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Storm chase: USA 2016

TORNADO DIVISION REPORT: July - August 2016

Site Investigation: Haverthwaite, Cumbria

Extreme Weather

Forty Years of the Tornado and Storm Research Organisation (TORRO)

Robert K. Doe

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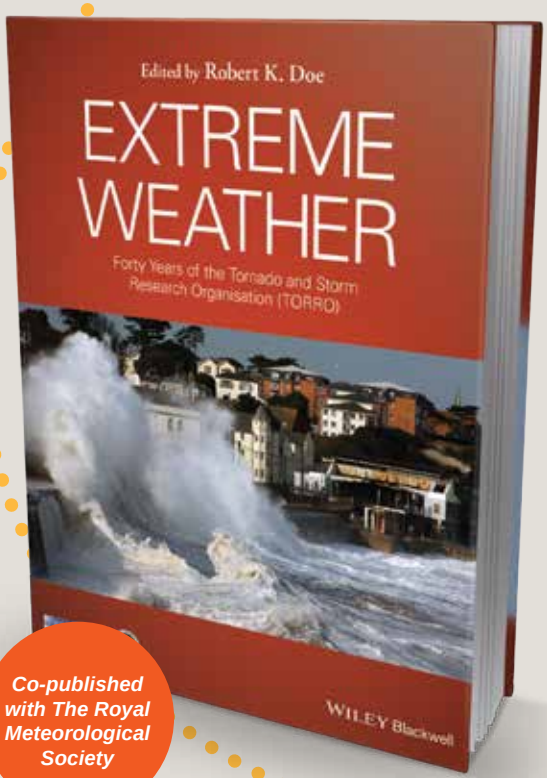

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Cover image: © **PAUL KNIGHTLEY.** Feathery hoar frost patterns on a car, Devizes, Wiltshire.

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WEATHER ANNIVERSARIES: NOVEMBER/DECEMBER

25 years ago, a vigorous westerly pattern prevailed for much of November 1991. A very active frontal system crossing the country on the 12th produced several tornadoes, one of which reached T5 strength in Cambridgeshire in the evening. It was a wet month in the west and north but rainfall was below normal elsewhere. In December large anticyclones controlled the weather, especially in the south, where monthly mean pressure reached 1029 mb. Some places here had less than 25% of normal rainfall. In the north, however, there was a strong westerly spell in mid-month, during which a gust of 90 knots was measured at Sumburgh Airport in Shetland. (Late on New Year's Eve the approach of another intense depression heralded an even more violent gale in the Northern Isles in the early hours of 1992.) Rainfalls of 50-100 mm occurred in the west and north on the 21st, including 116.4 mm at Holme Moss, Yorkshire. There were sharp frosts (−5 to −10°C) in the second week of December, and freezing fog was occasionally persistent keeping day maxima well below zero (−4.6°C at Finningley on the 11th). At other times it was very mild, and 15°C was recorded east of the Pennines on the 22nd and 23rd.

50 years ago, November 1966 had several northerly outbreaks making it a cold month. On the 4th a deep depression off southwest England gave widespread rainfalls of 50-65 mm in the southwest (73.4 mm near Bruton, Somerset). On the 15th a vigorous depression moved southeast into the North Sea, producing gusts of 60-70 knots in the west (78 knots at Tiree) and an outbreak of 18 tornadoes as the cold front crossed central England. Another deep depression followed a similar track on the 30th, but this was merely a prelude to what was to come the next day. On 1 December one of the deepest depressions to cross the British Isles in the twentieth century moved east across the north of Ireland, and MSL pressure fell to 943 mb at Belfast. There were gales everywhere, severe in the west (gust 76 knots at Blackpool), and another outbreak of tornadoes (25 in total) accompanied the occlusion across England and Wales. An unsettled westerly pattern continued for the rest of the month interspersed with brief northerly outbreaks. Over 100 mm of rain fell in upland Wales on the 9th, and an exceptional orographic fall of 199.1 mm was recorded at Dalness, Argyll, on the 17th.

