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## **Steam Devils and Other Whirlwinds**

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**We're all familiar with tornadoes, but there are other types of rotating columns of air (vortices or whirlwinds), even in winter. The photo below from near Toronto, Canada (courtesy of The Weather Network) shows steam devils. There are two of them that I've bracketed by red markings. One is in the center foreground and the other in the right background.**



**Steam devils are rotating columns of rising air, formed as bitterly cold air is heated by unfrozen water (or possibly thin ice at a temperature much warmer than the air). Moisture evaporated from the water surface then condenses in the colder air and slightly lowered pressure in the vortex. Some locally generated wind swirl gets concentrated into more vigorous rotation as it is drawn into the rising air column, like a skater spinning faster as arms are pulled**

**inward (conservation of angular momentum), and the vortex is formed. Video showed counterclockwise rotation of the closer steam devil in this case, but they can also rotate counterclockwise.**

**My estimate is that the rotation of this steam devil was pretty weak, maybe not more than 30 mph, and I don't expect steam devils to become strong enough to produce damage. By the way, scientists on a research aircraft saw hundreds of steam devils over the Atlantic Ocean off North Carolina in the bitterly cold air mass that resulted in the explosion of the Space Shuttle Challenger back in 1986.**

**A cousin vortex is the dust devil, formed on sunny days when the land surface gets much hotter than the air above ground. Some dust devils can become strong enough to produce EF0 or perhaps EF1 damage (and definitely at least eye damage from the blowing dust). The photo below shows one captured by TWC Weather Warrior dcmcc99 near Landers, CA on September 17, 2008.**



**Another cousin is the fire whirl or fire devil (see photo below), formed in the**

intense heating from fires. I did a blog on these in October 2007. They can also reach EF0 or EF1 intensity. **The generic term for these rotating air columns is whirlwind.**

