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Spring 2012

The TORRO annual reports 2011

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EDITORIAL
Spring 2012

BY PAUL KNIGHTLEY

Welcome to the latest edition of the International Journal of Meteorology. As you may or may not already be aware, Samantha Hall stepped down as Editor of the International Journal of Meteorology in mid-September 2012 after over 6 years in the role. During her tenure she pushed the Journal well into the digital age by creating an online version which now allows subscribers the option of receiving it in a digital format, rather than waiting for the postman to arrive. She also managed to keep the international feel of the publication by attracting both readers and articles from all over the world.

Despite stepping down as Editor, Samantha will continue to be involved in TORRO. She will remain the Regional Coordinator for north-west England so TORRO members in this area will continue to hear from her.

We wish her well for the future and good luck for her upcoming nuptials in Spring 2013.

As current Head of TORRO I will be stepping into the role of Editor for the time being, backed by the TORRO staff team. The Journal will continue to evolve over the coming months. To complete the 2012 volume journals for Summer, Autumn, and Winter will be issued. As we move into 2013 the Journal will become bimonthly (every two months) but full colour. As there will now won't be 10 journals in the 2012 volume, you will continue to receive issues through into 2013 until you have the ten copies you initially subscribed to.

We thank you for your support and look forward to many more years of weather watching with you.

Paul Knightley
Head of TORRO/Editor of the International Journal of Meteorology

Please send your articles, letters, papers, photos or any correspondence to
editor@ijmet.org

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TORRO TORNADO DIVISION REPORT: November-December 2011

BY PAUL R. BROWN AND G. TERENCE MEADEN

South or southeasterly winds prevailed for the first three weeks of November 2011 followed by westerlies in the last week; and an unbroken run of westerlies continued through the whole of December. November was very mild, as was December except in the far north. Most of November's eight tornadoes occurred on the 29th, but many of the reports for this day lacked sufficient evidence to rate them as definite tornadoes; there were two more tornadoes (one definite) in December, together with one (definite) in the Irish Republic, and each month had a single report of funnel clouds.

TN2011Nov03 *Inkberrow to Astwood Bank, Worcestershire*
(52° 13' N 1° 57' W to 52° 16' N 1° 56' W, SP 037579 to SP 045623)

The BBC (and various newspapers) reported that 'funnel clouds' had damaged homes in Astwood Bank, Redditch, and uprooted trees near Inkberrow, where the roof of a stable was blown off at Knowle Fields Barn Farm. The owner, Ms Adele Leigh, said: "I saw this huge sort of greyness approaching. It just looked like something that you only ever see on the television, leaves whipping around and hailstones, great big hailstones ...". *The Redditch Advertiser* (4th November) gave the time as 1300 GMT. Phil Thomas of TORRO inspected the area on the 6th and found signs of intermittent damage (mostly to trees) from the farm near Inkberrow to Astwood Bank Cricket Club, a distance of 4.5 km from south-southwest.

At 1200 GMT a large low, 962 mb, was slow-moving to the west of the British Isles and a southerly airstream covered the country; a waving cold front lay north to south over central England and a showery trough lay through the Irish Sea and Wales. There were showers, mainly in the west, but also some heavy ones near the tip of a wave over the west Midlands at 1300.

FC2011Nov05 *Llanddulas, Denbighshire (c 53° 17' N 3° 39' W, SH 9078)*

A report was received from Ms Jo Bell of a funnel cloud moving north-west to southeast at 1630 GMT from Little Orme Head towards Llanddulas. It lasted about 10 minutes during which time rotation was visible but it did not make contact with ground or sea surface. At 1200 GMT a ridge of high pressure was building northeast across Ireland while a trough from a low, 998 mb, in the Mediterranean extended north near eastern England. Many places were dry but there were a few showers, mainly in the east and the far northwest.

WS-TN2011Nov29/I *Llanfwrog, Anglesey (53° 20' N 4° 34' W, SH 287848)*

The Daily Post of the 30th November reported this under the headline 'Tornado rips through Anglesey caravan park'. It occurred just before midday at the Sandy Beach Caravan Park at Llanfwrog, where six caravans were wrecked by the wind. The owner, Mr John Seymour-Jones, said: "It was so sudden ... a staff member rushed in to say the caravans were being lifted in the air and bits flying all over the place ... There was a straight line where the tornado had come through, nothing either side was damaged". Force T3-4.

At 1200 GMT a deepening wave depression, 978 mb, was moving northeast to the north of Scotland, and its cold front, accompanied by moderate to heavy rain, was moving quickly east across Wales and western England. All the reported whirlwinds of the day occurred on this front.

tn2011Nov29/II *Darwen, Lancashire (53° 43' N 2° 29' W, SD 683239)*

A report in the *Lancashire Telegraph* (29th November) stated that a 'mini-tornado' had removed roof tiles from three houses in Blackburn Road (between Anchor Road and Birch Hall Avenue) at about 1400 GMT, damaging motor cars and windows; a witness described the tiles as 'hovering' in the air. In a second account on the 1st December the same newspaper reported damage at a nursery school in Veronica Street, where a greenhouse was lifted from its foundations and carried into a neighbouring churchyard. Force T2.

tn2011Nov29/III *Heaton Moor, Stockport, Cheshire (53° 25' N 2° 12' W to 53° 25' N 2° 11' W, SJ 863908 to SJ 876913)*

The BBC reported that a woman was injured when a 'tornado' caused a chimney to fall in Heaton Moor Lane at about 1430 GMT. A witness, Ms Eleanor Hirst, said: "It looked like a scene out of the Wizard of Oz. The sky went black and I saw it all whirling around. It was as if you could see the wind itself. It was going around and round. It doesn't surprise me that it was a tornado". In a report submitted to TORRO Ms Kathryn Dainty described a 'massive gust of wind' which badly damaged some items in her garden (at Heathcote Avenue, SJ 883913) while leaving others untouched.