75 years ago, southeasterly winds were more frequent than usual in November 1941, resulting in above average rainfall in the east and below average totals elsewhere; it was also very dull. Gales occurred in the north, especially on the 10/11th and 25/26th, a gust of 81 knots being recorded at Stornoway on the latter occasion. Heavy orographic rainfalls on these dates included a two-day total of 156.2 mm at Glendessary, Inverness-shire, on the 25/26th. High pressure became established towards the end of the month and persisted for much of December. There was, however, a disturbed westerly spell in the first half of the month, during which severe gales in the north of Scotland gave gusts of 87 knots at Sumburgh and 80 knots at Stornoway on the 6th. Much of Britain had no more than half the normal rainfall in December, and locally in

northeast England it was only 10%. Most of the month was mild, although foggy spells kept temperatures down at times in the first and third weeks (parts of central England reported morning fog on more than half the days of the month). Cold frosty weather then set in after Christmas marking the start of a third successive severe winter.

100 years ago, November and December 1916 were cyclonic months. The first week of November was stormy with heavy rain and gales (pressure fell to 957.7 mb at Falmouth on the 5th), and there was another very disturbed period in the third week. Daily rainfalls of more than 75 mm occurred in Ireland on the 16th (109.2 mm at Kenmare, Kerry) and damaging gales affected England in the following days. Although depressions continued to affect the British Isles in December they were often centred directly over the country resulting in lighter winds and lower temperatures, and freezing fog was widespread and persistent at times, especially about mid-month. Glazed frost caused much trouble for pedestrians in Dublin on the 17th, and snow lay 10-20 cm deep in the north on the 18/19th (30 cm at Darleith, Ayrshire). Temperatures fell below -10°C locally in northern England and Scotland on the 20th. After nearly four weeks of this cold cyclonic weather southwesterly winds introduced much higher temperatures in the closing days of the month. Monthly rainfall was above average in the east but below in most western areas, despite a heavy orographic fall in the Lake District and Wales on the 28th, when Dungeon Ghyll, Cumbria, reported 129.5 mm.

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STORM CHASE: USA 2016

BY DAN HOLLEY

We flew into Dallas on the 17 May 2016 but the weather was fairly quiet for the first few days so we gradually drifted up to Amarillo in the Texas panhandle. The weather then became more active, and our storm chase began.

SATURDAY 21 MAY

We left Amarillo, Texas from our overnight stay and headed north for 4 hours with a target of Syracuse, Kansas. It took a few hours for convective initiation to take place, but eventually a few storms formed (it was around 4-5pm) along the dryline close to the Kansas/Colorado border and drifted north-east. They were messy for the first hour or so, but eventually the southernmost cell (which went up pretty much overhead) became better organised and slowed its forward motion.

As we nudged north of Marienthal, Kansas, this storm, now a supercell, dropped two very brief (5 to 10 seconds) tornadoes, before splitting. The new southern supercell then became better organised once again, drifting to the north-east at only 5mph, and eventually dropped another brief tornado.

As the sun began to set, this supercell took on some incredible structure, especially when backlit by the setting sun, with a lot of lightning flashing around. Tennis ball sized

Image 1. First tornado of the day north of Leoti (KS), taken from 6 miles to the east.

Image 2. It was hard to focus the camera, even on a tripod, giving the buffeting inflow winds and stark contrasts of light levels in front of and behind the storm.

Image 3. The Leoti storm.

hail was reported with this storm, but the hail core stayed to our west/north-west.

We left the storm as it was getting dark and headed south to book a hotel for the night in Garden City, Kansas.

SUNDAY 22 MAY

Some days are good, others not so good - and today was one of those days. We left Garden City, Kansas with a lunch target of Dumas, Texas, where we'd reassess the situation and nudge accordingly. After lunch, given that the environment was uncapped and hazy, convection was already bubbling-away and developing nicely. A dryline bulge had developed west of Lubbock, in theory providing the lift required for storm initiation - in reality, very little developed over west Texas on the dryline and it was primarily focussed on a north-south line much farther east in the eastern Panhandle.

Storms developed quickly here and became severe in no time, so after driving down to Canyon, Texas, we quickly headed east to intercept a line of developing supercells, some exhibiting better rotation than others. We found ourselves chasing the southernmost cell which became more-or-less stationary close to Lakeview, Texas. It had good, fast rotation at times, but quickly became rain-wrapped before allegedly dropping a tornado. We were slammed by rear flank downdraft (RFD) wind / rain / hail which made us a little on edge for a while, and once we managed to get out from under the storm, it became a race to move west to avoid a whole line of thunderstorms that were now developing overhead, with the threat of large hail.

