

Severe Weather and Tornadoes of June 5, 2012 in Central Montana

Severe weather was expected for the afternoon and evening of June 5 as the atmosphere was unstable, with a wind-shear profile that would support tornado development. The Storm Prediction Center issued a Severe Thunderstorm Watch (359) from 142 pm through 900 pm MDT, for portions of southwest Montana, including Meagher County. Storms began in the afternoon, with the first severe storms in the Meagher County area. Figure 1 shows the track of the Maximum Estimated Hail Size from the Doppler Radar at Great Falls. Storms that initiated south of White Sulphur Springs, in the Bozeman area, tracked north-northeast through White Sulphur Springs, before diminishing on the south slopes of the Little Belt Mountains. Another, long-track storm, developed in western Wheatland County, near Two Dot, then tracked through eastern Judith Basin, western Fergus and eastern Chouteau Counties. Several observations of large hail, funnel clouds, tornadoes and strong winds were reported from these storms. Table 1 shows a chronology of events for the afternoon and evening.

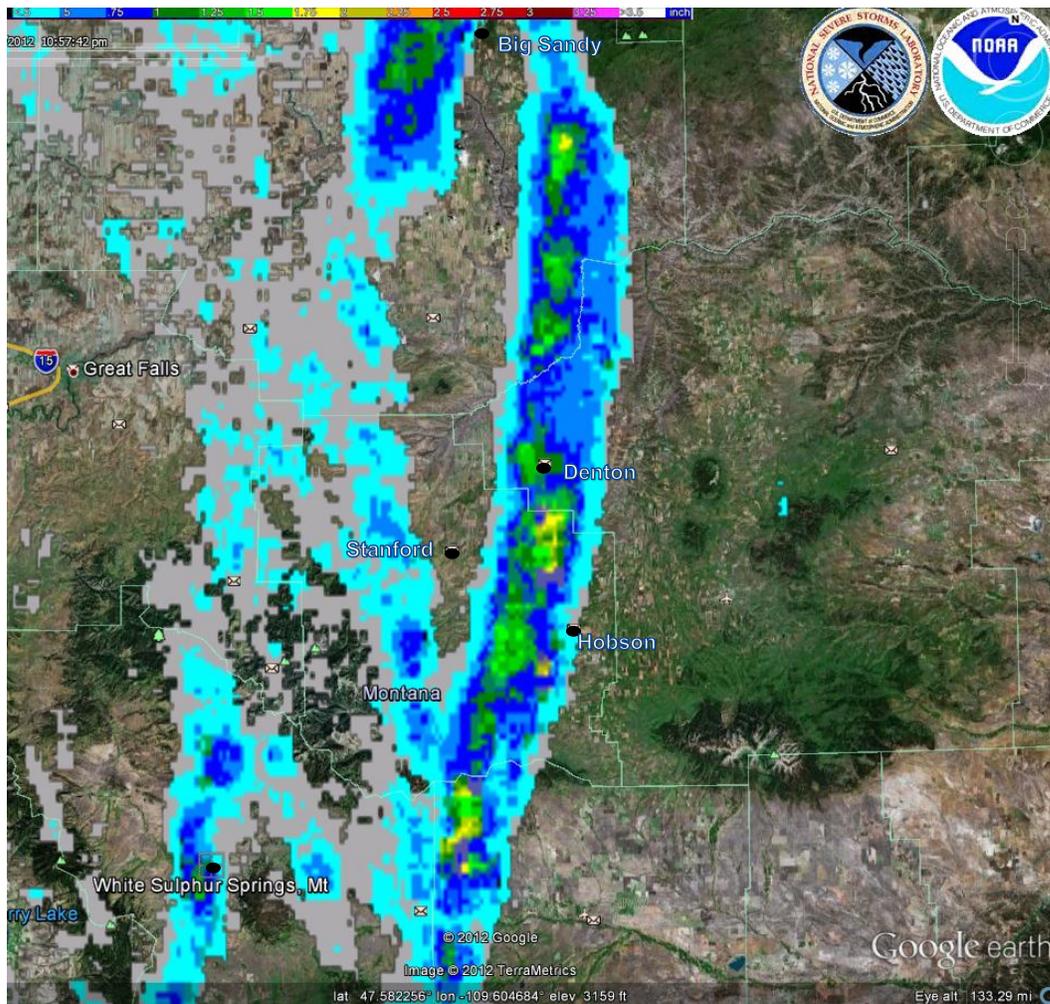


Figure 1. Maximum estimated hail size from NEXRAD 88D algorithm (NSSL WDSII). One-inch to 1.75-inch hail is depicted in shades of green. 1.75-inch to 2-inch hail is shown in bright yellow.

Table 1. Chronology of events.