Samantha Hall, former Editor, carried out a site investigation the next day, in which she found damage along a track of 1.5 km in an east-northeasterly direction from Cranford Golf Course to Hawthorn Grove - minor roof damage, a few trees felled, and garden furniture moved about. The distribution of damage, however, was not entirely characteristic of a tornado track, leading to some doubts as to whether this was really a tornado or just a squall. Force T2.

tn2011Nov29/IV *Hyde, Cheshire (53° 26' N 2° 05' W, SJ 947937)*

According to the *Tameside Advertiser* of the 29th November, a 'mini-tornado' left a trail of destruction when it passed through Redgate, Lanegate, and Knott Lane at about 1430 GMT. There were unconfirmed reports that a

house had had its gable end badly damaged and another had lost a large section of its roof, as well as damage to gardens and trees. Force T3. Reports of wind damage in Rutland Crescent, Brinnington (SJ 915925), and Gee Cross, Hyde (SJ 9593), suggest that this might have been a continuation of the Heaton Moor track.

q2011Nov29 *Meltham, West Riding of Yorkshire (53° 36' N 1° 51' W, SE 099106)*

The *Huddersfield Daily Examiner* (1st December) reported two incidents of wind damage, the first at Scapegoat Hill (SE 0816), where a large wind turbine was blown over, the second at Meltham, where there was (mostly minor) damage to trees and roofs, in particular to the Church Hall (time not stated); the Meltham damage was tentatively attributed by a witness to a 'mini-tornado', but there was no evidence for this.

tn2011Nov29/V *East Leake, Leicestershire (52° 50' N 1° 11' W, SK 555261)*

This was reported in the *Loughborough Echo* of the 9th December, where a 'mini-tornado' was said to have damaged roofs, garden fences, and trees in Potters Lane, Salisbury Avenue, Costock Road, and Oldershaw Road at about 1530 GMT. A witness, Ms Coleen Betts, said: "... there was a whirly wind and there was kind of a whoosh. It took two panels out of the fence then went round the back of the garden and took the top of the chalet roof right off into next-door's garden ...". Force T1-2.

TN2011Nov29/VI *New Rossington, West Riding of Yorkshire (53° 28' N 1° 05' W to 53° 28' N 1° 04' W, SK 613973 to SK 624974)*

Tim Prosser of TORRO visited this area on the 2nd December after reading an article in a local newspaper, and found evidence of a tornado track of one kilometre from west to east, from Radburn Road to Stripe Road (the tornado was seen to continue beyond this point, but here was open countryside where it left no further marks). Damage was generally of a minor nature (a few roof tiles removed) but a witness saw items carried upwards. Force about T1. The time appears to have been late afternoon. A report also appeared in the *Thorne and District Gazette* of the 4th December, where it was described as a 'freak tornado' that damaged roofs and gardens, falling debris then causing subsidiary damage to motor cars.

TN2011Nov29/VII *Brighton to Seaton Ross, North Yorkshire/East Riding of Yorkshire (53° 47' N 0° 58' W to 53° 51' N 0° 49' W, SE 694323 to SE 782407)*

Tim Prosser of TORRO investigated this event on the 30th November after hearing about it via local television the previous day. He found unmistakable evidence of a tornado from Brighton to Seaton Ross, giving a track of at least 9 km from southwest to northeast; and following a further inspection on the 4th December the track was extended to give a total length

of 12 km from near Holmes House at Brighton, to South End at Seaton Ross. There was damage to farm buildings and machinery and to a timber yard, where the tornado vortex was recorded on a security camera. Force T2, width about 100 metres. The time was 1515 GMT. (Although Brighton is in the East Riding, the start of the track was just across the county boundary in North Yorkshire.)

q/tN2011Nov29 *Melton Mowbray, Leicestershire (52° 47' N 0° 54' W, SK 744203)*

The *Leicester Mercury* (1st December) described this as a 'mini-tornado' that tore tiles from roofs in Hillside Avenue. Mr Callum Blair, said: "I was in the garage. The wind was howling and all of a sudden there was a massive gust which lasted for about five seconds and took the tiles off the roof". Another person affected, Mrs Jane Wydra, said: "The wind literally carried me across the road. If there had been a car coming I wouldn't have been able to stop"; and according to her neighbour, Mr Peter Dodson: "It was a mini- tornado, I looked out the window and saw slates coming off next door heading for my roof ... My roof was shaking, it's done about £1,000 worth of damage". Despite the claims, this cannot be documented as more than a squall.

TN2011Dec13 *Yeovil, Somerset (50° 57' N 2° 40' W, ST 5317)*

Mr Aaron Clark sent us a detailed report of a tornado he witnessed while out walking at about 1620 GMT. There was a heavy shower accompanied by a discharge of thunder and lightning, following which a funnel cloud was seen to descend from the cloudbase until it reached the ground nearby; dust, mud, and grass was then sucked up, branches and fragments of bark were removed from mature trees, and a small tree was uprooted. The tornado then approached a group of houses but retracted before reaching them. The duration was just under one minute. Force T1. The exact location was not given but it was not far from St Patricks Road (perhaps the open ground at ST 536173).

At 1200 GMT a very deep depression of 946 mb was moving east across the Hebrides and a strong unstable westerly airstream covered most of Britain; there were showers, locally thundery, especially in the west, while Scotland had longer periods of rain.

FC2011Dec18? *Llandudno, Caernarvonshire (53° 19' N 3° 49' W, SH 7981)*

Ms Antonia Dewhurst submitted a report of a well-formed funnel cloud seen over the eastern part of Llandudno in the early afternoon; it was retreating into the cloudbase when she first saw it but a colleague told her it had previously been much longer, the end being hidden by buildings. There were wintry showers at the time. The report was received on the 22nd December and was dated the 19th, on which day an occluding front was crossing Llandudno at the time stated; the front was, however, accompanied by moderate to heavy rain, not wintry showers, making the date uncertain - the 18th seems more likely, when a northwesterly airstream prevailed and a shower trough lay over

Llandudno in the early afternoon.

tn2011Dec23 *Piddletrenthide, Dorset (50° 48' N 2° 25' W, ST 702007)*

The *Dorset Echo* (28th December) reported that a 'freak tornado' struck Kiddles Farm at about 1430 GMT. The farmer, Mr David Trott, said: "... you could hear a lot of noise coming down the valley [i.e. to the west]. We walked in the doorway of the cattle shed to see half the roof lifting up and it just shattered and went everywhere. Some of it went 150 yards and landed in peoples' gardens ... We think it was a mini tornado ... because it only really hit within one hundred yards [90 m] across – it also picked the chicken house up and dragged it into another person's garden ...". Force T1-2.