Annoyingly, several other thunderstorms in Texas (and Kansas etc) produced some tornadoes, but alas ours was too high precipitation (HP) to see anything that may have briefly formed. Always tomorrow...

MONDAY 23 MAY

Our initial target was Woodward, Oklahoma, so from Amarillo, Texas we drove east on Interstate-40, had lunch in Shamrock, Texas, and parked up in Elk City, Oklahoma, to give us options to head north, south or west. One lone storm fired up near Memphis, Texas, so we nudged southeast to chase it, along with so many other chasers as well - the roads became very busy around Hedley, Texas. A select few chasers clearly have a lack of respect for other road users, but thankfully most other chasers know how to drive safely.

This storm more-or-less died in-situ, so we headed south towards Turkey, Texas, to see another cluster of thunderstorms that had developed. These were messy in organisation at first, but the southern cell became a much more organised supercell as the evening wore on - even developed a wall cloud for a short time.

We waited until the sun had set, and then, as is often the case, thunderstorms spring up along the axis of instability and it becomes a race to get out of them and find a hotel. Annoyingly our supercell near Turkey produced a wedge tornado around 21:45-22:00, only made visible by lightning lighting up its silhouette, but by this point we were well on

our way to our already-booked hotel in Clarendon, Texas. Annoyingly there were also a couple of tornadoes near Woodward - our initial chase target!

It was always going to be a close call as to whether we would make it to the hotel before a big thunderstorm approached us from the west, we got there just in time and parked the car under the hotel awning. As the thunderstorm arrived, it produced a lot of heavy rain, and hail around 1-1.5 cm in diameter. The storm also exhibited, on radar, some rotation, enough to prompt the NWS (USA National Weather Service) guys in Amarillo to issue a tornado warning! This was unusual for us - we usually chase the tornado, not the other way round!

Thankfully, to my knowledge, there was no tornado and the storm eventually passed - but a lot of hotel guests were standing outside with us watching it, and one family from Tennessee asked to have a photo taken with us, with a lizard on my shoulder! First time for everything…

Image 4. Tornado warning was issued 5 mins after we arrived at our hotel for the night. The blue circle indicates our position; the red polygon the tornado warning! NOAA radar image on Radarscope mobile phone app.

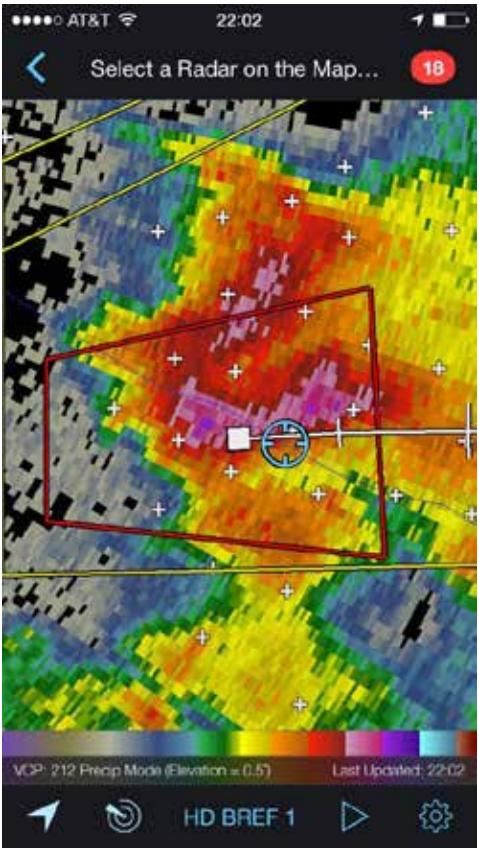

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Image 5. Lightning north of Clarendon, Texas.

TUESDAY 24 MAY

The run of frustrating days continue! We targeted Woodward, Oklahoma, for lunch then nudged northwest to sit at May, Oklahoma, for a couple of hours waiting for initiation. It was a big tornado-type day, had lots of potential, and hence practically every chaser was in the area, poised ready to pounce on the first supercell of the day. For that reason, once storms began to fire, we chose a supercell near Liberal, Kansas, instead of Dodge City, Kansas, in the hope that the roads would be quieter but we might still see a tornado.

