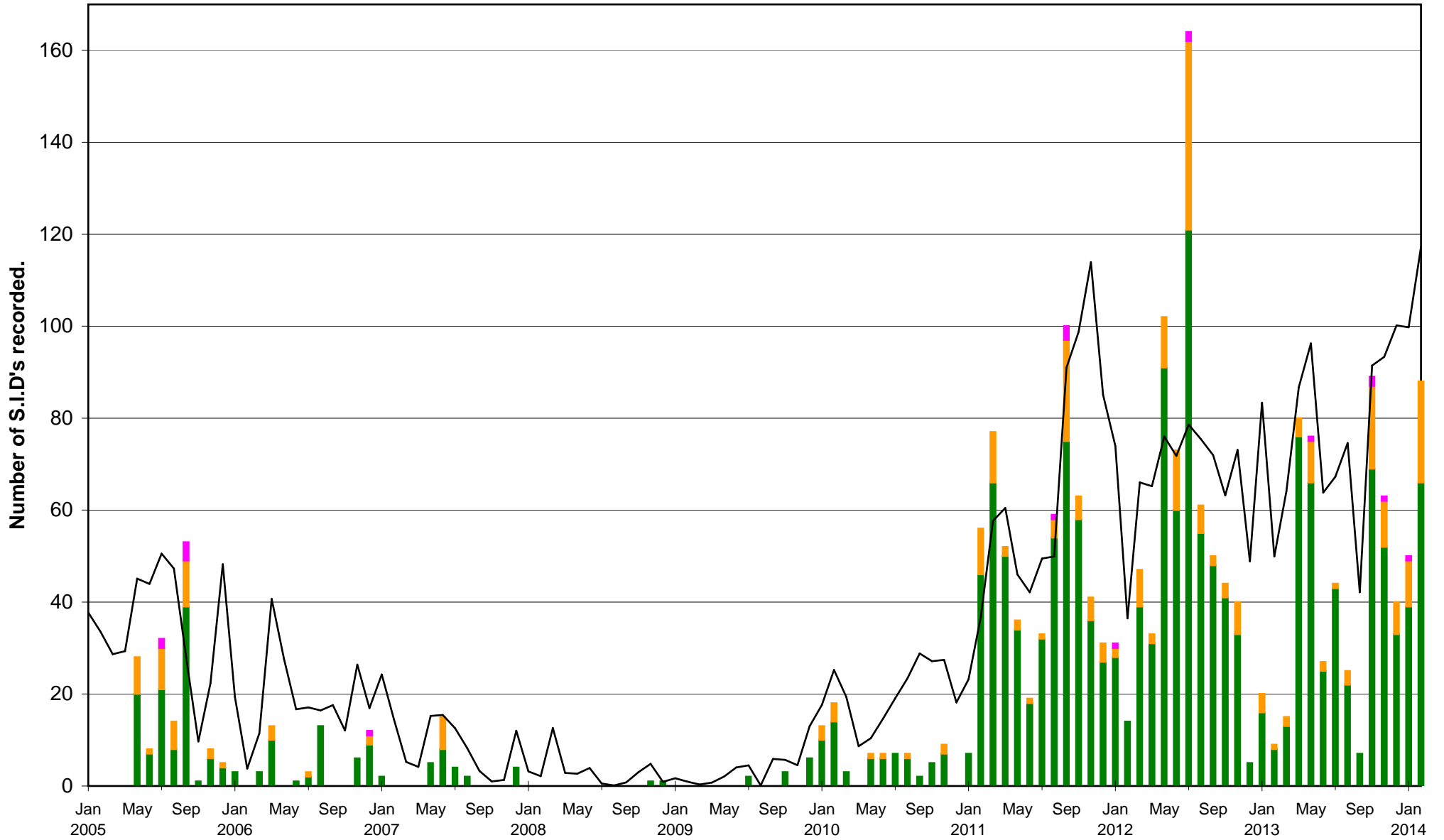


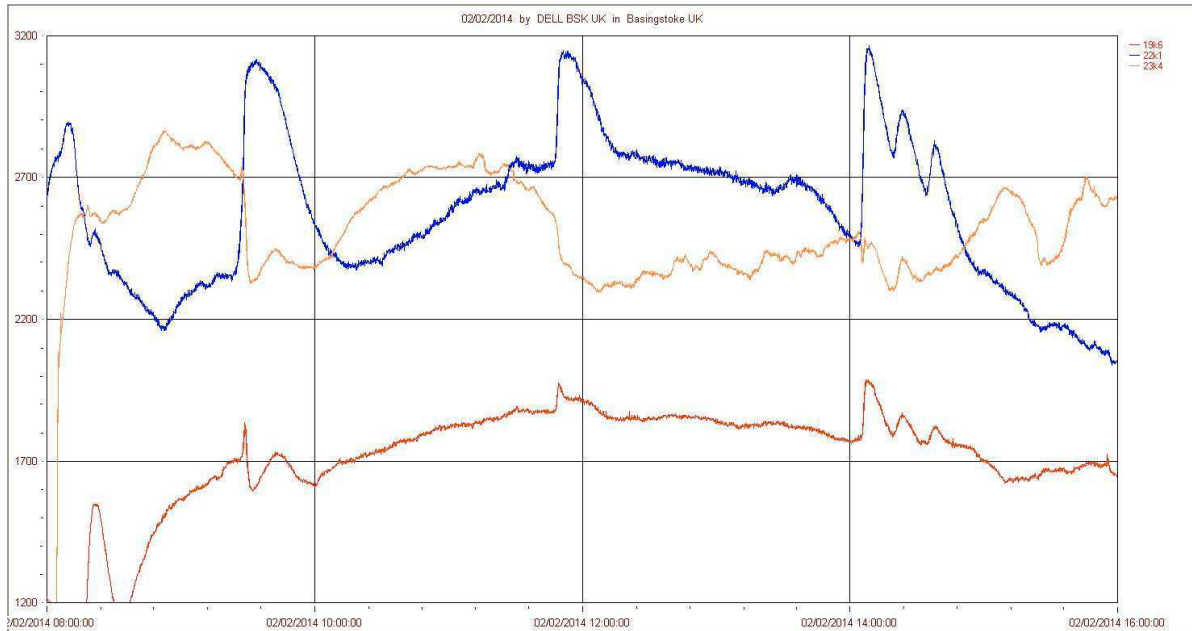
7	C3.0					
7	?					
8	C3.2					
8	C1.5					
8	C8.6					
9	M1.0					
10	?					
10	C2.1					
10	C1.8					
11	*					
11	?					
11	?					
11	C8.4					
11	M1.8					
12	?					
12	?					
12	C7.9					
12	M2.1					
13	M1.0					
13	*					
13	C8.4					
13	?					
13	*					
13	C3.0					
13	?					
13	?					
13	?					
13	M1.4	15:50	16:00	16:15	1	
13	?					
14	C3.3					
14	C2.2					
14	C2.6					
14	C7.2					
14	M1.6					
14	M1.1					
14	M1.0					
16	M1.1					
16	C3.4					
16	C1.2					
17	C2.0					
17	C1.7					
17	*					
17	*					
17	C2.4					
17	?					
18	C3.3					
18	C1.7					
19	C2.5					
20	M3.0					
21	C1.9					
21	C1.8					
21	?					
22	?					
22	C7.7					
23	C2.4					
23	?					
23	C3.3					
23	?					
23	?					
23	?					
24	M1.2					
24	M1.3					
24	?					
24	C5.0					
25	*					
25	?					
25	C5.7	15:10	15:13	15:20	1-	
26	C1.9					
26	C1.5					
26	M1.1					
26	*					
27	C2.1					
27	C3.1					
27	C5.7					
27	C6.8					
27	?					
27	C1.8					
28	?					
28	C8.1					
28	?					
28	?					
28	?					
28	C2.4					
28	?					
28	?					
28	C2.7					

VLF flare activity 2005/14.