At 1200 GMT a sharply-defined cold front was moving east across England associated with a large low, 953 mb, in the Norwegian Sea. There was a broad band of rain, locally heavy, on the front, which was crossing Dorset at the time of the tornado.

fc?2011Dec23 *Suffolk*

Mr Paul A. Meadows contacted us to say that he saw a 'massive funnel cloud' while travelling west on the A14 road in Suffolk at 1620 GMT. It was 'very broad' - he estimated between ½ and 1 mile across and there was torrential rain at the time. He did not say exactly where in Suffolk he was (that road runs the width of the county), but he evidently encountered the aforementioned cold front. His description, however, leaves it uncertain as to just what it was he saw.

Tornado in the Irish Republic

TN2011Dec16 *Castleisland, County Kerry (52° 13' N 9° 29' W, Q 9908)*

This tornado was reported in detail in the *Kerryman* of the 21st December. It occurred at lunchtime and caused damage to roof slates, walls and fences, trees and shrubbery in the Cahereen Heights district. An anonymous witness described it thus: "... I saw this black/purple coloured thing in front of me, shaped like a horse shoe. It was about 50 yards away from me and about 100 ft [30 metres] wide ... It was about five foot off the ground and the force of it was so intense. I tried to make my way into the house and could hardly close the door with the force of it". Another witness, Mr Tom McCarthy, recorded the vortex on film. He said: "First there was massive hailstone[s], then the whole place went dark and [then] I looked out the door and saw the twister ... It was nearly a quarter of a mile away at that stage but was still huge and it was only afterwards I realised the damage it had done". A third witness "... saw it coming in along the valley. It was like a big, black cone in the sky. I could see it dipping down into the town and then lifting off into the sky again. It carried on in the sky and came down over somewhere in the Cordal area again" (Cordal is about 5 km east of Castleisland). Force T1-2.

At 1200 GMT a northwesterly airstream with minor troughs covered the

British Isles behind a vigorous low, 965 mb, over Germany (which had moved through the English Channel earlier in the day). Showers spread inland from exposed coasts, but sheltered areas were mostly dry (after the clearance of early rain and snow in the south).

Annual totals for 2011

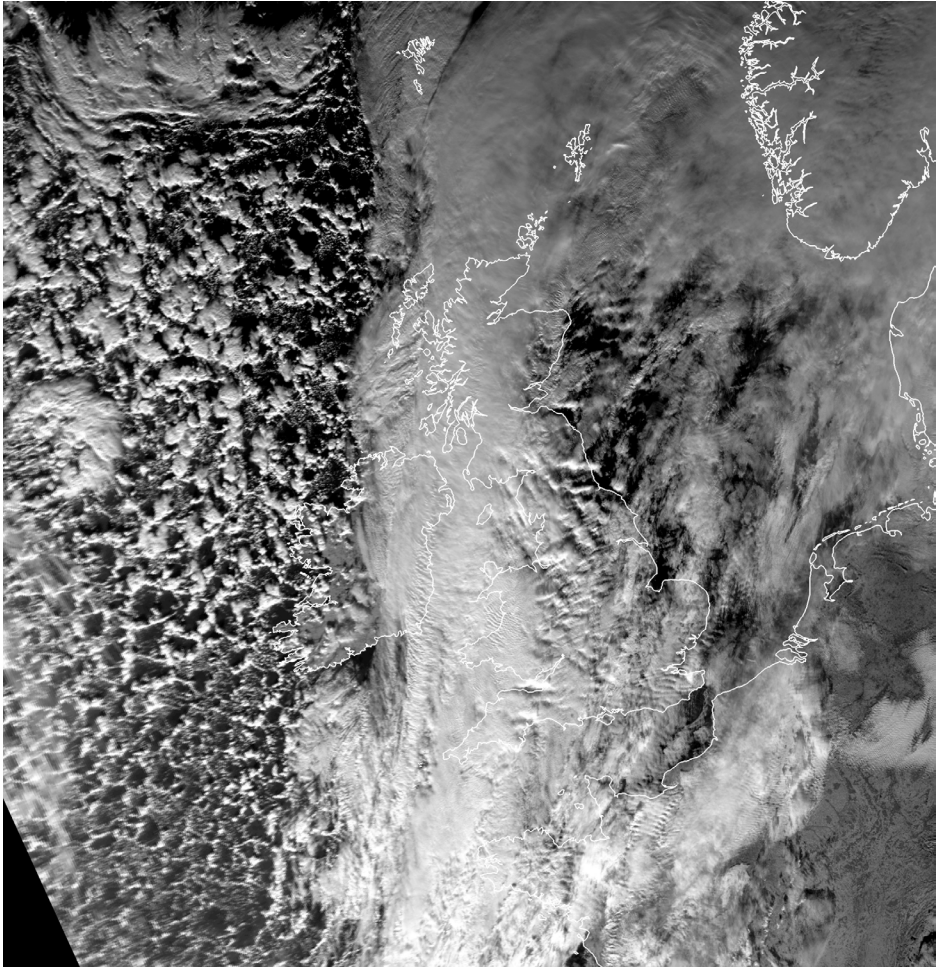
The number of known tornadoes in the British Isles in 2011 was 26. Of these, 22 were in the United Kingdom and, provisionally, four in the Irish Republic (we await Dr John Tyrrell's summary for the official Irish totals). Two of the British and one of the Irish tornadoes began or ended over the sea as waterspouts; in addition, there were nine reports of waterspouts that did not reach land (all from the UK). There were 62 reports of funnel clouds not reaching the surface in the United Kingdom, plus four (provisionally) in the Irish Republic (66 in total). The total number of days in the British Isles for which tornadoes, waterspouts, or funnel clouds are known is 56. Nine land devils, one eddy whirlwind, and two whirlwinds of unknown type were also recorded during the year.