However, despite this storm being tornado-warned multiple times, it never produced. Meanwhile I could see the amazing hook echo of the Dodge City storm on radar, and photos started filtering in of tornado after tornado, so we ditched our storm and raced northeast to try and get onto the Dodge City storm, that was riding an outflow boundary. As we approached we could see a tornado in the distance on the left side of the large wall cloud, and then this lifted and a new one formed on the right side. But a new storm was going up overhead with a lot of cloud to ground (CG) lightning nearby, so we had to head east to get out of this storm and by this stage everything had become rather messy with storms popping up all over the place.

We hung about through the evening hoping we might catch a tornadic circulation on one of the storms, but eventually gave up and drove to our hotel in Alva, Oklahoma, for the night. So despite feeling disappointed that we could've gone straight to Dodge City and seen the whole event, we did still see 2 tornadoes in the evening before the storm died. And Dodge City was very fortunate that the tornadoes stayed to the west of downtown...

Image 6. Tornado near Dodge City, Kansas.

Image 7. Another one of the tornadoes on the Dodge City, Kansas storm.

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WEDNESDAY 25 MAY

A lower / marginal risk of severe thunderstorms today, so in no rush to be anywhere in particular we thought we'd visit Wakita, Oklahoma, the location of where Twister was filmed! We had in the back of our minds a chase target of Enid, Oklahoma, for the chance of an isolated storm later in the day.

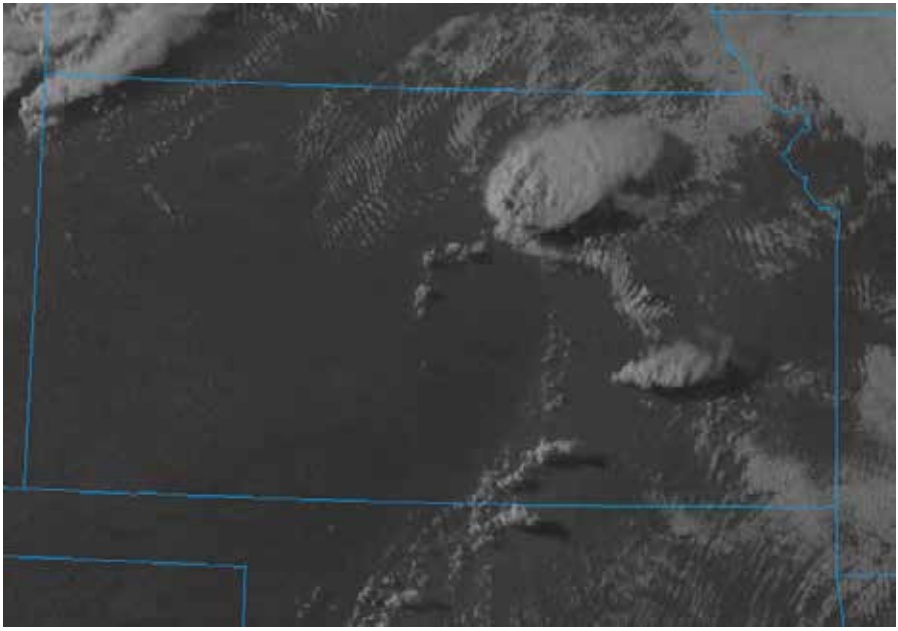
After spending much of the afternoon in Blackwell, Oklahoma, we nudged north towards Wichita, Kansas, just in case any developments occurred to our north. By the time of arrival in Wichita, there was already one thunderstorm off to our east, and another way to the north of Salina, Kansas. The latter soon became severe warned, but was a good 90 minute drive away - we estimated we wouldn't be on this storm until near 19:30 and didn't want to drive all that way for it to die and a southern storm to then turn interesting.

So instead we drove around southern Kansas after several different faffy LP thunderstorms that had very thin updrafts and didn't really produce much at all, even lightning or rain was rather limited! Meanwhile the storm north of Salina was producing a tornado that was on the ground for well over an hour - in hindsight we could've chased this cell eventually if we'd've left Wichita earlier, and one look at the satellite picture revealed that this cell would carry on producing tornadoes given the fact it was riding along 2-3 boundaries.

Oh and around 9-10pm a lone severe thunderstorm popped up just north of Enid and dropped a brief tornado! Just to add insult to injury...

Image 8. The Wakita water tower, as seen in the film Twister.

Image 9. Visible satellite image of the tornadic supercell in north Kansas, and trailing boundaries. Smaller, non-severe thunderstorms are visible in south central Kansas. Image credit NOAA.



