

Supplementary Materials

Table S1. The drought duration (DD), drought peak (DP), drought severity (DS) and drought intensity (DI) of the five most severe drought events identified by SPEI1 in the wine regions of China during the period from 1981 to 2015. Drought events in each wine region are sorted out based on the drought severity from high to low.

| <i>Region</i> | <i>Event</i> | <i>Initiation</i> | <i>Peak time</i> | <i>Termination time</i> | <i>DD (months)</i> | <i>DP</i> | <i>DS</i> | <i>DI</i> |
|---------------|--------------|-------------------|------------------|-------------------------|--------------------|-----------|-----------|-----------|
| JJJ | D1 | Jun-1999 | Jun-1999 | Sep-1999 | 4 | -1.38 | -3.93 | -0.98 |
| | D2 | Jun-1997 | Jun-1997 | Aug-1997 | 3 | -1.50 | -3.73 | -1.24 |
| | D3 | Apr-1981 | Jun-1981 | Jun-1981 | 3 | -1.42 | -3.52 | -1.17 |
| | D4 | Jul-2001 | Sep-2001 | Sep-2001 | 3 | -1.43 | -2.95 | -0.98 |
| | D5 | Jun-1983 | Jun-1983 | Jul-1983 | 2 | -1.55 | -2.85 | -1.42 |
| NE | D1 | May-1999 | Jul-1999 | Sep-1999 | 5 | -2.04 | -5.91 | -1.18 |
| | D2 | Apr-1982 | Jul-1982 | Jul-1982 | 4 | -1.82 | -4.99 | -1.25 |
| | D3 | Jun-2000 | Jun-2000 | Aug-2000 | 3 | -1.71 | -3.17 | -1.06 |
| | D4 | Apr-2001 | Apr-2001 | Jun-2001 | 3 | -1.60 | -3.09 | -1.03 |
| | D5 | Jun-2007 | Jun-2007 | Jul-2001 | 2 | -1.50 | -2.59 | -1.29 |
| IM | D1 | May-2001 | May-2001 | Jul-2001 | 3 | -2.13 | -4.73 | -1.58 |
| | D2 | Jun-2009 | Jun-2009 | Sep-2009 | 4 | -1.68 | -4.15 | -1.04 |
| | D3 | Jun-2010 | Jun-2010 | Aug-2010 | 3 | -1.82 | -4.07 | -1.36 |
| | D4 | Jun-2011 | Sep-2011 | Sep-2011 | 4 | -1.39 | -3.92 | -0.98 |
| | D5 | Apr-1986 | May-1986 | May-1986 | 2 | -2.46 | -3.52 | -1.76 |
| HXC | D1 | Jun-2010 | Jul-2010 | Aug-2010 | 3 | -1.72 | -4.18 | -1.39 |
| | D2 | Jun-2001 | Jun-2001 | Aug-2001 | 3 | -1.80 | -3.90 | -1.30 |
| | D3 | May-2008 | Jun-2008 | Jun-2008 | 2 | -1.85 | -3.69 | -1.84 |
| | D4 | Apr-2004 | Apr-2004 | Jul-2004 | 4 | -1.61 | -2.97 | -0.74 |
| | D5 | Apr-2011 | Apr-2011 | Jul-2011 | 4 | -1.46 | -2.84 | -0.71 |
| HLM | D1 | Apr-2005 | Apr-2005 | Aug-2005 | 5 | -1.60 | -5.49 | -1.10 |
| | D2 | Jun-1982 | Jul-1982 | Sep-1982 | 4 | -1.40 | -3.83 | -0.96 |
| | D3 | Jul-1991 | Jul-1991 | Sep-1991 | 3 | -1.35 | -3.44 | -1.15 |
| | D4 | Apr-2000 | May-2001 | May-2000 | 2 | -1.71 | -3.24 | -1.62 |
| | D5 | May-2001 | Sep-1985 | Aug-2001 | 4 | -1.19 | -3.19 | -0.80 |
| XJ | D1 | Jul-1985 | Sep-1985 | Sep-1985 | 3 | -1.84 | -4.77 | -1.59 |
| | D2 | Apr-1982 | Jul-1982 | Sep-1982 | 6 | -1.63 | -4.73 | -0.79 |
| | D3 | May-2001 | May-2001 | Jun-2001 | 2 | -2.25 | -3.55 | -1.77 |
| | D4 | Jun-2008 | Jun-2008 | Sep-2008 | 4 | -2.06 | -3.43 | -0.86 |
| | D5 | Jul-1986 | Jul-1986 | Sep-1986 | 3 | -1.65 | -3.28 | -1.09 |
| LP | D1 | May-1997 | Jun-1997 | Sep-1997 | 5 | -2.22 | -6.62 | -1.32 |
| | D2 | May-2001 | May-2001 | Aug-2001 | 4 | -1.67 | -3.82 | -0.95 |
| | D3 | Aug-1994 | Sep-1994 | Sep-1994 | 2 | -1.70 | -3.32 | -1.66 |