Addition to earlier reports

tn1990Oct? *Brighton to Everingham, East Riding of Yorkshire (c 53° 48' N 0° 56' W to 53° 52' N 0° 47' W, SE 7034 to SE 8042)*

While investigating the Brighton tornado of the 29th November (see above) Tim Prosser was told about a much earlier one that followed a track about 50 metres to the west, in or about October 1990 (both the year and month are uncertain). The time was about 1700 clock time (either BST or GMT). It removed the roof of a chapel at Seaton Ross (SE 7841), tore branches from oak and beech trees, and wrecked game pens at Everingham; there was also damage at Foggathorpe (SE 7537). Force perhaps T3.

Below is a satellite image from 29 November 2011 1229 UTC showing a cold front down the western side of Britain. This cold front then swept eastwards over the following hours causing multiple wind damage and tornado reports, as discussed in the previous article.



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Further images can be found at <http://www.sat.dundee.ac.uk/>



TORNADOES AND OTHER WHIRLWINDS IN THE UNITED KINGDOM 2011

BY PAUL R. BROWN AND G. TERENCE MEADEN

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Abstract: Tornadoes, waterspouts, funnel clouds, and other whirlwinds are summarised for the United Kingdom for 2011, and the data compared with those for the preceding five years. 2011's totals were similar to those for 2010 for tornadoes and waterspouts, but there were more funnel clouds and fewer land devils.

COMPARISON OF WHIRLWIND TOTALS FOR 2011 WITH THOSE FOR RECENT YEARS

The number of known tornadoes for 2011 was the same as in the previous year, and again rather low in comparison with some of the other years in the past decade. The number of waterspouts reported was also very similar to 2010's total, and somewhat higher than in earlier years. Another unsettled summer in 2011 meant there were only isolated reports of land devils. For the United Kingdom we know of 22 tornadoes over land, of which 16 have been classified as definite (six probable); two of the tornadoes began as waterspouts, and there were another nine reports of waterspouts that did not reach land. The total of all tornadoes, whether over land or sea, is therefore 31. Funnel clouds that did not reach the surface totalled 62 sightings. This gives a combined annual total for all tornado-related events (TN+WS+FC) of 93.

Table 1. UK whirlwinds: Annual totals 2006 to 2011

	2006	2007	2008	2009	2010	2011
Tornado	63	53	14	36	22	22
Waterspout	4 ²	8 ¹	9 ¹	5 ²	12	11 ¹
Funnel cloud	92	165	67	85	54	62
Total tornadic events	158 ³	224 ³	88 ³	125 ³	88	93 ³
Total No of days (UK) having TN, WS, or FC	72	68	52	57	51	52
Land and water devils	11	6	4	4	22	8
Eddy whirlwinds	0	2	0	1	1	1

¹ - Two of these also included in Tornado total

² - One of these also included in Tornado total

³ - Total excludes WSs that were also TNs

Tornadoes or waterspouts occurred on 22 different days during 2011, and there were an additional 30 days on which only funnel clouds were reported, making a total of 52 days with tornado-related events of some sort.

SUMMARY OF WHIRLWINDS FOR 2011 BY MONTH AND TYPE

Nearly all the tornadoes of 2011 occurred in the second half of the year, and within that period they were evenly distributed by month apart from November, when a minor outbreak of tornadoes occurred on the 29th; and, as usual, the three summer months produced most of the funnel cloud sightings (see Table 2).

Table 2. UK whirlwinds: Monthly and annual totals 2011

2011	TN	WS	FC¹	TN+WS+FC	LD+WD	EW
January	0	0	1	1	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	0	0	1	1	4	0
May	0	0	6	6	0	0
June	1	1	14	16	2	0
July	2	1	18	21	1	0
August	4	4	14	22	1	0
September	3	2 ²	3	7 ³	0	0
October	2	2	3	7	0	1
November	8	1 ²	1	9 ³	0	0
December	2	0	1	3	0	0
Year	22	11	62	93	8	1

¹Excluding any that were seen together with tornadoes or waterspouts

²One of these also included in Tornado totals

³Total excludes WS that was also TN

Of the 22 tornadoes, one was rated T3-4 (strong to severe tornado) on the International Tornado T-Scale, three were T3, one was T2-3, five were T2, three were T1-2, five were T1, one was T0, and three were unrated.

Table 3a. Tornadoes in the United Kingdom in 2011

TYPE/DATE	PLACE	COUNTY	NGR/IGR	STRENGTH
TN2011Jun08	Craigbrack	Derry	C5418	T3
TN2011Jul08	Westhoughton	Lancashire	SD648054 to SD650059	T1?
TN2011Jul08	Bognor Regis	West Sussex	SZ927995 to SU934002	T2
DB+TN 2011Aug03	Dunnington	Yorkshire, East Riding	SE6549	T2-3
tn2011Aug17	Portree	Inverness-shire	NG~4743	
TN2011Aug25	Newbridge to Crumlin	Monmouth- shire	ST207969 to ST212982	T2
TN+FCs 2011Aug26	Meols	Cheshire	SJ2290	T0
WS-TN 2011Sep10	Polruan	Cornwall	SX123511 to SX129515	
TN2011Sep17	Lytham St Anne's	Lancashire	SD340278	T1
TN2011Sep21	Maybole	Ayrshire	NS285102	T3
TN2011Oct17	Whitehaven	Cumbria	NX975166 to NX980170	T1-2
TN2011Oct17	Templand	Dumfriesshire	NY~084861	T1
TN2011Nov03	Inkberrow to Astwood Bank	Worcestershire	SP037579 to SP045623	
WS-TN 2011Nov29	Llanfwrog	Anglesey	SH287848	T3-4
tn2011Nov29	Darwen	Lancashire	SD683239	T2
tn2011Nov29	Stockport	Cheshire	SJ863908 to SJ876913	T2
tn2011Nov29	Hyde	Cheshire	SJ947937	T3
tn2011Nov29	East Leake	Leicestershire	SK555261	T1-2
TN2011Nov29	New Rossington	Yorkshire, West Riding	SK613973 to SK624974	T1?
TN2011Nov29	Brighton to Seaton Ross	North Yorkshire to East Riding	SE694323 to SE782407	T2
TN2012Dec13	Yeovil	Somerset	ST5317	T1
tn2011Dec23	Piddletrenthide	Dorset	ST702007	T1-2