Time (MDT) June 5 2012	Event	
142 - 900 pm	SPC issued Severe Thunderstorm Watch 359 until 900 pm	Broadwater, Gallatin, Jefferson, Madison, Meagher
237 – 1100 pm	SPC issued Tornado Watch 360 until 1100 pm	Blaine, Cascade, Chouteau, Fergus, Glacier, Hill, Judith Basin, Lewis and Clark, Liberty, Pondera, Teton, Toole
305 - 345 pm	Severe Thunderstorm Warning	Broadwater, Cascade, Lewis and Clark, Meagher
338 – 430 pm	Severe Thunderstorm Warning	Meagher
340 pm	Funnel clouds and one unconfirmed tornado	White Sulphur Springs, Meagher
349 -415 pm	Tornado Warning	Meagher
344 pm	1.5-1.75-inch hail	White Sulphur Springs, Meagher
350 pm	1-inch hail	White Sulphur Springs, Meagher
358 pm	0.75-inch hail	Bozeman 4W, Gallatin
401 – 515 pm	Severe Thunderstorm Warning	Lewis and Clark, Teton
417 pm	2-inch hail	White Sulphur Springs, Meagher
441 pm	0.88-inch hail	Wolf Creek, Lewis and Clark
445 pm	0.88-inch hail	Wolf Creek 3N, Lewis and Clark
459 – 600 pm	Severe Thunderstorm Warning	Lewis and Clark, Teton
500 pm	1.25-inch hail	Wolf Creek 3ESE, Lewis and Clark
513-538 pm	Severe Thunderstorm Warning	Judith Basin, Meagher
530 pm	1.75-inch hail	Utica 7SSW, Judith Basin
537 – 630 pm	Severe Thunderstorm Warning	Fergus, Judith Basin
540 – 615 pm	Tornado Warning	Fergus, Judith Basin
541 pm	2.75-inch hail	Hobson 3WSW, Judith Basin
541 pm	Tstm Wind Damage – garage flattened	Hobson 3WSW, Judith Basin
548 pm	90 mph gust	Hobson, Judith Basin
550 pm	1-inch hail, rotating wall cloud	Benchland 2NW, Judith Basin
600 pm	1-inch hail	Windham 4NNE, Judith Basin
611 -700 pm	Tornado Warning	Chouteau, Fergus, Judith Basin

612 pm	Tornado	Moccasin 4NNE
614 pm	100 mph gust, trees down	Danvers, Fergus
616 – 715 pm	Severe Thunderstorm Warning	Chouteau, Fergus, Judith Basin
618 pm	1.75-inch hail, funnel cloud	Denton
652 – 715 pm	Tornado Warning	Blaine, Chouteau, Fergus
653 pm	Large funnel	Coffee Creek area
655 pm	1-inch hail	Geraldine 16E
706 – 800 pm	Tornado Warning	Blaine, Chouteau, Fergus, Hill
724 – 815 pm	Severe Thunderstorm Warning	Chouteau
729 -815 pm	Tornado Warning	Chouteau
733 pm	Tornado	Big Sandy 8SE
758 pm	1.25-inch hail	Big Sandy 8W

White Sulphur Springs Tornado

The first unconfirmed tornado was reported in the White Sulphur Springs area around



340 pm MDT on June 5, 2012 by the public. A tornado warning was issued a few minutes later at 349 pm. Several funnels were sighted and photographed south of the city. The tornado appears to have touched down east-southeast of the city, in the Castle Mountain Estates subdivision. The city's water tank is partially buried in the ground at the top of a ridge in the area. Another building housed a water filtration system. This building was almost completely destroyed, with the debris from the building scattered about 1000-1500 feet to the northeast, then in an arc to the northwest. As a result of the damage to the water tank, the city was under a boil order through Friday June 8.

From this point, other buildings were damaged in the subdivision. One home's gable-end was pushed in and part of the roof removed and deposited about 600 feet to the northeast. Most of the shingles were removed on the east side of the main

house. A canoe was ripped from beneath a deck. The homeowner stated “I thought it might be a tornado when I looked up and saw my canoe rotating in the air about 80 feet above me.” The canoe, nearly torn in half, was deposited approximately 750 feet north of its origin. A debris pattern from this house extended at least 1500 feet to the north. At another residence to the north, a fifth-wheel camper was pushed over and a Volkswagen van was reportedly lifted from near the camper, and deposited in a garden about 1000-feet north. Several yard items were tipped over at this residence. Along the highway (US12), long dry grass was caught in a barbed-wire fence over a span of about 500 feet. On the north side of US12, many trees were heavily damaged, with several trees either snapped off, or pushed over near the intersection of US12 and US89.



Figure 2 shows the 88D Rotation Track in the White Sulphur Springs area. The approximate tornado path is shown in the figure. The path was approximately two miles long and 300 yards wide. The debris was scattered in a path up to 500 yards wide. There was some difficulty in low level radar interpretation due to blockage of the lowest radar angle by the Little Belt Mountains in the direction of White Sulphur Springs. Radar reflectivity and storm-relative velocity images near the time of the tornado are shown in Figure 3. Preliminary EF rating: EF1. (Start coordinates: 46.5378, -110.8578, end coordinates: 46.5774, -110.8683)

