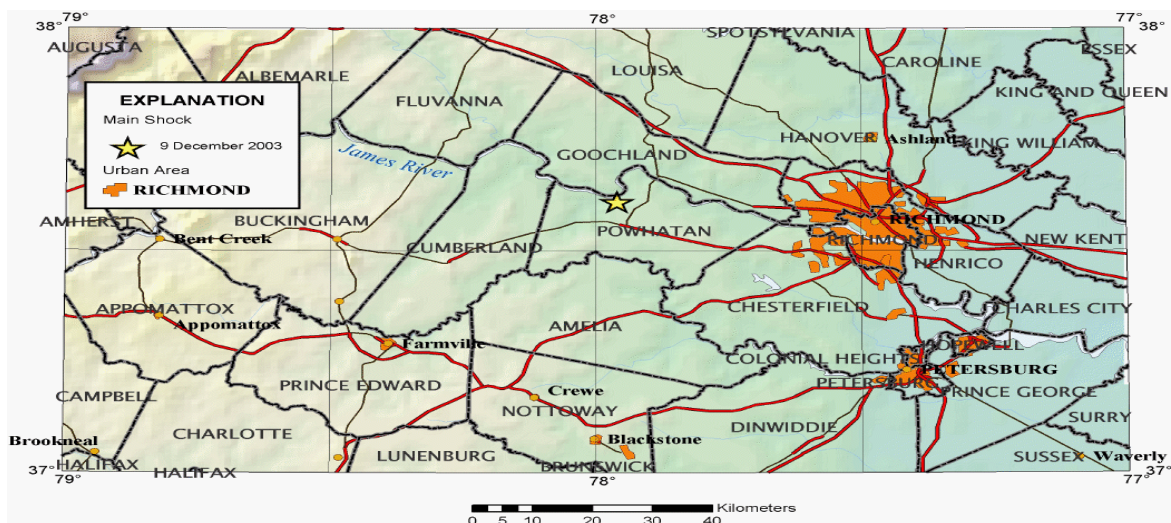


Figure 1. Location of Dec 9, 2003 Central Virginia Earthquake

### Central Virginia Earthquake History

The Virginia piedmont tectonic plate is bounded on the east by a fault line, which passes directly through Richmond. The oldest rocks are about 1.1 billion years old and occur in the area known as the Goochland terrain. Some recent Virginia earthquakes include:

- 2.6 magnitude near Ashland on November 6<sup>th</sup>, 2003,
- 3.9 magnitude 30 miles southeast of Charlottesville on May 5<sup>th</sup>, 2003
- 3.2 magnitude near the town of Shadewell (just east of Charlottesville) on September 22<sup>nd</sup>, 2001
- 3.8 magnitude near Dillwyn on October 21<sup>st</sup>, 1998.

The largest Central Virginia earthquake was a 4.8 magnitude which was recorded on December 22<sup>nd</sup>, 1875 in Goochland county where some structural damage was reported.

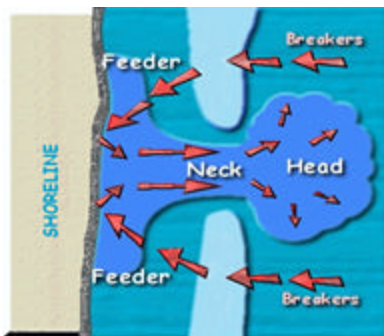
(Continued on page 5)

# Rip Current 2003

## What is a Rip Current?

**A** rip current is strong narrow channel of water that flows from the surf-zone out to sea. It develops when breaking waves push onshore, then gravity pulls the water back out to sea. If the water converges into a narrow river like channel moving away from shore, a Rip Current forms.

Rip Currents are sometimes mistakenly called an undertow. However, a rip current will not pull you under the water surface. Rip currents can be 50 feet to 50 yards in width, and the strength of the current can be up to 3 to 5 mph, which can carry even a strong swimmer into deeper water beyond the sandbar. The development and persistence of a Rip Current requires a mass transport of water from **WIND...WAVES and/or SWELL**. The swell or waves produce a greater than normal mass transport of water onto the beach, causing an above normal volume of receding water, and the channel or **Rip Current** is formed.