Table 3b. Tornadoes in the Irish Republic in 2011

TYPE/DATE	PLACE	COUNTY	IGR	STRENGTH
TN 2011Jun22	Portlaoise	Laoise	S4698	T1
TN-WS 2011Sep16	Clogherhead	Louth	O154835 to O~1690	T2
TN 2011Dec16	Castleisland	Kerry	Q9908	T3

The figures given so far in this summary exclude events in the Republic of Ireland, but when these are included the 2011 totals for tornadoes and waterspouts rise to 25 and 13 respectively (see Site Investigations and Tornado Reports in Ireland, 2011 by Dr John Tyrrell for details, which will be printed in a future issue). Brief descriptions of all whirlwind events for 2011 can be found in the monthly summaries published in this journal.

Acknowledgements, TORRO thanks all those people who have helped us in any way in 2011, and especially those who conducted site investigations.

Keywords: tornado, whirlwind, funnel cloud, waterspout, eddy whirlwind, land devils, water devils, United Kingdom, 2011



THUNDERSTORM REVIEW FOR BRITAIN AND IRELAND 2011

(also incorporating the TCO Annual Survey)

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OVERVIEW

Thunder day totals for 2011 are mapped in Figure 1 (with a map of 1971-2000 means for comparison in Figure 2) and are also presented, for selected stations with long term averages (1981-2010 where available), in Table 1. This was another quiet year with only northeast England and southeast Scotland recording an excess of thunder days. Elsewhere, large areas, including much of the south Midlands, recorded less than half the normal quota.

Fig 1: Number of Thunder days 2011

Fig 2: Mean thunder days 1971-2000



Key:



Keywords: TORRO, thunder, hail, lightning, Britain, Ireland, 2011

Table 1. Thunder days in 2011 at selected stations.

STATION	COUNTY	2011 total	Average 1981-2010 (unless otherwise stated)	Diff +/-
Waddington	Lincs	16	15	+1
Carlton-in-Cleveland	N Yorkshire	16	13	+3
Calthorpe	Norfolk	13	17 (1987-2010)	-4
Bury St Edmunds	Suffolk	13	19 (2001-2010)	-6
Buxton	Norfolk	12	16	-4
Cosby	Leics	10	13	-3
Wokingham	Berkshire	10	16	-6
Llangyndeyrn, Carmarthen	Dyfed	10	11 (2001-2010)	-1
Bulford	Wiltshire	10	11 (Boscombe Down 1957-85)	-1
Epping	Essex	9	18 (2001-2010)	-9
Straide, Co Mayo	Ireland	9	9 (2001-2010)	0
Barnstaple	Devon	9	9 (Chivenor 1957-1973)	0
Drumburgh	Cumbria	9	8 (2001-2010)	+1
Epsom Downs	Surrey	8	17	-9
Doncaster	S Yorks	8	13 (Finningley 1961-1995)	-5
Gloucester	Glos	7	10 (Innsworth 1961-1981)	-3
Eskdalemuir	Dumfries	7	7	0
Elderslie	Renfrew	7	6	+1
Leuchars	Fife	6	5	+1
Llansadwrn	Anglesey	6	7	-1
Leeds (Bramley)	W Yorks	6	10	-4
Camborne	Cornwall	6	8 (St Mawgan)	-2
Dun Laoghaire, Dublin	Ireland	5	8 (2001-2010)	-3
Casement A/Pm Dublin	Ireland	5	5	0
Oxford	Oxon	5	12	-7
Stony Stratford	N Bucks	5	14 (1986-2010)	-9
Great Malvern	Worcs	5	10	-5
Knockroe, Co Monaghan	Ireland	5	5 (Clones)	0
Ebbw Vale	Gwent	5	8 (1988-2010)	-3
Lymington	Hampshire	5	11 (Southampton 1969-85)	-6
Swansea	W Glamorgan	5	7	-2

Dunbar	Lothian	4	4	0
Guernsey Airport	Chan Isles	4	12	-8
Velindre	Powys	4	10	-6
Ardpatrick, Co Limerick	Ireland	4	11 (1991-2005)	-7
Woodlands St Mary	Berkshire	3	12 (1990-2009)	-9
Fair Isle	N Isles	3	6 (1975-2000)	-3
Fishponds	Bristol	2	10 (1950-2010)	-8
Belmullet, Co Mayo	Ireland	2	7	-5
Valentia, Co Kerry	Ireland	2	7	-5
Ronaldsway	Isle of Man	2	4	-2
Newtownards, Co Down	Ireland	1	6	-5
Cork airport, Co Cork	Ireland	1	3	-2

WIDESPREAD THUNDERSTORM OUTBREAKS IN 2011

The identification of days of widespread thunderstorm activity across England and Wales has again been based on a geographical spread of stations used by Prichard (1986), the automation of synoptic stations being compensated for by the use of more reports from voluntary observers. Thunder could be described as widespread over England and Wales on only ten days in 2011 (April 23; May 7 and 9; June 28; July 8; August 3, 7, 25 and 26; September 17). The 1946-1995 average was 15 days. The most widespread thunderstorm events across Scotland were on July 8-9 and August 26th (Webb and Blackshaw 2012).