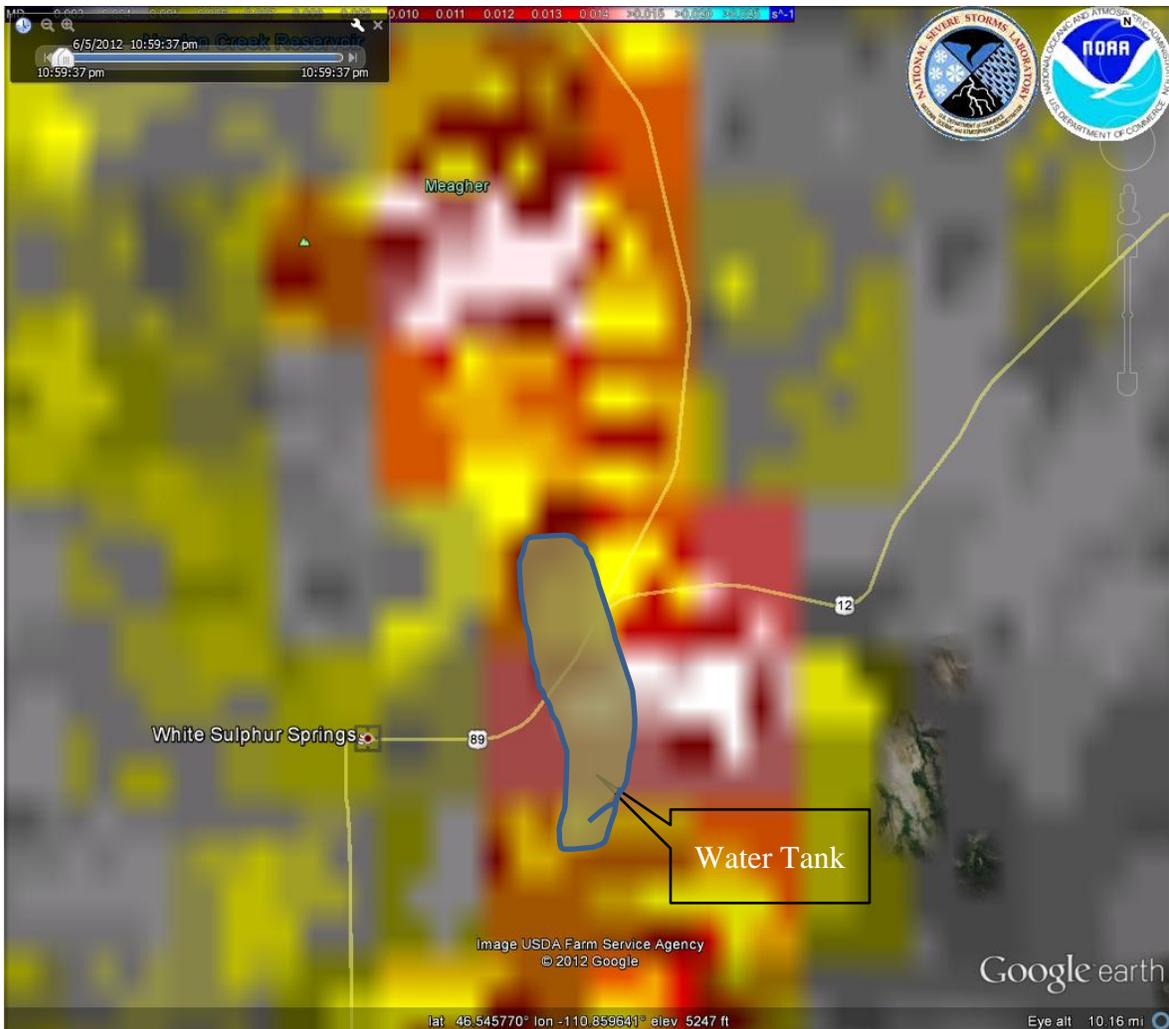


Figure 2. NEXRAD 88D Rotation Tracks White Sulphur Springs, MT (NSSL WDSSI). Approximate tornado path in tan polygon. The colors show the rotation tracks (shear) as derived by the Doppler radar mesocyclone algorithm. White colors are shear regions of 0.015 to 0.020 s^{-1} , values of 0.020 or greater are cyan.

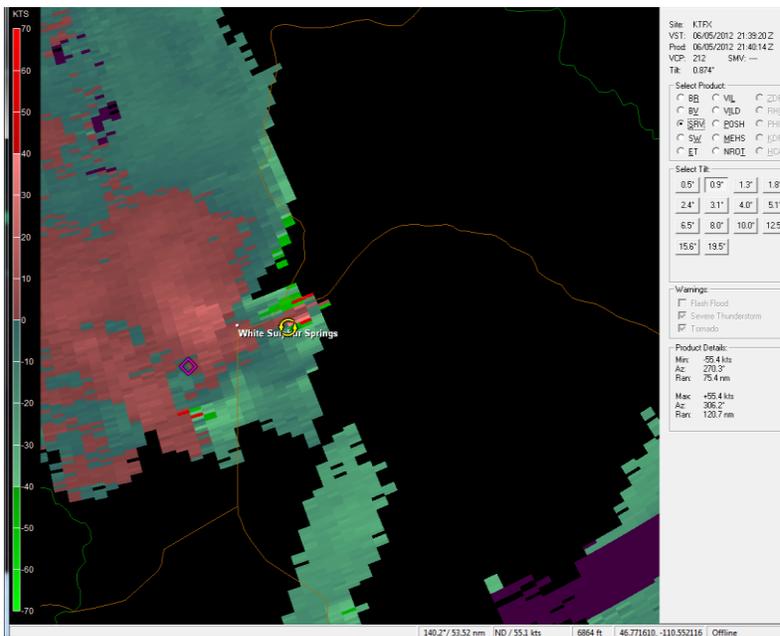
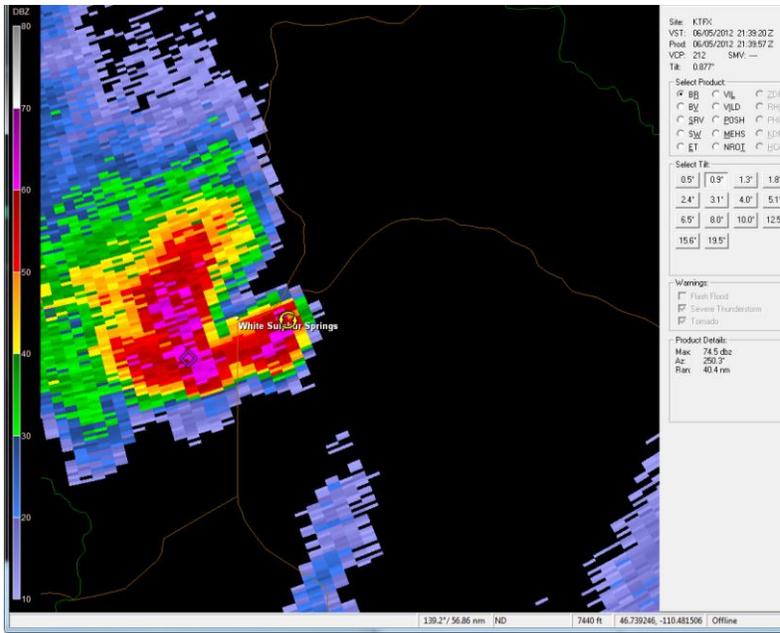


Figure 3. Great Falls Doppler 0.9-degree radar reflectivity and storm-relative velocity images at 339 pm MDT June 5, 2012. On the storm-relative velocity image, the strongest gate-to-gate shear was -47/+52 kts.