C M X — Relative sunspot number



February has provided plenty of interest for SID observers, with some highly energetic flares and complex SID recordings. There is a single X-class flare shown in the GOES X-ray data, occurring at 00:49T on the 25th. The rise in activity in the last week of January continued into February with plenty of M-class flares recorded. A triple SID was recorded by some observers on the 2nd. This chart is from Paul Hyde:



The first peak of the triple is from an M1.3 flare, peaking at 14:06UT. The second, at 14:21 is listed at C7.8, while the third (14:35) is unlisted by SWPC. All three peaks are very clear in the GOES X-ray recording. AR1967 produced the first flare, while AR1968 produced the second. Paul’s chart also shows the M4.4 flare at 09:32 and the C9.7 at 11:51.

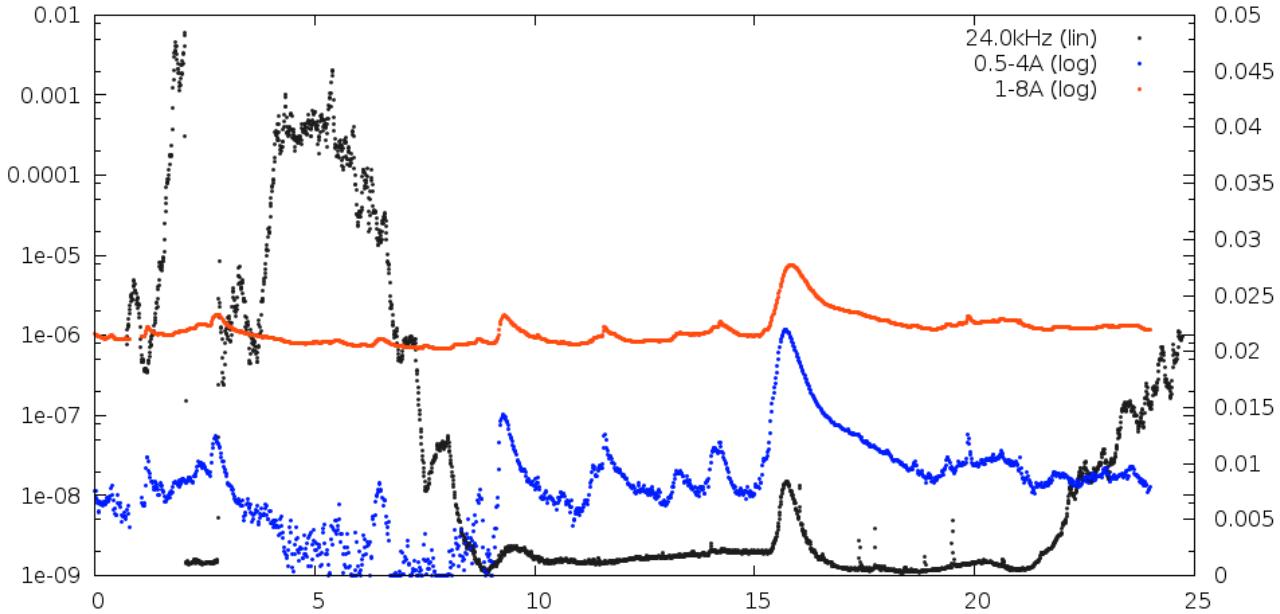
Some very slow flares have also been recorded:



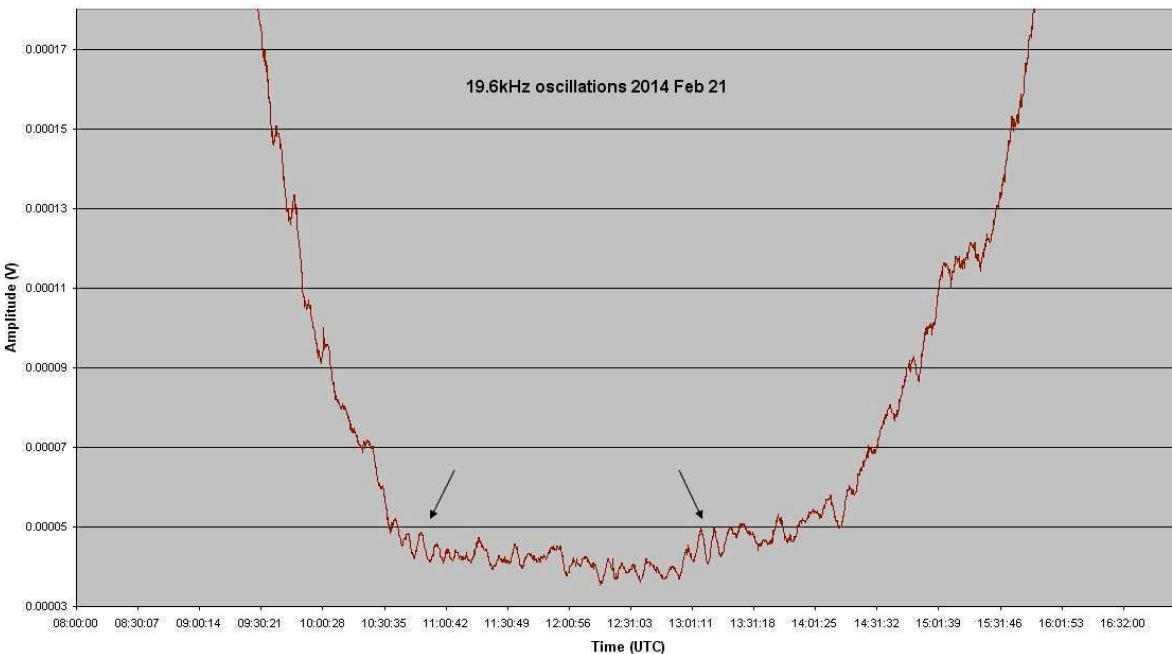
My own recording for the 11th shows two very un-SID like events. Although the C8.4 SID seems to have a very well defined start, the SWPC lists the start as being “before 13:11”, and a peak at “uncertain 13:11”. A second (unclassified) flare is listed with a start “before 13:46”, peaking “uncertain 13:46”. I have allocated our observed SID to the C8.4 flare. An earlier unlisted event is marked ‘?’ on my chart. This has a much less distinct start time, with a decay lasting into the following C8.4 flare. Although the response at 23.4kHz does not look like a SID, it does seem to follow the X-ray flux.

The C7.7 flare on the 22nd was well timed for recording at 24kHz. Richard Kaye made the interesting observation that there was a significant delay between the X-ray timing at short and long wavelengths.

2014/02/22 channel and GOES XRay data



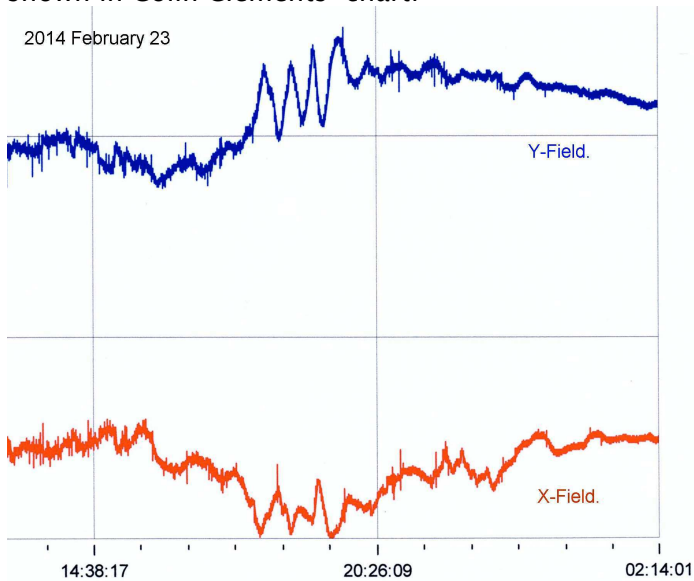
Richard's chart, above, shows the 24kHz signal in black, short wave X-ray in blue, and long wave X-ray in red. The short wave peak occurs before the long wave peak, the SID being nearer to the short wave timing. Looking at the GOES 1 minute data gives the following: short wave peak = 15:42UT, long wave peak = 15:50UT. Richard timed the SID peak at 15:43. The SWPC bulletin gives 15:50 in its list, but does not specify the active region responsible. Flares emit energy over a wide spectrum, and as our various SID shapes show, no two are the same. While the more impulsive flares often cause larger SIDs, the shorter wavelengths are also more efficient at ionising the D-region.