REPORTED INCIDENCE OF OVERHEAD STORMS, LIGHTNING DAMAGE AND OTHER SEVERE THUNDERSTORM EVENTS IN 2011

Overhead thunder is defined as electrical activity reported by an observer to be at a distance of 5km or less, or "close". Observations of overhead thunder and the duration of thunder are given for selected locations in Table 2.

Table 2: Duration of thunder in 2011: number of hours of thunder heard

Station (County)	Thunder days/ Overhead thunder days	Storm hours 2011	Comparative notes ref thunder duration
Fishponds (Bristol)	2	4	Mean t hours at Filton 1971-1980 were 23
Oxford (Oxon)	5	8	Mean t hours at Brize Norton 1971-1983 were 24
Bury St Edmunds (Suffolk)	13	21	Mean t hours at Marham 1971-1983 were 41, at Wattisham 1971-1983 mean were 34
Carlton-in-Cleveland (N Yorks)	16	32	Mean t hours at Leeming 1971-1983 were 22
Elderslie (Renfrew)	7	11	Mean t hours at Abbotsinch 1966-1980 were 16

The reported lightning incidents (assumed to be only a proportion of the total and subject to future review) were far below the average for the previous 20 years (see the 2010 summary in the Int. J. Meteorology). The seasonal distribution of reported lightning incidents and damage is shown in Table 3.

Table 3: Reported lightning incidents by month, 2011

January	1
February	0
March	0
April	7
May	11
June	37
July	10
August	22
September	5
October	1
November	1
December	5
	100

Of the total of 100 known lightning incidents, five involved people being struck, with the actual number of persons struck totalling seven. Fortunately there were no fatalities or reports of serious long term injuries attributable to lightning. The reported incidents also included 59 strikes on buildings; of these 49 (83%) caused noticeable damage to at least one property and 17 (29%) caused severe damage, i.e. rendering at least one dwelling temporarily uninhabitable. However, incidents causing little or no damage are less likely to have been reported.

There was a severe outbreak of thunderstorms across southeast England and East Anglia on 28 June - accounting for 34 of the lightning incidents referred to above (the most in a single event since 2006). These storms caused considerable transport disruption around London (Sibley 2012).

DAMAGING HAIL IN 2011

There were few reports of significant hail in 2011, consistent with the marked shortfall in thunder evident over much of these islands.

April 23: The charts for 22nd April showed a classic Spanish Plume with a very warm southeasterly low level airflow and, at 500mbar, a large upper trough extension just west of the UK down to Iberia, with a cut off centre developing near Portugal. As this upper trough moved eastwards, the trough disruption left very warm, stagnant air over England and Wales with cold air aloft. By 23rd, a cold front was lying across Scotland and southwards down the Irish Sea with the 1200 UTC chart indicating a pre-frontal trough ('upper' cold front) lying down the spine of England. During a severe thunderstorm in Sheffield, hailstones up to 30mm diameter were observed. The hail lasted for 15 minutes with most stones 10-20mm across (Butterfield 2011). The hail shredded shrubs in the city. In Shepshed, north Leicestershire, hail at least 10-20mm fell across the northern side of the town and caused extensive vegetation damage (Jowett, S- Pers Comm, TORRO forum). Footage posted to YouTube indicated hail exceeded 20mm diameter at the time of the fall. In Birstall (also Leicestershire) the storm struck at about 1600 UTC. Hailstones the size of marbles slammed into windows, ripped leaves from trees and took paint off window frames and within 20 minutes streets looked as though they were covered in snow. Paint was chipped off windows by the stones which were very hard and the size of thumbnails. A conservatory roof was left with tiny holes, and gardens were ruined with leaves shredded off trees and all blossom knocked to the ground. The hailstones were a mixture of clear and opaque ice and estimated at least 10mm in diameter -probably more.

May 7: At 1800 UTC, at Llansadwrn, Anglesey, large clear hailstones 10 mm diameter were observed during almost continuous thunder from 1759 to

1815 GMT. Even larger (size unconfirmed) hailstones, were reported in Llansadwrn and Pentraeth villages, descriptions varying from marble to golfball size!

June 10: Surface charts show a slack area of low pressure across Great Britain. Britain and Ireland were under an upper trough, the axis of which was moving into western areas. A thunderstorm at the Lincolnshire village of Quadring was accompanied by hailstones which left a 'white out'. The storm hit shortly after 1900 UTC. Hailstones – 10mm square and larger – pummelled everything in their wake and left many garden plants hanging in shreds. Some gardens were still strewn with hailstones at a depth of three to four inches (7-10cm) until after noon on 11th.

June 11: At Clacton, Essex, conical hailstones up to 25-30mm diameter were reported during a thunderstorm around 1945 UTC (report received via the European Severe Weather Database)

July 8: An area of low pressure slowly transferred from Ireland on the 7th to the north of England by the 8th and out in to the North Sea by the 9th. An associated large upper vortex drifted slowly northeast to be centred directly over Scotland at 0000h on the 9th. Thunderstorms developed quite widely during the second half of the morning of the 8th and became severe in the Edinburgh area in the afternoon (Webb and Blackshaw, 2012). A series of storm cells drifted slowly northwest across the city and were accompanied by torrential rainfall, hail up to 20mm diameter and frequent cloud to ground lightning strikes, one of which struck the Royal Observatory on Blackford Hill and another (according to an eye witness) the Forth Road Bridge. Widespread flooding occurred in the city with the west end particularly badly hit with shoppers having to wade through water knee deep. Hail was sufficiently intense to damage allotment plants in the city. Radar returns of up to 160mm/hour (over 2km²) indicate the presence of significant hail, probably up to at least 12-15mm diameter.

At Ripley, Yorkshire, there was an intense overhead electrical storm from 1930 to 2014 UTC and for 20 minutes there was torrential hail which accumulated about 5cm deep. This lying hail persisted well into the night and was even present in heaped up areas on the 9th.