Rural Hobson/Moccasin Tornado

The second tornado occurred with thunderstorms that developed in western Wheatland County and moved north-northeast into Judith Basin County. Golf-ball size hail was reported southwest of Utica at 530 pm. As the storm strengthened and moved toward



Hobson, baseball-size hail fell west of Hobson, along with very strong winds. Trees were uprooted and snapped off, and a garage was destroyed. Little or no damage was observed between this point (3 miles west-southwest of Hobson) and Hobson. In Hobson proper, numerous larger cottonwood trees were uprooted or snapped off. Several homes were damaged from the trees falling onto the structures and one wooden light pole was snapped off. A NWS cooperative weather observer



with an anemometer reported 90 mph winds with no damage, a block or two from the main damage. Given this, the winds easily exceeded 100 mph in the zone of most damage. The assessment team felt that the damage was more consistent with strong straight-line winds from thunderstorm downburst winds. Wind gusts were estimated at 115-mph, based on EF scale information. Figures 4 and 5 show the radar images of reflectivity and velocity as this storm passed through the Hobson area around 550 pm MDT. As this storm continued to the north, severe weather reports became more sporadic. Once in northeast Judith Basin County, very strong outflow winds pushed northeast from the storm. One-hundred mile-an-hour winds were reported from the Danvers area at 614 pm. There was some damage to trees, and big-round bales were rolled across the fields for 100 to 200 feet in the area. A cone-shaped tornado from the large supercell was reported around 612 pm in northeast Judith Basin County. Several reports of funnels were received from the area as well. The tornado was reported to be on the ground for eleven minutes.

After the tornado dissipated, strong winds continued with the storm. A building was destroyed about 5 miles east of Denton, with the debris blown across the highway. This debris appeared with be associated with straight-line winds, all blown in the same direction, north-northeast of the structure.

Figure 6 shows the 88D Rotation Track in the rural Moccasin/Hobson area. The approximate tornado path is shown in the figure. The radar-estimated path was up to three miles long and 400 yards wide. There was only one sighting of the tornado, with no damage or debris path noted. This portion of Judith Basin County is predominately open rural farm and pastureland, with no apparent structures in the vicinity of the tornado. Preliminary EF rating: EF0. (Start coordinates: 47.1013, -109.8875, end coordinates: 47.1547, -109.8696)

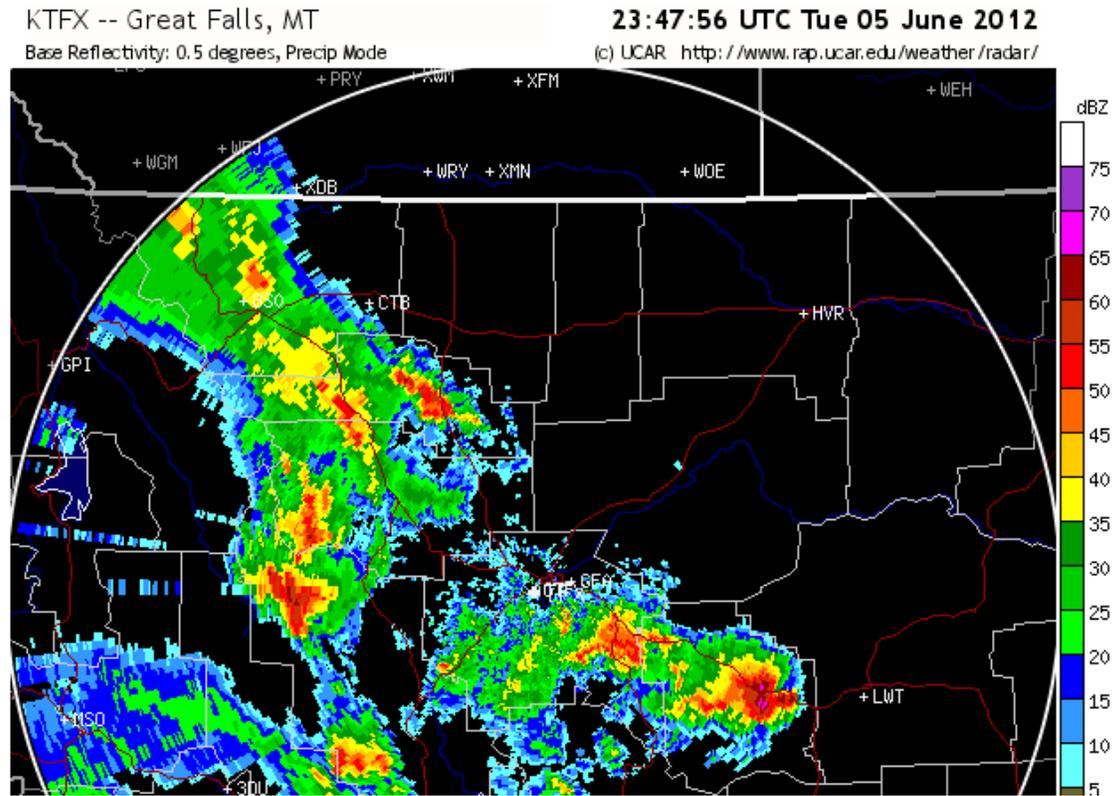


Figure 4. Great Falls 88D Reflectivity signature of severe thunderstorm near Hobson.