THURSDAY 26 MAY

The Storm Prediction Center (SPC) issued a moderate risk of severe thunderstorms today, stating that there could be the potential for a few tornadoes, perhaps significant. Whenever the threat level is moderate or high, it always tends to be very messy and not particularly ideal for chasing nor for photography, and that's exactly what happened this time. Elevated convection quickly developed over southwest Kansas in the morning and moved northeast, bringing extensive cloud and cooler surface temperatures such that, despite numerous rounds of thunderstorms, most of them were sub- or just marginally-severe, with very little evidence of this potential tornado outbreak.

We drove around Kansas throughout the day, jumping from storm to storm, but overall very few got organised enough to provide any real interest, and so we called the chase off early in the evening and booked a hotel in Newton, Kansas.

FRIDAY 27 MAY

Starting the day in Newton, Kansas we had to decide to head north to the Interstate-70 corridor where shear would be maximised given easterly low-level winds, or nudge south towards the Oklahoma border where there appeared to be better sunshine / higher temperatures / higher dewpoints. We chose the southern option and chased multiple marginally-severe thunderstorms that were very much outflow-dominant but produced some pretty gust fronts. After stopping to chat to Paul Botten and the Netweather gang

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(UK chasers) we decided to ditch this messy convection and head south as we knew we needed to be back in the Texas panhandle for Sunday.

On our way towards Oklahoma City, Oklahoma, we found Pete Scott (UK chaser) and Dave Ewoldt parked up near a field trying to shoot some lightning, so we chatted for about an hour until it was almost dark, and then went our separate ways. Overall, some thunderstorms around, but a fairly unimpressive day.

Image 10. One of many gust fronts approach from a marginally-severe thunderstorm near South Haven, Kansas.

SUNDAY 29 MAY

Perhaps the biggest bust I've ever chased - started the day in Amarillo, Texas and drove for nearly 4 hours southwards towards Midland, Texas, placing us in the SPC's 'Enhanced' risk area for severe thunderstorms. A few storms had developed over the mountains out west, so we headed towards them, just north of Pecos, Texas, but as we approached it was clear they were collapsing. In fact, an hour later there were no storms left, resulting in the SPC cancelling their Severe Thunderstorm Watch! Meanwhile back near Amarillo there were a succession of thunderstorms, in a messy fashion.

MONDAY 30 MAY

Starting in Midland, Texas we headed west for 3hours and 30mins into southeast New Mexico and chased a couple of bog-standard UK-style thunderstorms near Carlsbad, New Mexico. As these storms moved off the mountains, they were struggling for moisture and eventually dissipated, but produced some nice CGs for a time. So we headed back east to Hobbs, New Mexico, by which point we noticed a few storms developing just east of Midland. Since nothing else looked like it would develop nearby, we drove 2 hours back to Midland to get onto a near-stationary thunderstorm complex.

The great thing about these storms hardly moving meant that we could park up and try and shoot lightning for a few hours without needing to move with (or 'chase') the storms. This allowed me to stream the storm through Facebook Live to viewers back in the UK (and elsewhere in America) from near Garden City, Texas, as the lightning frequency really ramped up as the sun set. In fact, from multiple storms, we had a good 6 hours of constant lightning. Definitely worth the long drive back to Midland, and makes it the 2nd best day of the trip!

Image 11. Lightning near Garden City, Texas.

Image 12. Lightning near Garden City, Texas.

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TORRO TORNADO DIVISION REPORT: July - August 2016

BY PAUL R. BROWN AND G.TERENCE MEADEN

July 2016 was a westerly month (cyclonic in the north). It included one probable tornado, two waterspouts, and 10 reports of funnel clouds; two land devils were reported. August was another westerly month but more anticyclonic than July, and the only whirlwinds reported were seven funnel clouds (most of them on the 27th).

tn2016Jul01 *Scunthorpe, Lincolnshire (53° 35' N 0° 38' W, c SE 911096)*

Mr David Legmann drew our attention to reports in the *Scunthorpe Telegraph* of 1 and 2 July stating that a 'freak storm' (not witnessed by him) had occurred at Scunthorpe shortly before 1800 GMT on the 1st. Trees were uprooted and large branches torn off within a small area near the junction of Brigg Road and Grange Lane North, both of which roads were blocked as a result. Correspondents to the newspaper saw 'a huge dust cloud' and 'one area of the clouds start to turn round like a tornado'. There was a hailstorm at the time (and thunder according to our correspondent). This might have been no more than a squall but we allow it the benefit of the doubt. Force T1/2.

