

Abstract Submitted
for the OSF13 Meeting of
The American Physical Society

Tornadogenesis: Can horizontal rotation be tilted to vertical?

AUSTIN MULLEN¹, Bishop Fenwick High School — Tornadoes are one of mother nature's most dangerous creations. An average of 80 people are killed annually by tornadoes, and property damage averages \$4.9 billion per year. It is critically important to be able to forecast when and where a tornado will form to improve warning accuracy. Before this is possible, however, meteorologists must learn how tornadoes actually form. One theory of this tornadogenesis suggests that a horizontally rotating column of air, induced by low level wind shear, is tilted by the updraft of a thunderstorm to a vertical axis, then stretched to increase wind speeds and form the tornado's funnel. This experiment was designed to test if horizontal rotation can, by virtue of the law of conservation of angular momentum, be tilted to a vertical axis by a simulated updraft. To do this, a wind tunnel was constructed. Horizontal rotation was created by two opposing wind diffusers, and then an updraft hose was used to attempt to tilt the rotation to vertical. It was found that an average of 53.4% of the horizontal rotation could be tilted to a vertical axis. Therefore, this experiment supports the hypothesis, as long as a tornado forms under well controlled laboratory conditions. In the real world, this rotation would be subjected to many other forces generated by the turbulent winds in and around a thunderstorm. This experiment does give data to support the hypothesis, but it also points out some of the flaws of the theory.

¹Recipient of an OSAPS-SOSAAPT award at State Science Day 2013

Gordon Aubrecht
Ohio State University at Marion

Date submitted: 12 Sep 2013

Electronic form version 1.4