August 3: England and Wales were under a slack area of low pressure, rather like on the 10 June but with warmer air. Fronts were approaching south-west UK in association with an increasing south-westerly jet stream aloft around a major 500mbar vortex south of Iceland. A severe thunderstorm, microburst and tornado affected the Dunnington area of South Yorkshire. Hailstones about 10-15mm diameter also caused considerable damage to plants and crops and scored paintwork on doors and fences (Smart et al 2012).

August 26: There was a complex area of low pressure across these islands with an occluded front lying just to the west of Scotland. With light winds, temperatures rose to 19°C in the brighter spots. The 500mbar contour and 500-1000mbar thickness charts show an intense long wave upper trough extending south-south-east across western Britain and down to Iberia. Thunderstorms developed during the late morning and around midday a slow moving thunderstorm affected east Lothian. Lightning caused extensive damage to telephone lines and electrical appliances in the Elphinstone and Tranent areas, just east of Edinburgh. At Prestonpans, lightning also struck and damaged a building and 57mm of rain was recorded for the rainfall day. There were also reports of marble sized hailstones covering the ground and these reports are supported by peak radar reflectivity (over 2km²) of 163mm/hour, consistent with hail up to 15mm diameter.

Other occasions with deep accumulations of hail

On 16 June, a huge accumulation of hail accompanied a local thundery downpour at Cawdor, Nairnshire. A week later, a severe thunderstorm occurred in the Lochee area of Dundee in the late afternoon of 23 June. Low pressure was situated over southern Norway at 1200 UTC and the storm occurred in a northerly airflow behind an occluded front. The storm was accompanied by a deep accumulation of hail and there was severe flash flooding. On July 17, near Wetheral (Cumbria), hailstones the size of marbles fell, described as more than 10mm in diameter. On December 8th, hail up to 10mm diameter fell at Elderslie, west of Glasgow, during squally thundery showers in a gale force, unstable westerly airflow south of a very deep low crossing the outer Hebrides.

Sincere thanks are again due to all TORRO and other (e.g. COL, WON, also UKWW internet forum) observers who have contributed information on thunderstorms and associated severe weather in 2011. New thunderstorm observers are always welcome. Further details of reporting are available from Jonathan Webb.

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TORRO SEVERE WEATHER FORECAST SUMMARY FOR BRITAIN AND IRELAND 2011

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INTRODUCTION

Another reasonably cool 'warm season' meant that widespread severe convection was once again lacking during these months, although there were one or two notable events. A more active autumn and early winter period occurred compared with recent years, and as such, a number of the reports of tornadoes and probable tornadoes occurred in this period. As far as can be told, no tornadoes occurred before June, which is remarkable in itself, as quite often the steep low-level lapse rates of Spring allow for at least a few convergence-zone type tornadoes, whilst the first 'plumes' of warm air from the south can often lead to some severe thunderstorms in May.

Keywords: severe weather forecast, forecast, Britain, Ireland, 2011

TORRO'S FORECASTS

TORRO issued 3 types of verifiable forecast in 2011.

These were:

Convective discussion (TCD) :

Issued when conditions are favourable for either isolated severe weather events, or when marginally severe events are expected (e.g. T0-2 tornadoes; damaging hail, or heavy hail, but <20mm diameter).

Severe weather watches, which include:

Severe thunderstorm watch (SVR):

Issued when conditions are expected to be favourable for organised severe thunderstorms/convective storms.

Tornado watch (TOR):

Issued when either organised severe thunderstorms are expected, and they bring a risk of tornadoes, or when tornadoes are deemed possible, even though thunder may not occur (e.g. strong cold front, non-electrified showers).

In 2011, TORRO issued 33 verifiable forecasts, of which 23 were convective discussions along with 10 weather watches made up of

- 8 tornado watches
- 2 severe thunderstorm watches

There is, as yet, no formal recording of severe convective winds within TORRO although some damaging wind events get assigned a 'squall' rating. However, verification of forecasts is not possible in regard to winds at this time.

Hail

There were 4 days of significant (>H1) and/or damaging hail in 2011 across the UK (J. Webb, pers. comm.) Whilst no measurement information has come to light, the hail was more than likely bordering on severe (≥ 20 mm diameter) in one of these, July 22nd. The event was within a TORRO Convective Discussion.

There are too few reports for any meaningful analysis to be carried out with regard to hailstorm forecasting in 2011.

Tornadoes

Provisionally, 26 verifiable tornadoes/probable tornadoes occurred in 2011 across the UK and Eire (Brown/Meaden/Tyrrell, pers comm.). This number does not include tornadoes over the sea which did not make landfall, or tornadoes which occurred during the period of the author's holidays.

Tornadoes were reported in 3 tornado watches and not in 5 tornado watches. This gives a probability of detection (POD – the % number of watches containing at least one tornado) of 37.5%, and a false alarm rate (FAR) of 62.5%. This compares to a POD of 11% in 2010, 19% in 2009, 24% in 2008, 27.5% in 2007, 29% in 2006, and 35% in 2005. The reasons for this decline will be discussed below. Within the successful watches, 9 tornadoes occurred. This means 35% of 2011's tornadoes occurred within tornado watches; for comparison, 4% of 2010's tornadoes were within watches; 13% of 2009's tornadoes were within watches; 38% of 2008's tornadoes were within watches; 31% of 2007's tornadoes were within watches, 32% of 2006's were within watches, and 2005's figure was 33%.

Table 1 shows the number of tornadoes within each type of TORRO forecast.

Table 1: Number of tornadoes by TORRO forecast type

Forecast Type	Number of tornadoes	Percentage
TORNADO WATCH	9	35
SEVERE THUNDERSTORM WATCH	0	0
CONVECTIVE DISCUSSION	6	23
NOT FORECAST	11	42
TOTAL	26	100

In addition, 6 tornadoes occurred in convective discussions, with 0 occurring in severe thunderstorm watches. In total, 15 out of the 26 tornadoes occurred within a TORRO forecast, which means 58% of the tornadoes developed within a TORRO forecast.