## WHAT TO DO IF CAUGHT IN A RIP CURRENT

What should you do if you are caught in a rip current? First, **REMAIN CALM!** Signal to someone on the beach, a lifeguard or a friend, that you need help. If you are a strong swimmer, try to swim parallel to the beach until you are out of the rip current. Then swim toward the shore. Never try to swim back to shore directly against the Rip current, as this can exhaust and drown even the strongest swimmer. For the less confident swimmers, wade sideways parallel to the beach until you are out of the Rip's pull, then swim back to shore. Next time you venture to the beach, be sure to check out the Rip Forecast first so that you can be prepared.

The summary below are preliminary statistics for Ripcurrent SUMMER 2003 Beach Season extending along the East Coast from Ocean City Maryland South to Currituck Beach Light North Carolina.

<b>Total Surf Rescues Ocean City</b>	<b>1100</b>
<b>Total Surf Rescues Virginia Beach</b>	<b>150</b>

"Low" Threat		"Increased" Threat		"High or Dangerous" Threat	
Ocean City	Virginia Beach	Ocean City	Virginia Beach	Ocean City	Virginia Beach
# days = 106	# days = 108	# days = 13	# days = 11	# days = 9	# days = 9
# rescues = 947	# rescues = 138	# rescues = 123	# rescues = 4	# rescues = 30	# rescues = 8
# rescues/day = 8.9	# rescues/day = 1.3	# rescues/day = 9.5	# rescues/day = 0.4	# rescues/day = 3.3	# rescues/day = 0.9

# Tornados

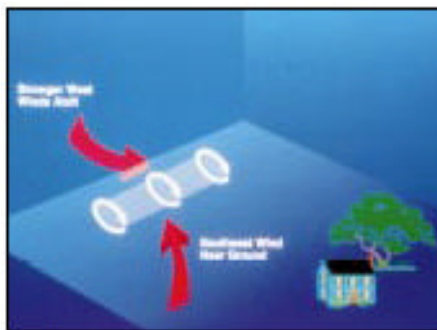
## Post-Isabel Early Morning Tornado Outbreak in east central Virginia

In the predawn hours of September 23<sup>rd</sup> 2003, 7 tornadoes touched down in east central Virginia, including one occurrence within the Richmond city limits. There were at least three aspects of this tornado outbreak that makes it noteworthy; the unusual time of day, the low-topped storms that spawned the tornados, and the closeness of the event after Hurricane Isabel. Although these tornadoes were relatively weak (they were given either F0 or F1 ratings on the Fujita Scale of tornado intensity), the combination of the unusual aspects of this severe weather event contribute to its uniqueness, and have peaked the interest of local forecasters and weather enthusiasts alike.

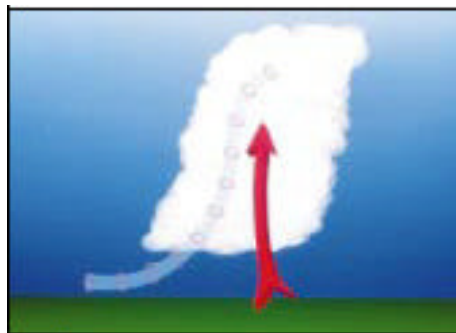
During the early morning hours of September 23<sup>rd</sup>, a line of low-topped storms formed along a cold front moving through the piedmont areas of Virginia and North Carolina. Low-topped storms, or storms that have limited vertical development, are not usually associated with severe weather as they generally lack the necessary strong updraft/downdraft circulations (thunderstorm schematic diagram?). Conversely, storms that are vertical well-developed usually contain the intense down-draft/updraft circulations that contribute to strong downburst winds and hail development. Additionally, storms that have a rotating or “twisting” component are called “supercell thunderstorms”, and are normally associated with large and violent tornados. The storms that moved through east central Virginia during the early morning of September 23<sup>rd</sup> were unusual in the fact that there were able to generate and maintain tornado activity despite their small vertical extent. In fact, very little lightning occurred during the event which can be another indication of weak, vertically limited storms.

It is theorized that the main contributing factor to the development of tornados during the morning of September 23<sup>rd</sup> was the presence of a small area of low pressure, know as a mesolow that accom-

Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height creates an invisible, horizontal spinning effect in the lower atmosphere.



Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical.



An area of rotation, 2-6 miles wide, now extends through much of the storm. Most strong and violent tornados form within this area of strong rotation.