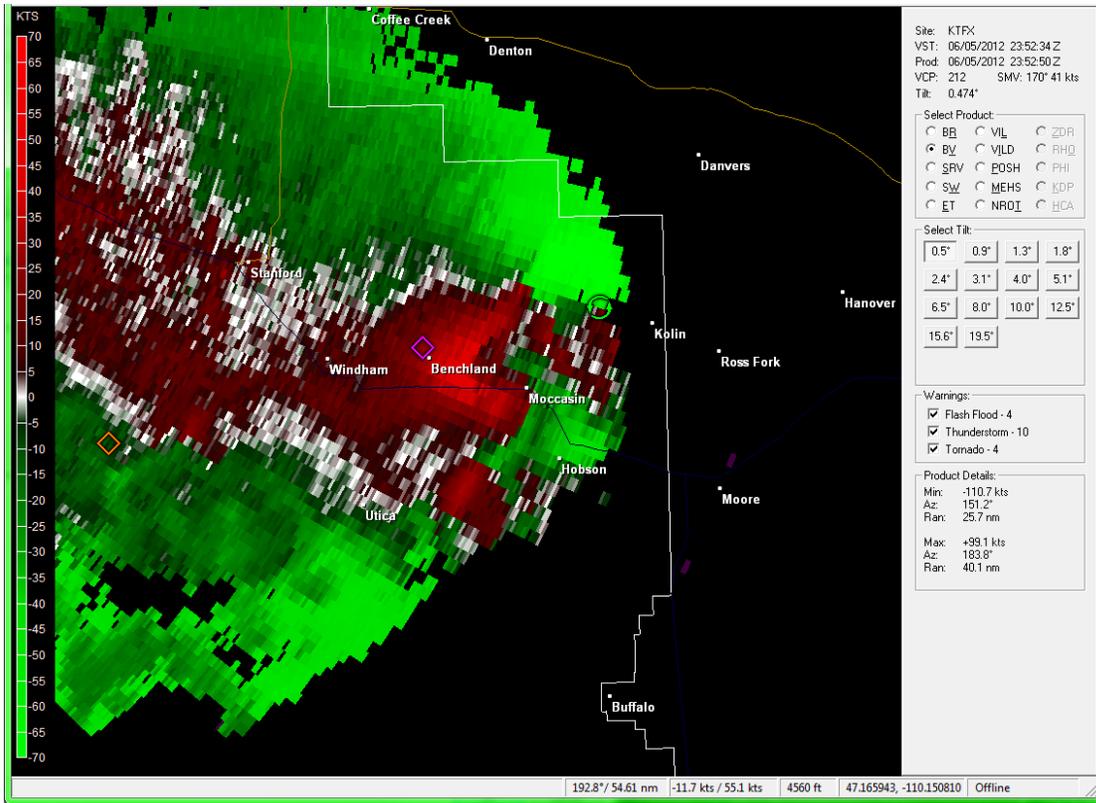


Figure 5. Great Falls Doppler radar base velocity image at 552 pm MDT. The radar beam is about 9000 feet above ground level in eastern Judith Basin County.