| | | | | | | | | |
|-----|----|----------|----------|----------|---|-------|-------|-------|
| | D4 | Apr-2007 | Apr-2007 | May-2007 | 2 | -1.67 | -2.82 | -1.41 |
| | D5 | Jul-2002 | Jul-2002 | Sep-2002 | 3 | -1.99 | -2.74 | -0.91 |
| AYR | D1 | Apr-1981 | May-1981 | May-1981 | 2 | -2.43 | -4.07 | -2.04 |
| | D2 | Jun-2013 | Jun-2013 | Sep-2013 | 4 | -1.52 | -3.83 | -0.96 |
| | D3 | Apr-2011 | Jul-2011 | Jul-2011 | 4 | -1.37 | -3.82 | -0.95 |
| | D4 | Jun-1997 | Jun-1997 | Sep-1997 | 4 | -1.38 | -3.64 | -0.91 |
| | D5 | Aug-2001 | Aug-2001 | Sep-2001 | 2 | -1.60 | -3.05 | -1.53 |
| SD | D1 | Apr-1981 | Sep-1981 | Sep-1981 | 6 | -1.99 | -7.40 | -1.23 |
| | D2 | Apr-1992 | Jun-1992 | Aug-1992 | 5 | -1.48 | -4.98 | -1.00 |
| | D3 | Jun-1997 | Jul-1997 | Jul-1997 | 2 | -1.96 | -3.72 | -1.86 |
| | D4 | Apr-1988 | Apr-1988 | Jun-1988 | 3 | -1.71 | -3.33 | -1.11 |
| | D5 | Apr-2000 | Apr-2000 | Jul-2000 | 4 | -1.35 | -2.83 | -0.71 |
| SW | D1 | Apr-2011 | Aug-2011 | Sep-2011 | 6 | -2.09 | -6.78 | -1.13 |
| | D2 | May-1983 | Jul-1983 | Jul-1983 | 3 | -1.84 | -5.04 | -1.68 |
| | D3 | Apr-1992 | Jun-1992 | Sep-1992 | 6 | -1.31 | -4.60 | -0.77 |
| | D4 | Jul-2006 | Aug-2006 | Aug-2006 | 2 | -2.11 | -3.53 | -1.77 |
| | D5 | Apr-2014 | Apr-2014 | May-2014 | 2 | -1.82 | -2.64 | -1.32 |
| S | D1 | Apr-1985 | Jun-1985 | Jul-1985 | 4 | -2.20 | -4.96 | -1.24 |
| | D2 | Jun-1981 | Aug-1981 | Sep-1981 | 4 | -1.42 | -4.23 | -1.06 |
| | D3 | Apr-1988 | Apr-1988 | Jul-1988 | 4 | -1.53 | -4.05 | -1.01 |
| | D4 | Jun-1984 | Jun-1984 | Sep-1984 | 4 | -1.54 | -3.42 | -0.86 |
| | D5 | Apr-2011 | May-2011 | May-2011 | 2 | -1.80 | -3.42 | -1.71 |
| EMC | D1 | May-1981 | Jun-1981 | Sep-1981 | 5 | -1.46 | -5.51 | -1.10 |
| | D2 | Apr-2011 | Apr-2011 | Aug-2011 | 5 | -1.84 | -4.98 | -1.00 |
| | D3 | May-1989 | Aug-1989 | Aug-1989 | 4 | -1.76 | -4.15 | -1.04 |
| | D4 | May-1982 | May-1982 | Jul-1982 | 3 | -1.56 | -3.93 | -1.31 |
| | D5 | Jun-1997 | Jun-1997 | Sep-1997 | 4 | -2.05 | -3.89 | -0.97 |