At 1800 GMT a depression of 994 mb was centred over the Faeroe Islands and an unstable westerly airstream covered the British Isles. Showers, sometimes with thunder, were widespread in the west and north during the day, more scattered in the south and east.

FC2016Jul02 *Hook Ebb, near Sidmouth, Devon (50° 41' N 3° 12' W, SY 1587)*

Matt Clark of TORRO photographed a short (and short-lived) funnel cloud out to sea from the beach at Hook Ebb at 1128 GMT. At 1200 GMT a westerly airstream continued to cover the British Isles giving further showers in many areas, thundery in central and eastern parts.

fc2016Jul12/I *Prestwick Airport, Ayrshire (55° 30' N 4° 34' W, NS 3826)*

Mr Danny Clark saw a distant funnel cloud for about two minutes while driving just east of Prestwick Airport at 1130 GMT.

At 1200 GMT a northwesterly airstream covered most of Britain within which there was a minor low, 1011 mb, over East Anglia. There were showers over central and southern areas (and Ireland), and thunderstorms in the east, but the north was mostly dry.

WS2016Jul12 *offshore Fairbourne, Merioneth (c 52° 42' N 4° 04' W, SH 6013)*

Mr Andrew Perrins submitted a report of a 'tornado-like spout churning up the sea' in Cardigan Bay at 1400 GMT, observed for about 10 minutes. No photograph was supplied but a picture in a national newspaper, located only as 'Wales', was probably of the same event.

FC/TN2016Jul12 *Block Fen, near Chatteris, Cambridgeshire (52° 26' N 0° 06' E, TL 4383)*

Ms Sophie Day photographed an oblique funnel cloud at least halfway to ground

at 1400 GMT (she said it touched the ground 'for a couple of seconds'). Force possibly T0 (if it did reach the ground).

FC2016Jul12/II *near Bedford, Bedfordshire (c 52° 06' N 0° 28' W, TL 0549)*

Mr Mark Bowler photographed a distant funnel cloud perhaps halfway to ground over the countryside near Bedford, apparently in the afternoon.

FC2016Jul13 *Jersey, Channel Islands (49° 13' N 2° 12' W)*

A funnel cloud was reported in the 1150 GMT METAR from Jersey Airport, and in the distance at 1220 GMT. At 1200 GMT a northwesterly airstream continued to cover the British Isles ahead of a ridge coming into Ireland. There were further showers in many areas (and a few thunderstorms) as troughs moved southeast.

BBC Look East mentioned a hay devil in Essex on 18 July but the location is too vague to document.

LD2016Jul19 *Rudgwick, West Sussex (51° 05' N 0° 28' W, TQ 080337)*

Mr Tim Bargman filmed a land devil raising straw from a field on his farm at Canfields Farm (time not known). At 1200 GMT a hot southeasterly airstream (32°C) covered the British Isles between a high, 1022 mb, over Germany and a low, 1011 mb, in the Bay of Biscay. Weather was fine with prolonged sunshine.

FC2016Jul20 *Lauder, Berwickshire (55° 43' N 2° 46' W, NT 5247)*

This funnel cloud was photographed from a variety of places, including Lauder, the Lammermuir Hills, Edinburgh, and Soutra Hill. Nobody gave the time of observation more precisely than 'evening'. *BBC Scotland* showed pictures taken at Lauder (by Mr Aaron Frizzel and Ms Michelle Cushin), from where it was quite close; the *Edinburgh Evening News* (22 July) published an equally close view (from Ms Maureen Walker) said to have been 'over the Capital', so there might have been two separate funnels. Some of the photographs show it a good way to the ground. At 1200 GMT a thundery trough (after the previous day's heat) was crossing Scotland and northern England followed by cooler westerly winds. Widespread thunderstorms over Scotland and northern England in the morning moved away but further storms developed over eastern Scotland and East Anglia later in the day.