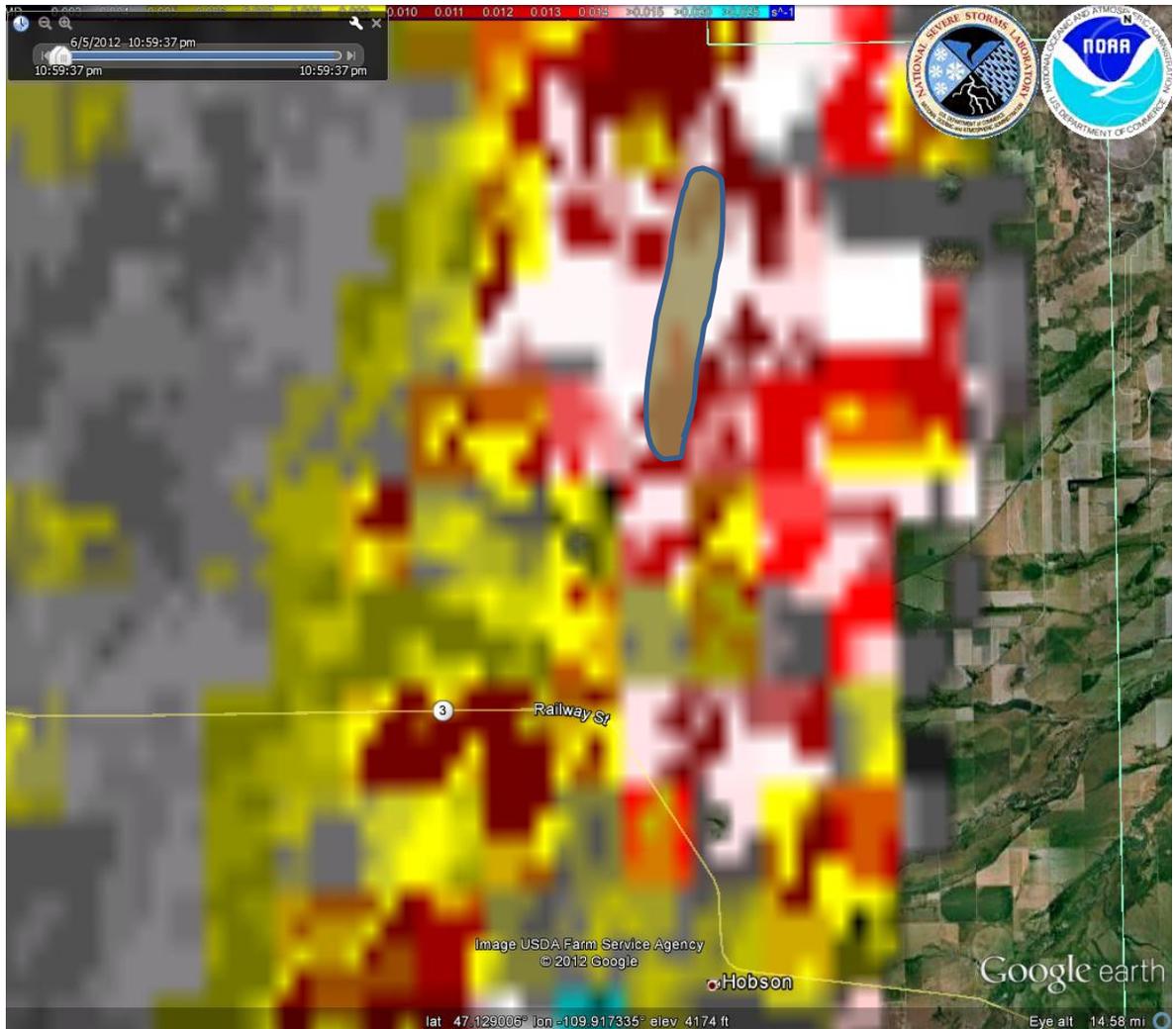


Figure 6. NEXRAD 88D Rotation Tracks Hobson/Moccasin, MT (NSSL WDSI). Approximate tornado path in tan polygon. Legend as in Figure 2.

Rural Big Sandy Tornado

The final tornado of the evening occurred as the severe thunderstorm continued and pushed north-northeast through eastern Chouteau County. As the storm moved north through more sparsely populated country, fewer severe weather reports were received. Though the storm appeared to intensify as it moved away from the Denton area, no severe reports were received from Fergus County in the path of the storm. At 655 pm, one-inch hail was reported 16 miles east of Geraldine, with the rotational track moving through Fergus County, just east of this area. No further reports were received until the storm crossed Eagleton Road. Afterwards, a report of a tree snapping off a damaging home was received near the intersection of Eagleton Road and Judith Landing Road (MT Secondary Highway 236). Large tracts of grassland predominate in this area, making surveying damage difficult. Once the storm moved to near the intersection of Cow Island

Trail and Warrick Road, 16-miles southeast of Big Sandy, tree damage was noted in the Eagle Creek drainage. Trees were snapped, twisted off, and uprooted. Large branches were tossed up to 400 yards from their origin. Photographs of this tornado showed a very



narrow funnel at ground level. From photographs and video, it was difficult to determine whether the funnel was actually on the ground, as several ridges occurred between the photographers and the actual touchdown. A rancher in the area, about 3 miles towards Warrick on the Warrick Road, reported that trees were also uprooted and snapped off at his ranch. The damage at the ranch was a result of the strong straight-line winds that continued to accompany this storm on the eastern front flank downburst-side of the storm. Figure 7 shows the 88D Rotation Track in the rural Big Sandy. The approximate tornado path is shown in the figure. The path was one-mile long and 75 yards wide. No observers closer than 16 miles distant sighted this tornado. The debris path was up to 100 yards wide. Reflectivity and velocity radar signatures at the time of the tornado are shown in Figure 8. Preliminary EF rating: EF0. (Start coordinates: 48.0388, -109.8201, end coordinates: 48.0525, -109.8301)