Table S2. The wet duration (WD), wet peak (WP), wet severity (WS) and wet intensity (WI) of the five most severe wet events identified by SPEI1 in the wine regions of China during the period from 1981 to 2015. Wet events in each sub-region are sorted out based on the drought severity from high to low.

| <i>Region</i> | <i>Event</i> | <i>Initiation</i> | <i>Peak time</i> | <i>Termination time</i> | <i>DD (months)</i> | <i>DP</i> | <i>DS</i> | <i>DI</i> |
|---------------|--------------|-------------------|------------------|-------------------------|--------------------|-----------|-----------|-----------|
| JJJ | W1 | Apr-1998 | Apr-1998 | Aug-1998 | 5 | 1.70 | 5.04 | 1.01 |
| | W2 | Jun-2012 | Jul-2012 | Sep-2012 | 4 | 1.65 | 4.40 | 1.10 |
| | W3 | Apr-1991 | Jun-1991 | Jul-1991 | 4 | 1.78 | 4.36 | 1.09 |
| | W4 | Apr-1987 | Apr-1987 | Jun-1987 | 3 | 1.55 | 3.62 | 1.21 |
| | W5 | Jul-1995 | Sep-1995 | Sep-1995 | 3 | 1.42 | 3.53 | 1.18 |
| NE | W1 | Jul-1994 | Sep-1994 | Sep-1994 | 3 | 1.73 | 4.01 | 1.34 |
| | W2 | Jul-1985 | Aug-1985 | Sep-1985 | 3 | 1.59 | 3.60 | 1.20 |
| | W3 | May-2015 | May-2015 | Aug-2015 | 4 | 1.85 | 2.67 | 0.67 |
| | W4 | Aug-1987 | Aug-1987 | Sep-1987 | 2 | 1.32 | 2.62 | 1.31 |
| | W5 | Aug-1998 | Aug-1998 | Sep-1998 | 2 | 1.67 | 2.60 | 1.30 |
| IM | W1 | Apr-1998 | Jul-1998 | Aug-1998 | 5 | 1.69 | 5.36 | 1.07 |
| | W2 | Apr-1991 | Jun-1991 | Jul-1991 | 4 | 1.84 | 4.82 | 1.21 |
| | W3 | May-1985 | Aug-1985 | Sep-1985 | 5 | 1.81 | 3.84 | 0.77 |
| | W4 | Jul-1994 | Jul-1994 | Aug-1994 | 2 | 1.85 | 3.60 | 1.80 |
| | W5 | Jun-2012 | Jun-2012 | Jul-2012 | 2 | 1.59 | 3.15 | 1.58 |
| HXC | W1 | Jul-1993 | Jul-1993 | Aug-1993 | 2 | 1.92 | 3.82 | 1.91 |
| | W2 | Apr-1987 | Jun-1987 | Jun-1987 | 3 | 2.28 | 3.75 | 1.25 |
| | W3 | May-1988 | Jun-1988 | Jun-1988 | 2 | 1.55 | 3.09 | 1.55 |
| | W4 | May-2002 | May-2002 | Jun-2002 | 2 | 1.72 | 2.82 | 1.41 |
| | W5 | Jul-1996 | Jul-1996 | Aug-1996 | 2 | 1.60 | 2.73 | 1.36 |
| HLM | W1 | Apr-2002 | May-2002 | Jun-2002 | 3 | 1.63 | 4.10 | 1.37 |
| | W2 | Jul-1995 | Aug-1995 | Sep-1995 | 3 | 1.88 | 3.83 | 1.28 |
| | W3 | May-1992 | May-1992 | Aug-1992 | 4 | 1.29 | 3.71 | 0.93 |
| | W4 | May-1988 | May-1988 | Aug-1988 | 4 | 1.61 | 3.65 | 0.91 |
| | W5 | Jul-2008 | Sep-2008 | Sep-2008 | 3 | 1.37 | 3.20 | 1.07 |
| XJ | W1 | Apr-1998 | May-1998 | Sep-1998 | 6 | 2.05 | 5.69 | 0.95 |
| | W2 | Apr-1996 | Jul-1996 | Aug-1996 | 5 | 2.15 | 4.79 | 0.96 |
| | W3 | May-1993 | Jul-1993 | Aug-1993 | 4 | 1.55 | 4.30 | 1.07 |
| | W4 | Apr-1987 | Jun-1987 | Jul-1987 | 4 | 1.70 | 4.19 | 1.05 |
| | W5 | Jul-1992 | Sep-1992 | Sep-1992 | 3 | 1.64 | 3.80 | 1.27 |
| LP | W1 | May-1984 | Jun-1984 | Jul-1984 | 3 | 1.92 | 4.14 | 1.38 |
| | W2 | Aug-2003 | Aug-2003 | Sep-2003 | 2 | 1.86 | 3.36 | 1.68 |
| | W3 | Jul-1988 | Jul-1988 | Aug-1988 | 2 | 1.91 | 3.11 | 1.56 |
| | W4 | May-1983 | May-1983 | Jul-1983 | 3 | 1.46 | 2.98 | 0.99 |
| | W5 | Jun-1996 | Jun-1996 | Aug-1996 | 3 | 1.21 | 2.91 | 0.97 |
| AYR | W1 | Apr-2003 | Aug-2003 | Sep-2003 | 6 | 2.06 | 5.80 | 0.97 |
| | W2 | Apr-2008 | Apr-2008 | Aug-2008 | 5 | 1.74 | 5.13 | 1.03 |