LD2016Jul23 *Upper Heyford, Oxfordshire (51° 56' N 1° 17' W, c SP 497260)*

The *Oxford Mail* of 24 July published a photograph of a tall dust devil that overturned a metal skip and picked up rubbish from a building site shortly after 1300 GMT; it lasted about two minutes. At 1200 GMT a weak westerly airstream covered England, where it was dry and warm inland (cooler with sea breezes on coasts).

FC2016Jul29/I *near Duxford, Cambridgeshire (52° 06' N 0° 08' E, TL 4646)*

BBC East showed a photograph (anonymous) of a well-formed funnel cloud stretching obliquely at least halfway (probably more) to ground; several other pictures were received from different sources (mostly near the Imperial War Museum), but the only person to give a time was Ms Milly Mitchell, whose husband saw it at 1605 GMT.

At 1200 GMT a northwesterly airstream covered the British Isles behind a secondary depression of 1007 mb, which had crossed northern England during the night and was now in the North Sea. There were scattered showers during the afternoon, a few of which were thundery in northern England.

FC2016Jul29/II *Newport, Essex (51° 58' N 0° 13' E, TL 5233)*

ITV News Anglia broadcast film of this funnel cloud taken by Mr Simon Baker at about 1600 GMT; it is long, narrow, sinuous, and almost horizontal. Mr Jade Hare photographed it from a different angle at Saffron Walden, timed at 1610 GMT, as did several other people. These were probably slightly later views of the Duxford funnel (see above) having travelled southeast across the county boundary.

FC2016Jul30/I *near Romney Marsh, Kent (c 51° 03' N 0° 56' E, TR 0632)*

Mr Liam Kenward photographed a well-formed vertical funnel cloud halfway to ground, probably in the late morning.

At 1200 GMT the previous day's low had moved away to Scandinavia leaving a very weak northwesterly airstream over England and Wales. There were showers over Scotland and Ireland and a few over East Anglia and southeast England.

FC2016Jul30/II *Brampton, Suffolk (52° 22' N 1° 34' E, TM 4381)*

Mr Ross Horner submitted a report of a funnel cloud seen at 1330 GMT, and his photograph of it was published in the *East Anglian Daily Times* (31 July) showing a long oblique, slightly ragged, funnel.

WS2016Jul30 *offshore Thorpeness, Suffolk (c 52° 10' N 1° 37' E, TM 4759)*

This attractive waterspout was photographed by many Saturday evening onlookers along the Suffolk coast from Sizewell down to Aldeburgh between 1900 and 1930 GMT. The best shots show it at full length, broad in the top half, narrowing sharply in the lower half, descending from a shower cloud coloured by the setting sun, and churning up the water at its base.

FC2016Aug05 *Jersey, Channel Islands (49° 13' N 2° 12' W)*

A recent funnel cloud was reported in the 0920 GMT METAR from Jersey Airport (still visible in the distance at that time). At 1200 GMT a weak, slightly anticyclonic, westerly airstream covered the British Isles. There were showers over Scotland and a few isolated ones in England and Wales.

FC2016Aug09 *South Uist, Inverness-shire (c 57° 09' N 7° 20' W, NF 7820)*

Dr Eddie Graham photographed a short, rather wide, funnel cloud over the sea from South Uist at 1650 GMT (exact position not stated, we presume near Lochboisdale); there was a heavy shower shortly after.

At 1200 GMT a northwesterly airstream covered the British Isles associated with a large high, 1039 mb, southwest of Ireland. Showers affected the north and east of Britain (isolated thunder on the east coast), while the south was fine but rather cool.

RS2016Aug09 *Weymouth, Dorset (50° 37' N 2° 30' W, SY 6579)*

The *Dorset Echo* of 9 August reported that hay had fallen from the sky near the Granby Industrial Estate at about 1200 GMT and again at 1500 GMT.

fc2016Aug27/I *Pewsey, Wiltshire (51° 20' N 1° 46' W, SU 1660)*

Mr Mitch Pendagast reported a funnel cloud at 1315 GMT during a thunderstorm.

At 1200 GMT a depression of 1002 mb was moving slowly east towards southwest Ireland, from where a broad trough lay along the English Channel; a warm

front was moving north over England and Wales. Widespread thunderstorms, some with large hail, broke out behind the front from Dorset to The Wash.