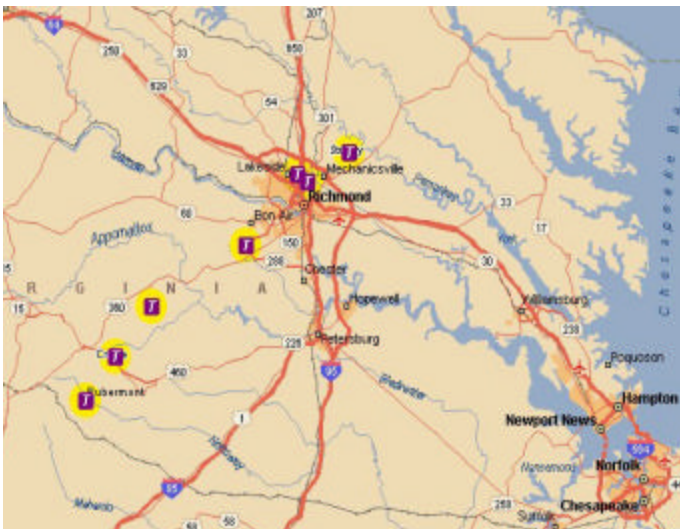
## Tornados, cont'd

(Continued from page 3)

panied the line of storms. The mesolow caused the low-level wind field to back to a more counter-clockwise or southeasterly direction, which created a clockwise turning of the wind with height. This low level turning of winds with height, known as wind shear or helicity, can cause storms to rotate and creates favorable conditions for tornado development.

The first tornado touchdown on the morning of the 23<sup>rd</sup> occurred just north of Victoria in Lunenburg County at 430 AM. This tornado caused damage to hay barns, and twisted and knocked over trees. The second tornado that morning touched down near Crewe in Nottoway County around 445 AM and toppled several trees, several of which fell on houses. The line of storms intensified, probably as a result of the strengthening mesolow, as it moved northeast through Amelia County. At 530 AM, a tornado touched down 4 miles south of Amelia Courthouse and caused extensive structural damage to several homes. Another tornado touchdown occurred about 15 minutes later near Brandermill in Chesterfield County where numerous trees were brought down. Richmond area residents got an unusual wake-up call as the strengthening line of storms moved into the metro area shortly after 6 AM. A tornado damaged several homes between Azalea and Wilmer Avenues, where trees were uprooted and a shed overturned. The tornado briefly lifted before touching down again around 615 AM near Lakeside in Henrico County where structural damage to buildings occurred. The last tornado touchdown of the morning in Virginia occurred at Studley in Hanover

County where numerous trees were downed. The line of storms continued to produce damage as they moved into King William County, but the damage was determined to be the result of down-burst winds and not tornados. However, the line of storms did produce several more tornadoes later that morning over eastern Maryland, Delaware, southeastern Pennsylvania, and southern New Jersey.



Surveys of the damage of these tornados were made difficult by the closeness of the event to Hurricane Isabel. Extensive repair to structures, and cleanup of the thousands of trees downed by Isabel several days before had yet to occur. This made the assessment of new damage attributed to tornados very challenging. In addition, the closeness of the event to Hurricane Isabel contributed to a sense of adding “insult to injury” for many residents of east central Virginia who had just experienced some of the worst damage ever seen from any weather phenomena in their lifetimes.

**By Brian Cullen, Senior Forecaster**



## Earthquake, cont'd

(Continued from page 1)