| | | | | | | | | |
|-----|----|----------|----------|----------|---|------|------|------|
| | W3 | Jun-2005 | Sep-2005 | Sep-2005 | 4 | 1.50 | 4.04 | 1.01 |
| | W4 | Apr-2015 | Jun-2015 | Jun-2015 | 3 | 1.83 | 3.84 | 1.28 |
| | W5 | Jul-2004 | Jul-2004 | Sep-2004 | 3 | 1.85 | 3.73 | 1.24 |
| SD | W1 | Apr-2003 | Apr-2003 | Sep-2003 | 6 | 1.80 | 6.32 | 1.05 |
| | W2 | May-1990 | May-1990 | Sep-1990 | 5 | 1.87 | 6.28 | 1.26 |
| | W3 | Aug-1985 | Aug-1985 | Sep-1985 | 2 | 1.75 | 3.40 | 1.70 |
| | W4 | Aug-2007 | Aug-2007 | Sep-2007 | 2 | 1.81 | 3.33 | 1.67 |
| | W5 | May-2004 | May-2004 | Aug-2004 | 4 | 1.02 | 3.26 | 0.81 |
| SW | W1 | May-2002 | May-2002 | Aug-2002 | 4 | 1.63 | 4.94 | 1.24 |
| | W2 | Apr-2000 | Apr-2000 | Aug-2000 | 5 | 1.69 | 4.22 | 0.84 |
| | W3 | Apr-2004 | Apr-2004 | Jul-2004 | 4 | 1.47 | 4.00 | 1.00 |
| | W4 | Jun-1998 | Jun-1998 | Aug-1998 | 3 | 1.39 | 3.85 | 1.28 |
| | W5 | Jun-1995 | Jun-1995 | Sep-1995 | 4 | 1.60 | 3.68 | 0.92 |
| S | W1 | Apr-2002 | May-2002 | Aug-2002 | 5 | 1.79 | 6.47 | 1.29 |
| | W2 | Apr-1999 | Apr-1999 | Sep-1999 | 6 | 1.74 | 5.94 | 0.99 |
| | W3 | May-2015 | Jun-2015 | Sep-2015 | 5 | 1.58 | 5.04 | 1.01 |
| | W4 | Jun-1993 | Jul-1993 | Sep-1993 | 4 | 1.79 | 4.09 | 1.02 |
| | W5 | Jul-1994 | Jul-1994 | Sep-1994 | 3 | 1.37 | 3.80 | 1.27 |
| EMC | W1 | May-1998 | Jun-1998 | Aug-1998 | 4 | 2.08 | 6.21 | 1.55 |
| | W2 | Apr-2002 | Apr-2002 | Jun-2002 | 3 | 1.80 | 4.94 | 1.65 |
| | W3 | Jun-1996 | Jul-1996 | Aug-1996 | 3 | 1.90 | 4.27 | 1.42 |
| | W4 | Jun-1995 | Aug-1995 | Aug-1995 | 3 | 1.58 | 3.69 | 1.23 |
| | W5 | May-2015 | Jun-2015 | Jun-2015 | 2 | 1.68 | 2.92 | 1.46 |