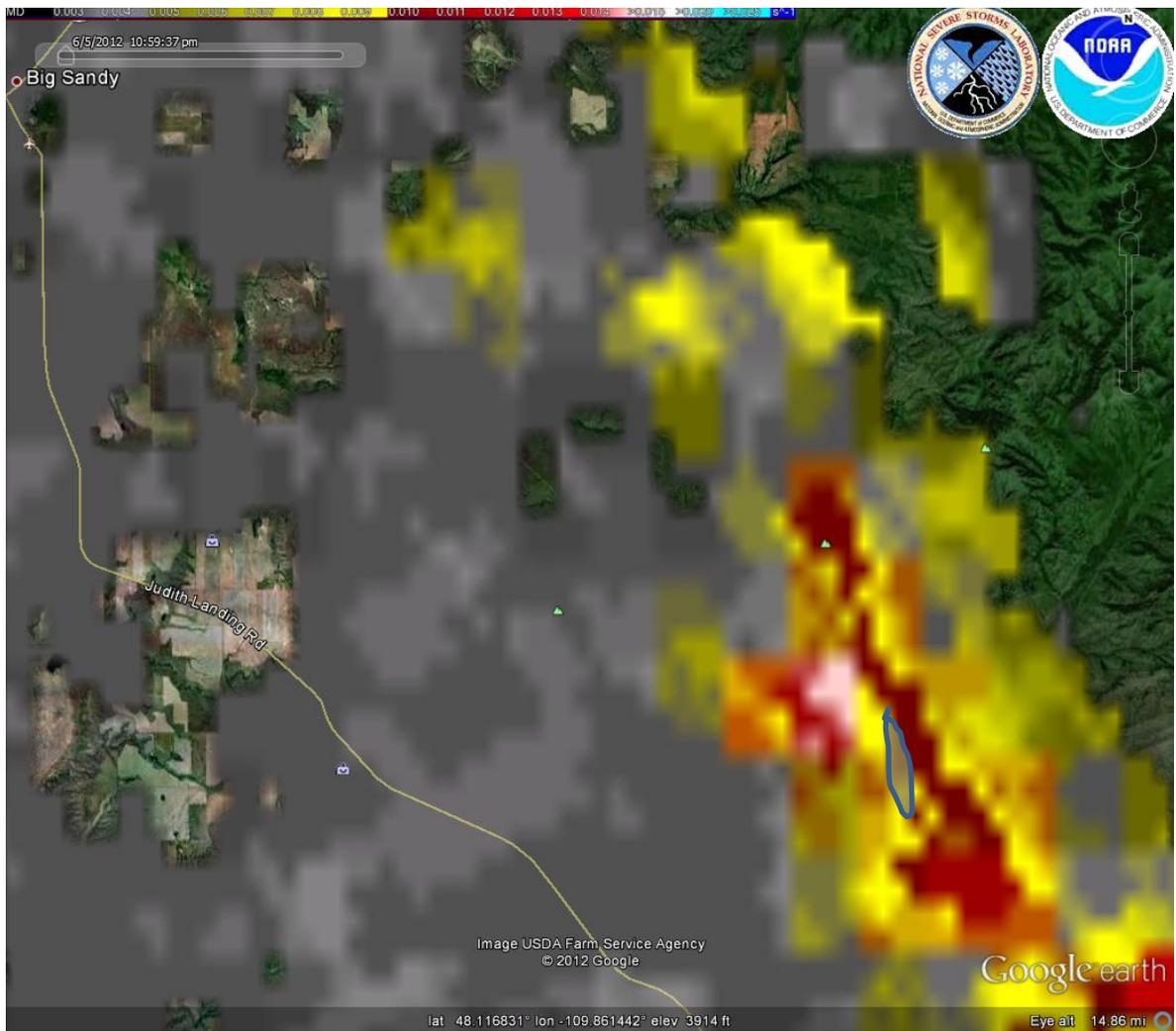


Figure 7. NEXRAD 88D Rotation Tracks Big Sandy, MT (NSSL WDSSI). Approximate tornado path in tan polygon. Legend as in Figure 2.

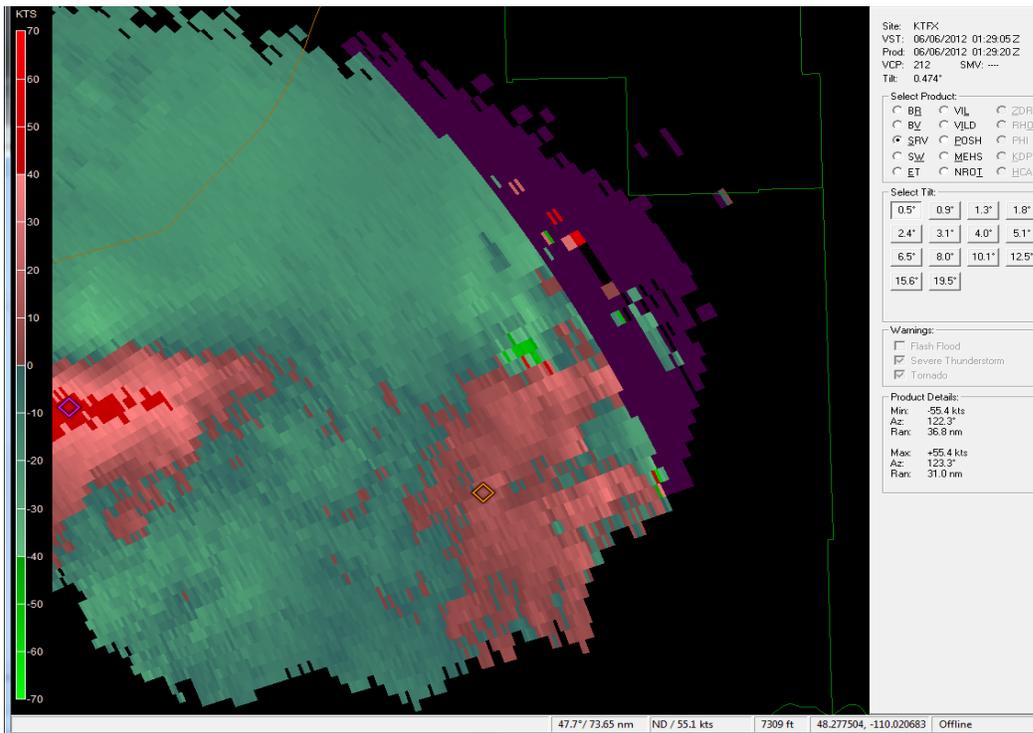
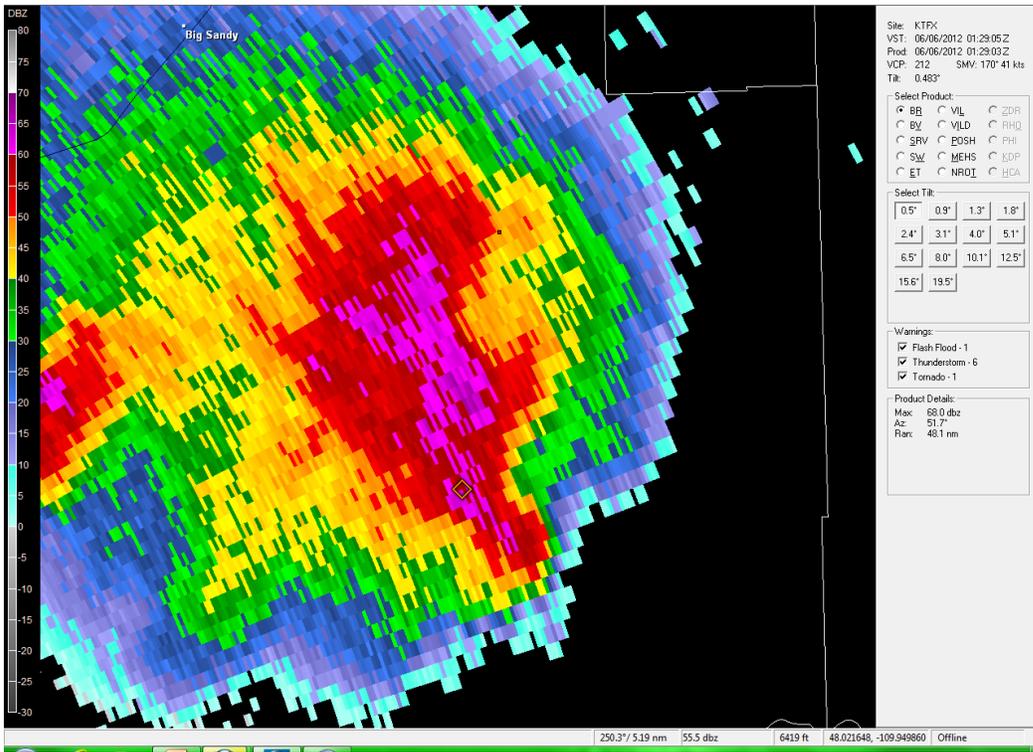


