

**DOPPLER WEATHER RADAR OBSERVATIONS OF THE 14 APRIL 2010 SOUTHWEST WISCONSIN METEORITE FALL**

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**Introduction:** Shortly after 10pm local time on 14 April 2010, residents of parts of Wisconsin, Iowa, Minnesota and Illinois were treated to an extraordinarily bright fireball traveling approximately NW to SE along a long, flat trajectory. The fireball followed a ground track that lies west of Madison, WI and north of Davenport, IA and was punctuated by a series of bright explosions at its terminus. This fall is unnamed at the time of this writing but was located near the towns of Livingston, Mineral Point and Mifflin, WI. At this time, approximately 2-3 kg of meteorites have been recovered from the strewn field and reports of new finds are still emerging.

This meteorite fall was recorded by four different Doppler weather radars of the National Weather Service's NEXRAD national radar network. In terms of detection of a fall using weather radar, this fall is remarkable in that it is the first fall detected while still optically bright (a "Type A" event [1]) at an altitude of 28 km above local terrain. Radar data collected from this fall was widely disseminated on a National Weather Service web site and used by meteorite collectors to rapidly locate meteorites. This makes the WI fall the fourth meteorite fall to be detected by weather radar at the time of the fall, after the West, TX ("Ash Creek"), Grimsby, Ontario, and Lorton, VA falls [2].

**Description:** The SW Wisconsin fall was recorded by the KDMX, KARX, KMKX and KDVN radars which bracket the fall location. By coincidence, the KARX radar was only ~110 km distant and operating in high-speed VCP 12 mode, scanning through seventeen 360 degree sweeps every 4.5 minutes at elevations up to 19.5 degrees. KARX records a breakup event at a remarkable 28 km above local ground level while the fireball was still optically bright and roughly 25 km laterally distant from the approximate center of the strewn field as it is currently known. This event was recorded at 0306:09 UTC. An additional radar return is recorded at 27 km altitude by the KDMX radar. The next appearance of falling debris occurs at about 8 km altitude over the local terrain, detected in multiple sweeps from the data set begun at 0306:46 UTC by the KARX radar. Multiple radars then record a very large spread of falling debris below 2.5 km altitude, covering an area in excess of 20 km long along the long axis of the strewn field.

A radiosonde balloon launched from Davenport, IA at midnight UTC, 14-15 Apr (three hours removed from the fall) reveals that local winds were generally light and tend to blow from the southwest all the way up to 30 km altitude. Overall, this fall appears to be the result of multiple detonations of a bolide at and below 28 km altitude. The resulting multiple debris clouds were only mildly size-sorted by prevailing winds with smaller masses deflected towards the NE. The resulting strewn field appears to cover a large area with various meteorite sizes interspersed along the length of the field.

**References:** [1] Fries M. and Fries J., 2010. Abstract #1179. 41th Lunar and Planetary Science Conference. [2] Corrigan C. et al, (this volume) Meteoritical Society Conference 2010.