FCs2016Aug27/II *Kidlington Airfield, Oxfordshire (51° 50' N 1° 19' W, SP 4715)*

A distant funnel cloud (and approaching thunderstorm) was reported in the 1420 GMT METAR from Kidlington Airfield. Some time later Mr Bill Pike made contact with the duty air traffic controller, Ms Catherine Torrance, who was able to give further details. Following a close lightning strike to the west at 1415 GMT "three or four funnel clouds" appeared below the main Cb base (3,300 ft), the longest of which reached one third of the way to ground and exhibited rotation as it passed nearly overhead (the others were less developed). Shortly after there was very heavy rain (no hail) but the storm appeared to be weakening then.

fc2016Aug27/III *Bourne, Lincolnshire (52° 46' N 0° 23' W, TF 0920)*

Mr Scott Melton reported a short funnel cloud during a thunderstorm at 1625 GMT.

FC2016Aug27/IV *Gerinish, South Uist, Inverness-shire (57° 21' 7° 22' W, NF 7741)*

Ms Sandra Johnstone photographed a broad vertical funnel cloud reaching a good way to the surface (time not stated).

FC2016Aug27/V *Grenitote, North Uist, Inverness-shire (57° 39' N 7° 20' W, NF 8275)*

Mr Jason Paul Tolmie photographed a distant vertical funnel cloud about halfway to ground (time not stated).

PROVISIONAL TOTALS FOR THE YEAR SO FAR (excluding Irish Republic)

2016	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
TN	1	2	0	1	1	5	1	0	11
WS	1	0	0	2	0	1	2	0	6
FC	1	0	2	11	13	44	10	7	88
Number of days with:									
TN or WS	2	1	0	2	1	5	3	0	14
FC only	1	0	2	8	4	10	4	3	32
TN, WS, or FC	3	1	2	10	5	15	7	3	46

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SITE INVESTIGATION: HAVERTHWAITE, CUMBRIA

BY KRISTEN MAUDLING

On the evening of the 8 October 2014 reports began to circulate in the media that a tornado had occurred around 1800 near the village of Haverthwaite, Cumbria (Figures 1 and 2). Looking through these reports I was able to work out a rough location of the event. This was then backed up by a short video that was uploaded to YouTube of part of the event which clearly showed a tornado as well as road signs and local landmarks in the area. The video is available here: https://www.youtube.com/watch?v=yWzgOBW-6y7E

I was able to attend the area on the 11th October, I then spent a day walking around the area, looking for any damage and debris.

Figure 1. The red marker indicates the position of Haverthwaite, Cumbria. © Google 2017.

Figure 2. A zoomed in view of the Haverthwaite area, clearly showing its proximity to the River Leven © Google.

I started in the park adjacent to the river, here I found piles of leaves and twigs which appeared to be debris from the tornado, Figure 3. I was unable to find a touchdown point but from other evidence it is likely that it started over the River Leven.

Figure 3. Piles of debris in the park.

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The tornado then carried on in a roughly east-north-east path, arriving at the B5278 (where the YouTube video showing a signpost being disturbed was filmed). Some damage and a path were visible here, Figures 4 and 5.

Figure 4. Further small debris visible in the fields near the B5278.

Figure 5. A view across the fields near the B5278.

Standing by the signpost in the video and looking in the direction of further debris/ damage, the tornado track is clearly visible, implying it took a north-east trajectory here, figures 6, 7 and 8.

Figure 6. View north-east from the damaged signpost in the video

Figure 7. Damage locations indicated by red arrows.

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Figure 8. A view further back looking at the house in Figure 7.

The tornado then tracked through a housing estate, where an eye witness account states a trampoline was moved. It could be seen that a shed structure, wooden garage and roof had been damaged (pictures were not obtained for privacy reasons).

I was able to detect the track of the tornado again in the field behind the housing estate, which showed in an aerial hanging from a roof and tree damage, Figure 9. The trajectory here was still north-eastwards.

Figure 9. Tree damage.

From here it was difficult to establish a continued path. Walking in a north-easterly direction will bring one to 'Old Barrow Road'. There was some debris/broken twigs, Figure 10, but nothing solid enough to confirm it was from the tornado. As a result, the lift point could not be confidently established.

Figure 10. Further possible damage

Unfortunately, I was unable to establish the exact touchdown and lift points of the tornado but figure 11 clearly shows the north-easterly track. As shown in the YouTube video the tornado was narrow, although I was able to measure a width of approximately five metres.

Figure 11. Debris map showing the north-easterly direction.

Image © Paul Knightley

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