Figure 8. Doppler radar reflectivity and velocity images from the Big Sandy area at 729 pm MDT June 5 2012. The height of the radar beam was about 11,500 feet above ground level in this area.

Figure 9 shows a high-resolution satellite image taken two days after the storms in central Montana. No tornado path was detectable, but a hail path can be seen.

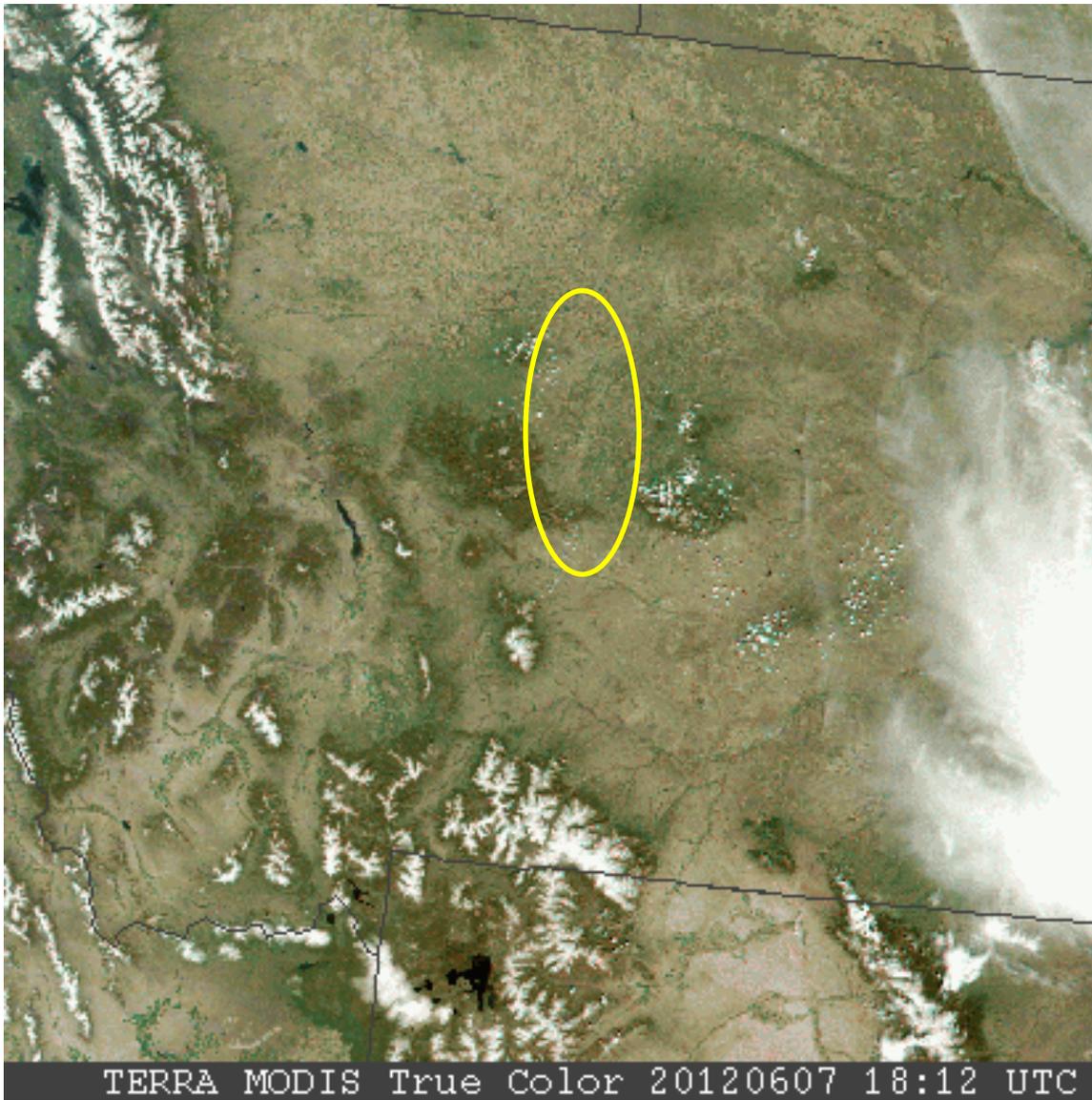


Figure 9. MODIS Terra True Color image from 1212 pm MDT June 7, 2012. The area in the yellow oval highlights the path scarred by hail from southwest of Hobson to northeast Judith Basin County. The scar was more diffuse across western Fergus County, and undetectable in Chouteau County.

The National Weather Service in Great Falls, MT would like to thank countless weather spotters, National Severe Storms Laboratory, NASA Short-term Prediction Research and Transition Center, the Cooperative Institute for Mesoscale Meteorology, local disaster and emergency service personnel and local responders, and citizens of central Montana for their input of data and interviews which have been included in this report.