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Radar Determined Intense Tornado Frequencies, Wind Profiles and the BEST Tornado Study

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Since 1995, DOWs have observed over 30 very intense tornadoes, with wind speeds calculated to exceed 200 mph (89 m/s), exceeding the EF-5 minimum wind speed. Some of these have been associated with officially-rated EF-5 levels of damage, but most have not.

We will discuss the spectrum of tornado structures, sizes, propagation speeds, and wind speed durations of these most intense tornadoes, how these relate to documented damage and resulting ratings. We will examine intense 2024 tornadoes, with a particular focus on measurements of a tornado which crossed Greenfield, Iowa. This tornado was very small, with the region containing the most intense winds extending perhaps 200 feet, and propagating very rapidly, over 50 mph, resulting in a rapidly moving very small region of winds near 300 mph, well in excess of the minimum EF-5 (or old F-5) wind speed criterion. EF-4 damage was documented. This tornado also destroyed several wind power turbines, and DOW measurements will be examined at those locations. Factors affecting how observed and calculated wind speeds result in documented damage, including vertical dependences of wind speeds, especially in built-up areas with many structural and arboreal obstructions, methodology, tornado propagation speeds, tornado structure, and, of course, the availability of strong structures to be damaged, will be discussed.

We will present results in the context of the BEST tornado study and extended DOW radar based tornado wind speed climatologies.