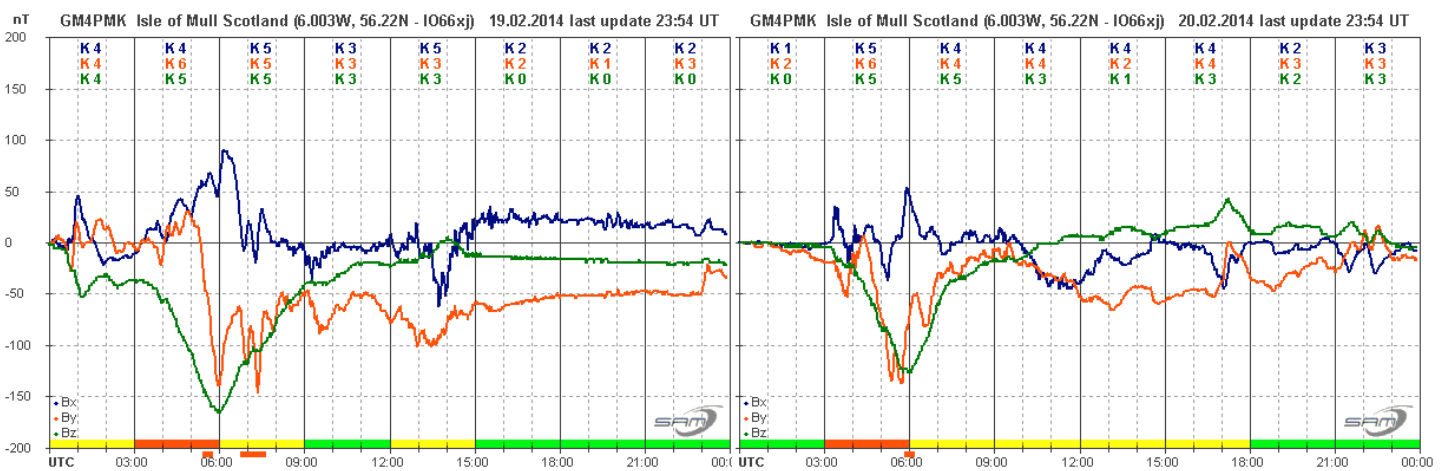
Mark Edwards has recorded more oscillations. His 19.6kHz chart for the 21st is shown above. Two periods of regular oscillation are visible, from 10:30 to 11:00 and 13:00 to 13:30. The period in each case is about 6 minutes. The 21st was about the least active day of the month. Background flux was at B9/C1 levels, with just a couple of small flares. A large proton event associated with the M3.0 flare recorded at 07:56 on the 20th was in its decay phase on the 21st, proton levels having returned to normal by the end of the 21st.

MAGNETIC OBSERVATIONS.

The M3.0 flare on the 20th also produced an earth-directed CME. Its arrival is listed at 02:30UT on the 23rd, although we have not recorded it. We did record a 2 hour active period from about 18:00 on the 23rd, as shown in Colin Clements' chart:



An earlier filament eruption and CME caused extended active periods on the 19th and 20th February. Roger Blackwell's recording shows the activity:



The CME occurred in the early hours of the 18th, reaching Earth around 04UT on the 19th. This disturbance lasted until 15:00. At 03UT on the 20th, material from the filament eruption reached Earth causing a further active period. This disturbance lasted nearly 24 hours. The change in levels at midnight is due to the magnetometer zero level being reset at the start of each day's recording.

The X4.9 flare at 00:49 on the 25th also generated a CME. My own recording shows an arrival time of 16:53UT on the 27th, with magnetic disturbances lasted until midnight. Using the SWPC flare timing gives a transit time of 64 hours and 4 minutes. Our recordings do not show any evidence of an SFE associated with the flare. There was also a widespread aurora, seen over a large part of the UK by those lucky enough to have a dark sky. The BAA website gallery pages include some superb images from the aurora section.

