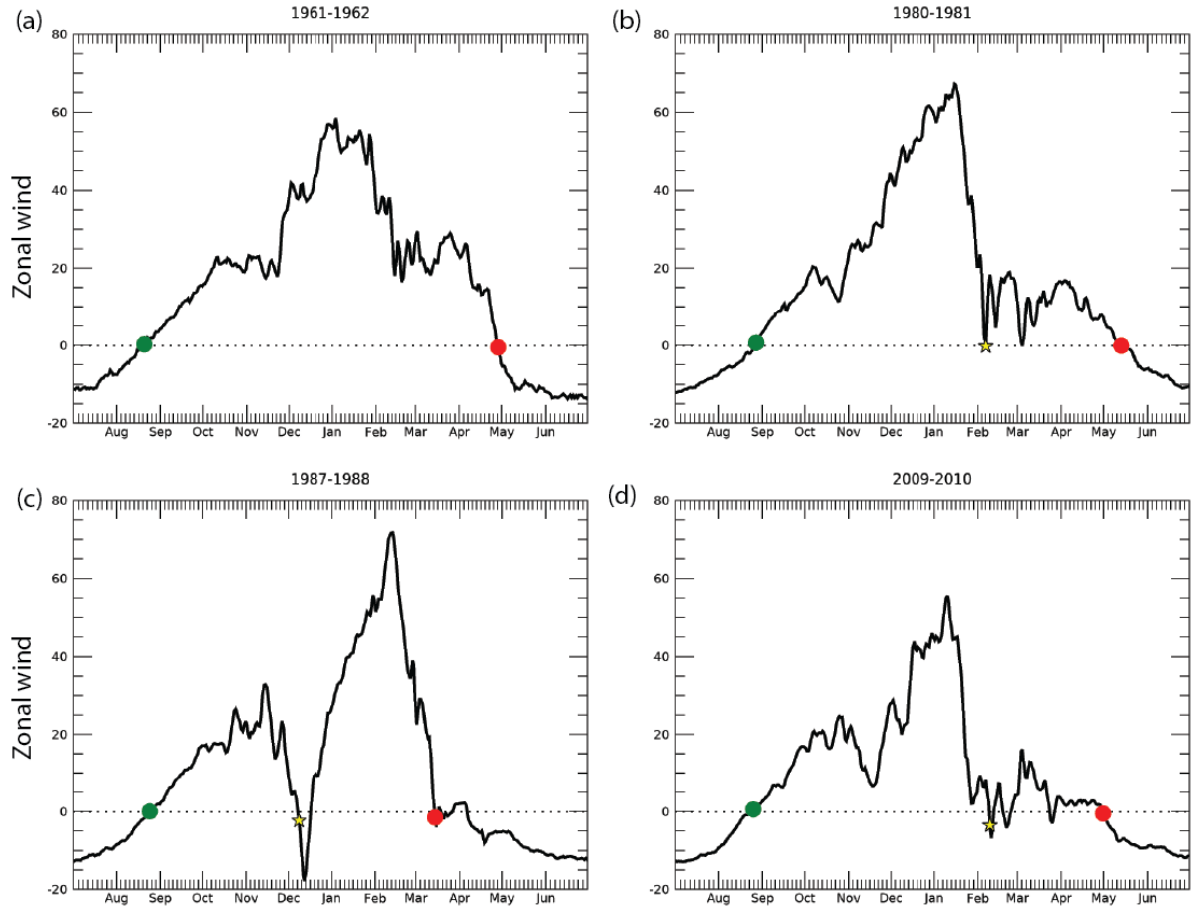
Supplementary Table 1. Final SSWs in the Northern Hemisphere defined by reversals of the zonal wind at 60°N and 10 hPa with no recovery to westerlies for at least 30 consecutive days. Note, every year has a final warming date. The Hu et al. (2014) method is applied to JRA-55 reanalysis (compared to NCEP-NCAR reanalysis used in their Table 1) using zonal winds at 65°N and 10 hPa and some additional requirements. Bolded values indicate the dates that were classified as SSWs in CP07.

FWs This study	FWs Hu et al. (2014)
3-May-58	2-May-58
18-Mar-59	19-Mar-59
2-Apr-60	12-Apr-60
11-Mar-61	10-Mar-61
28-Apr-62	27-Apr-62
13-Apr-63	11-Apr-63
19-Mar-64	16-Mar-64
19-Apr-65	19-Apr-65
9-Apr-66	7-Apr-66
14-Apr-67	25-Apr-67
21-Apr-68	20-Apr-68
13-Apr-69	7-Apr-69
12-Apr-70	11-Apr-70
24-Apr-71	7-May-71
25-Mar-72	24-Mar-72
6-May-73	28-Apr-73
12-Mar-74	23-Mar-74
17-Mar-75	16-Mar-75
30-Mar-76	30-Mar-76
1-Apr-77	28-Mar-77
12-Mar-78	24-Mar-78
8-Apr-79	5-Apr-79
8-Apr-80	6-Apr-80
13-May-81	12-May-81
4-Apr-82	4-Apr-82
1-Apr-83	21-Mar-83
24-Apr-84	24-Apr-84
24-Mar-85	23-Mar-85
19-Mar-86	20-Mar-86
2-May-87	25-Apr-87
14-Mar-88	6-Apr-88
15-Apr-89	15-Apr-89
8-May-90	5-May-90
10-Apr-91	9-Apr-91
22-Mar-92	20-Mar-92
12-Apr-93	7-Apr-93
2-Apr-94	2-Apr-94
8-Apr-95	7-Apr-95
10-Apr-96	10-Apr-96
30-Apr-97	29-Apr-97
28-Mar-98	25-Mar-98
2-May-99	30-Apr-99
9-Apr-00	9-Apr-00
10-May-01	13-May-01
2-May-02	5-May-02
14-Apr-03	14-Apr-03
29-Apr-04	20-Apr-04
13-Mar-05	12-Mar-05
7-May-06	9-May-06
19-Apr-07	18-Apr-07
1-May-08	29-Apr-08
10-May-09	8-May-09
30-Apr-10	28-Apr-10
5-Apr-11	6-Apr-11
18-Apr-12	18-Apr-12
3-May-13	5-May-13
27-Mar-14	28-Mar-14
28-Mar-15	n/a
5-Mar-16	n/a



Supplementary Figure 1. Time series of zonal-mean zonal wind [m s^{-1}] at 10 hPa and 60°N for four different years. (a) 1961-1962 had no SSWs; (b)-(d) show winters where the detection of SSWs was different than CP07. Green dot indicates start date of vortex, red date indicates end date of vortex (FW), yellow stars indicate SSW.