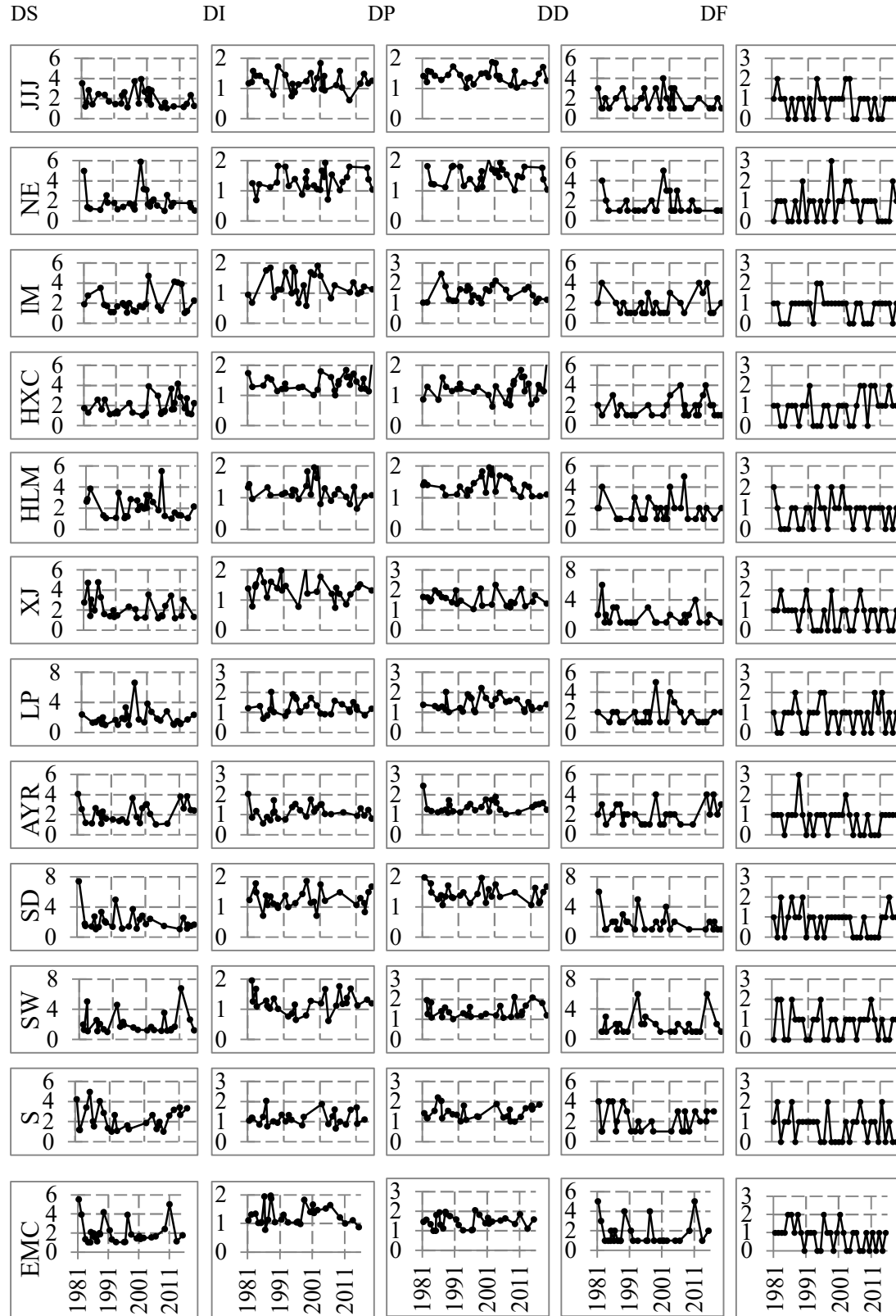


Figure S1. Temporal patterns of drought severity (DS), drought intensity (DI), drought peak (DP), drought duration (DD) and drought frequency (DF) of the drought events identified by the SPEI1 in the wine regions of China during 1981-2015.