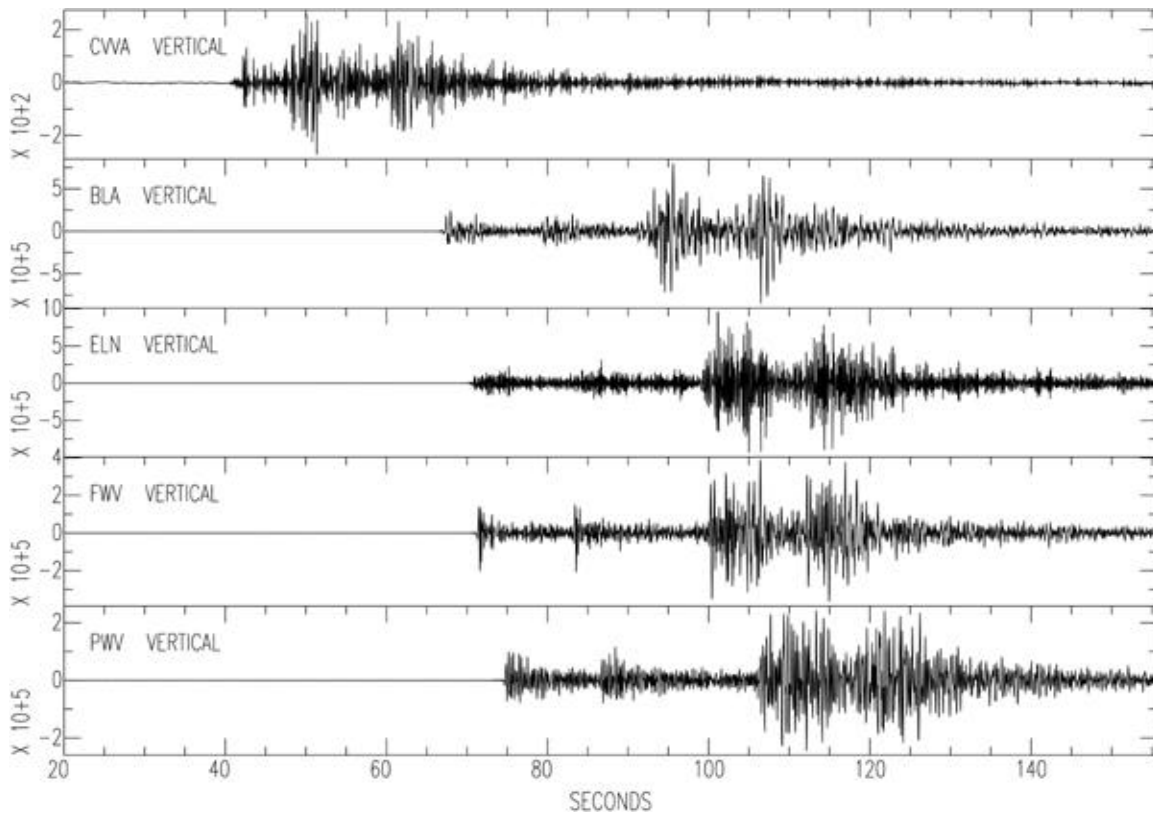


Figure 2, shown above, are vertical-component seismograms for five stations from the 9 December 2003 central Virginia event. The epicentral distance increases from top to bottom: CVVA (Charlottesville; 71 kilometers), BLA (Blacksburg; 225), ELN (Pearisburg; 253), FWV (Forest Hill, WV; 254), PWV (Princeton, VA; 277).

For more information on earthquakes, visit the National Earthquake Information Center web site: <http://wwwneic.cr.usgs.gov>.

**By Mike Rusnak, Forecaster**

### Have you Moved?

If you have changed your address or will be moving soon, please call (757) 899-5732 ext. 223 and let us know. Spotters, you can still participate in the SKYWARN program at your new address. If your new residence is no longer in our area, we will contact the office serving your new locale and let them know that you are available to help!



## SKYWARN Training

Date	Time	Location	Details
Monday May 3, 2004	6:30pm	<b>Richmond, VA</b> Henrico County Fire Training Center 7701 E. Parham Rd. Corner of Parham and Shrader	To Pre-register, please e-mail Al Martin MAR06@co.henrico.va.us
Thursday May 6, 2004	6:30pm	<b>Bowling Green, VA</b> Caroline Community Services Center 17202 Richmond Turnpike (Rt. 301) 2 miles south of town on Rt. 301	To Pre-register, call Mark Garnett (804) 633-9831
Saturday May 22, 2004	9:00am	<b>Elizabeth City, NC</b> College of the Albemarle Business Rt. 17	To Pre-register, please e-mail David Perham n1dp@arri.net
Wednesday June 9, 2004	6:30pm	<b>York County, VA</b> Yorktown Library 8500 George Washington Mem. Hwy. Rt. 17 just North of Ft. Eustis Blvd.	To Pre-register, call Judi Riutort (757) 890-3600
Monday June 21, 2004	6:30pm	<b>Amelia, VA</b> Amelia Emergency Squad Building Intersection of Otterburn Rd. and business Rt.360	To Pre-register, please e-mail Kent Emerson KEmerson@LANDAM.com

**NEW!! Basic SKYWARN Presentations ONLINE!!!**  
<http://www.erh.noaa.gov/er/akq/spotterinfo/calendar.htm#Spotter>

### Important Phone Numbers:

**Severe weather reports ONLY line:**  
**1-800-737-8624**

**Public phone line (forecast info):**  
**(757) 899-4200**

**FAX : (757) 899-3605/5107**

**Spotter Report E-Mail: akq-report@noaa.gov**