Table 2 below shows tornado occurrence in 2004-2011 as a function of TORRO's forecasts

Table 2: Tornadoes within TORRO forecasts

Year	Tornadoes	No. of tornadoes within TORRO forecast	No. of tornadoes not forecast
2004	51*	26 (51%)	25 (49%)
2005	63*	41 (65%)	22 (35%)
2006	70^	39 (56%)	31 (44%)
2007	51*	32 (63%)	19 (37%)
2008	13*	7 (54%)	6 (46%)
2009	39	21 (54%)	18 (46%)
2010	25	9 (36%)	16 (64%)
2011	26	15 (58%)	11 (42%)
2004, '05, '06, '07, '08, '09, '10, 11	338	190 (56%)	148 (44%)

* - figures based on provisional figures for those years, at the time the reviews were written.

^ - 5 more occurred, but due to forecaster absence, are not included.

Note figures for 2004-06 are based on those used in these years' forecast reviews, and may not match the actual, final tornado numbers.

CONCLUSIONS

2011 was a very quiet year for tornadoes. The vast majority were, as is normal, weak, with none exceeding T4. Efforts have been made in recent years to attempt to cover many of these weaker events with TCDs rather than Tornado Watches (TW). Whilst it is true that all tornadoes pose a risk to life and property, the author is of the opinion that it is useful to try to distinguish potentially more serious events from the brief, weak tornadoes which can form beneath spring and summertime showers and thunderstorms. In this regard, the fact that the POD of tornadoes within TWs has been falling over the last few years shows that more are being covered within TCDs, which given the generally weak nature of the events, is justifiable. However, the author welcomes comments and discussion on this point. The POD as a function of all TORRO's forecasts over the last several years has dropped slightly to 56% (it was 58% at the end of 2009). However, it must be remembered that probable tornadoes are included within these figures too.

The fact that tornadoes are inherently hard to forecast, and that their exact mechanism of formation is still far from clear, means that there is always a tendency to over-forecast. Thus, when a relatively low number of tornadoes occur in a year it follows that the accuracy is likely to take something of a hit, as synoptic set-ups favouring tornadoes still tend to occur.

Comparisons to the accuracy of watches within the USA are hard not to make: the USA has a formidable severe weather forecasting and reporting system. However, this is due to the fact that the USA, especially the Great Plains, has frequent bouts of severe thunderstorm activity. Major outbreaks of tornadoes are reasonably easy to forecast, certainly from the point of view of issuing watches. An outbreak day may bring 50-60 tornadoes, and if many of these are within watches, good verification figures can be achieved. Such outbreaks are often very synoptically evident. In a similar vein, when outbreaks occur within the British Isles, a high proportion of the yearly total of tornadoes can be 'captured' within a forecast – however, there may still be a number of individual tornadoes on separate days which are not forecast.

Weak tornadoes are intrinsically more difficult to forecast, as they can occur beneath 'ordinary cell' showers and thunderstorms, rather than supercells. Most tornadoes are weak anyway, which further shows the difficulty in forecasting them. Finally, supercells are rare in the British Isles, and thus supercell tornadoes are very rare. The irony is that such tornadoes may be easier to forecast, at least insofar as producing a tornado watch to cover them, as they require a more specific atmospheric environment in which to develop, viz. one containing strong vertical wind shear.

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MeteoGroup UK, for allowing the author time on shift to construct and issue TORRO forecasts, and for the provision of the NWP model data; Paul Brown, Terence Meaden, Jonathan Webb, and John Tyrrell for providing the data sets for tornadoes and hail; TORRO and UKWW members for their observations of severe weather, and severe weather discussion/forecasts/comments.

VIEWING TORRO FORECASTS

TORRO forecasts are posted within the members only forum for further discussion, on the front page of www.torro.org.uk viewable to all, and also on the TORRO Facebook Page.

Below is the TORRO Tornado Watch issued by Paul Knightley for TORRO on the morning of 29 November 2011.

TORRO TORNADO WATCH 2011/009

A TORNADO WATCH has been issued at 09:50GMT on Tuesday November 29 2011

Valid from/until: 09:50 - 20:00GMT on Tuesday November 29 2011, for the following regions of the United Kingdom & Eire:

Parts of (see map): Eastern Eire, Eastern N Ireland, England, Wales, S Scotland, IoM, Channel Is

THREATS: Tornadoes; wind gusts to 65-70mph

SYNOPSIS

A strong, well-marked cold front will surge eastwards today as a pronounced upper trough moves eastwards across the British Isles. Line convection has already been noted across Eire/N Ireland and S Scotland this morning, and as the front accelerates eastwards, this will cross the WATCH area.

Low-level shear just ahead of the front will be strong 35-50 knots - this will probably allow misocyclone/LEWP development along the line convection, locally enhancing SREH (which will already be high), and increasing the risk of strong winds. In addition, small but non-zero CAPE and neutrally buoyant or marginally unstable air in the lowest 3km may enhance the tornado risk. This seems most likely where air comes in from the warmer seas (e.g. S England). However, there is the suggestion that slightly -ve 700 hPa LIs may extend into the Midlands and E Anglia too.

Although the risk area is large, the higher probabilities seem to be for Wales, and England south of a Liverpool - Hull line.

Forecaster: RPK



WETTEST APRIL IN 100 YEARS

April started with 7 water companies, mainly across southern and south-eastern parts of England, introducing hosepipe bans. This was then followed by a rather wet three weeks of heavy rain and thundery downpours, turning April 2012 into the wettest April in 100 years.

Howard Kirby documented the high level of the River Teme, Leintwardine, Herefordshire on 28 April 2012. He says “Over the previous 3 days there had been over 40mm of rain (measured a few miles away in my garden) and probably more upstream into the Welsh borders, it was the highest I had seen the river for many months.”



© Howard Kirby

Leintwardine Bridge over the River Teme



© Howard Kirby

Looking upstream from Leintwardine Bridge