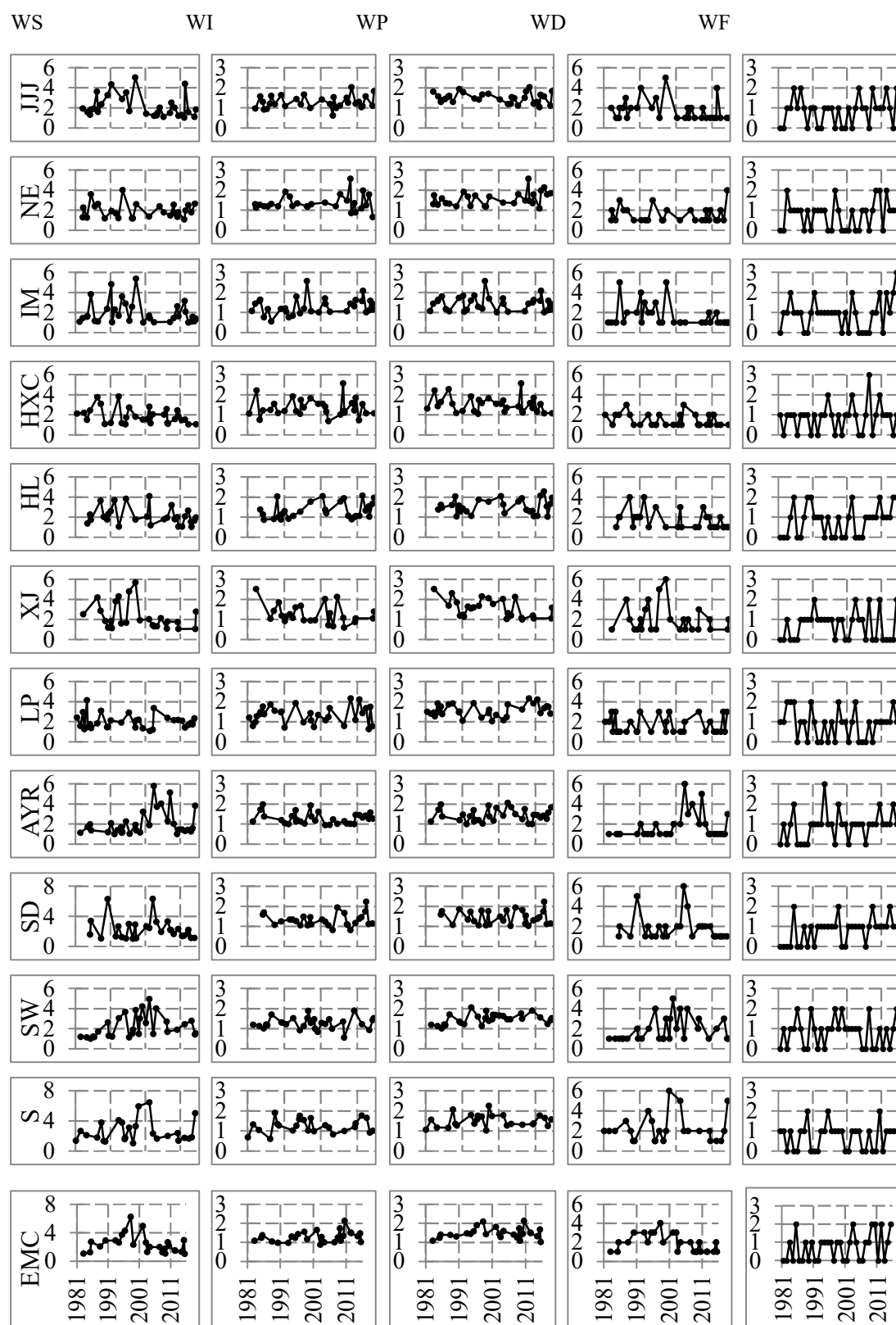


Figure S2. Temporal patterns of wet severity (WS), wet duration (WD), wet intensity (WI), wet peak (WP) and wet frequency (WF) of the wet events identified by the SPEI1 in the wine regions during 1981-2015.