Magnetic observations received from Roger Blackwell, Colin Clements, John Cook, Gonzalo Vargas.

ROTATION	KEY:	DISTURBED	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE	Synodic rotation start (carrington's)
2423	F	24 25 26 27 28	2011 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21 22	2108	17 18 19 20 21 22
2424	F	23 24 25 26 27 28 29 30 31	2011 April 1 2 3 4 5 6 7 8 9 10 11	12 13 14 15 16 17 18	2109	12 13 14 15 16 17 18
2425	F	19 20 21 22 23 24 25 26 27 28 29 30 31	2011 May 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15	2110	9 10 11 12 13 14 15
2426	F	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2011 June 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15	2111	9 10 11 12 13 14 15
2427	F	12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	2011 July 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15	2112	9 10 11 12 13 14 15
2428	F	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2011 August 1 2 3 4 5 6 7 8 9	10 11 12 13 14 15 16 17 18	2113	10 11 12 13 14 15 16 17 18
2429	F	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2011 September 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	28 29 30 31	2114	28 29 30 31
2430	F	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	2011 October 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	28 29 30 31	2115	28 29 30 31
2431	F	28 29 30 31	2011 November 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2116	25 26 27 28 29 30 31
2432	F	25 26 27 28 29 30 31	2011 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2117	25 26 27 28 29 30 31
2433	F	21 22 23 24 25 26 27 28 29 30 31	2012 January 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2118	25 26 27 28 29 30 31
2434	F	18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 February 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2119	25 26 27 28 29 30 31
2435	F	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2120	25 26 27 28 29 30 31
2436	F	10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2012 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2121	25 26 27 28 29 30 31
2437	F	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 May 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2122	25 26 27 28 29 30 31
2438	F	4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 June 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2123	25 26 27 28 29 30 31
2439	F	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	2012 July 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2124	25 26 27 28 29 30 31
2440	F	28 29 30 31	2012 August 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2125	25 26 27 28 29 30 31
2441	F	24 25 26 27 28 29 30 31	2012 September 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2126	25 26 27 28 29 30 31
2442	F	21 22 23 24 25 26 27 28 29 30 31	2012 October 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2127	25 26 27 28 29 30 31
2443	F	17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 November 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2128	25 26 27 28 29 30 31
2444	F	13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2012 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2129	25 26 27 28 29 30 31
2445	F	10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 January 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2130	25 26 27 28 29 30 31
2446	F	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 February 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2131	25 26 27 28 29 30 31
2447	F	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2013 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2132	25 26 27 28 29 30 31
2448	F	2132 30 31	2013 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2133	25 26 27 28 29 30 31
2449	F	2133 26 27 28 29 30 31	2013 May 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2134	25 26 27 28 29 30 31
2450	F	2134 22 23 24 25 26 27 28 29 30 31	2013 June 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2135	25 26 27 28 29 30 31
2451	F	2135 21 22 23 24 25 26 27 28 29 30 31	2013 July 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2136	25 26 27 28 29 30 31
2452	F	17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 August 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2137	25 26 27 28 29 30 31
2453	F	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 September 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2138	25 26 27 28 29 30 31
2454	F	10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 October 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2139	25 26 27 28 29 30 31
2455	F	7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2013 November 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2140	25 26 27 28 29 30 31
2456	F	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2013 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2141	25 26 27 28 29 30 31
2457	F	30 31	2014 January 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2142	25 26 27 28 29 30 31
2458	F	26 27 28 29 30 31	2014 February 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2143	25 26 27 28 29 30 31
2459	F	23 24 25 26 27 28 29 30 31	2014 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2144	25 26 27 28 29 30 31
2460	F	19 20 21 22 23 24 25 26 27 28 29 30 31	2014 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2145	25 26 27 28 29 30 31
2461	F	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 May 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2146	25 26 27 28 29 30 31
2462	F	12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 June 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2147	25 26 27 28 29 30 31
2463	F	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 July 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	25 26 27 28 29 30 31	2148	25 26 27 28 29 30 31