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Supplementary Materials for

Disentangling local and global climate drivers in the population dynamics of mosquito-borne infections

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This PDF file includes:

Table S1: Analyzed time series.
197 Dengue or Malaria time series (198 but Bangkok is both a Province and a geographical Zone and Rio de Janeiro and Recife have been analyzed with two different datasets**)**
737 climatic variables (724 local climatic variables and **13** global climatic variables**)**
1046 Power Wavelet Spectrum plots have been computed, 2267 Wavelet Coherence 2D maps and only 2791*2 selected Partial Wavelet Coherence 2D maps (and not 5657*2 PWC with all local and global climatic variables**)**

Disease	Country or Region or City (ref)	Geographical Level	# of Time Series	Type of data	Local climatic variables	Global climatic variables
Dengue	Thailand (38)	Country	**1**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4, DMI
Dengue	Thailand (38)	Political Region	**4**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4, DMI
Dengue	Thailand (38)	Geographical Zone	**13**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4, DMI
Dengue	Thailand (38)	Province	**76**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4, DMI
Dengue	Southern Vietnam (65)	Region	**1**	Incidence	Mean Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Southern Vietnam (65)	Province	**17**	Incidence	Mean Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Binh Thuan Province (32)	Province	**1**	Cases	Mean Temperature, Max Temperature, Min Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Phnom Penh (66)	City	**1**	Incidence	Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino3, Nino34, Nino4, DMI
Dengue	Singapore (67)	Country-City	**1**	Cases	Mean Temperature, Max Temperature, Min Temperature, Mean Rainfall Highest Rainfall Min Humidity Mean Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Sri Lanka (68)	Province (Colombo and Batticalao)	**2**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Mean Rainfall Max Rainfall Weekly Rainfall Mean Humidity Max Humidity Min Humidity Mean Surface Wind Max Surface Wind Min Surface Wind	SOI, MEI, ONI, DMI
Dengue	Central India (69)	City (Bhopal City)	**1**	Cases	Mean Temperature, Max Temperature,	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4, DMI

					Min Temperature, Temperature Range, Rainfall, Absolute Humidity, Relative Humidity	
Dengue	San Juan (Puerto Rico) (70)	City	**1**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	Caribbean Index, TNA, AMM, NTA
Dengue	Peru (71)	Region (Coast, Jungle, Montain)	**3**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Venezuela (27)	City (Aragua and Carabobo)	**2**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Dengue	Rio de Janeiro (72)	City	**1**	Incidence	Temperature daily mean, Humidity daily mean, Total Precipitation daily sum, Total Cloud Cover daily mean, Sunshine Duration daily sum, Temperature daily max, Temperature daily min	SOI, MEI, ONI, AMM, TNA, TSA
Dengue	Recife (73)	Metropolitan Region of Recife	**1**	Cases	Rainfall, Temperature mean, Temperature max, Temperature min	SOI, MEI, ONI, Nino12, Nino34, Nino4, AMM, TNA, TSA, NTA
Dengue	Recife (73,74)	Municipalities of the Metropolitan Region of Recife	**15**	Incidence	Temperature mean, Temperature max, Temperature min, Humidity mean, Humidity max, Humidity min	SOI, MEI, ONI, Nino12, Nino34, Nino4, AMM, TNA, TSA
Dengue	Brazil (74)	State Capitals	**27**	Incidence	Temperature min, Humidity max	SOI, MEI, ONI, Nino12, Nino34, Nino4, AMM, TNA, TSA
Malaria	Anhui Province (75)	Province	**1**	Incidence	Mean Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Malaria	Anhui Province (75)	District	**17**	Incidence	Mean Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, Nino12, Nino3, Nino34, Nino4
Malaria	Hainam Province (30,76)	Province	**2 (***P. Vivax and P. Falciparum***)**	Incidence	Mean Temperature, Max Temperature, Min Temperature, Rainfall Air Pressure Sun Wind	SOI, MEI, ONI, PDO
Malaria	India (17->77)	District (Kutch)	**2 (***P. vivax and P. falciparum***)**	Incidence	Rainfall	DMI, SOI, MEI, ONI, Nino34
Malaria	India (39)	City (Surat and Ahmedabad)	**2**	Incidence	Mean Temperature, Min Temperature, Rainfall, Relative Humidity	SOI, MEI, ONI, DMI

Malaria	Kenya (36)	Tea Plantation (African Highland Produce and Brooke Bond Farms)	**2**	Cases	Rainfall at Chagaiket, Rainfall at Kaisugu, CRU Temperature	DMI, SOI, ONI, MEI
Malaria	Kenya (35)	Districts (Kapsabet and Kisii)	**2**	Cases	Rainfall	DMI, Nino3, SOI, MEI, ONI
Malaria	Ethiopia (18)	Country	**2 (***P. vivax and P. falciparum***)**	Incidence	Max Temperature, Min Temperature	DMI, SOI, MEI, ONI, Nino34

Global climatic indices used:

SOI: Southern Oscillation Index (78)
MEI: Multivariate ENSO Index (79)
ONI: Oceanic Niño Index: (79)
NINO*: Nino indices (80)
PDO: Pacific Decadal Oscillations (81)
DMI: Dipole Mode Index (26->82)
AMM: Atlantic Meridionial Mode (83)
NTA: North Tropical Atlantic Index (79)
Caribbean Index (79)
TNA: Tropical Northern Atlantic Index (84)
TSA: Tropical Southern Atlantic Index (85)
CRU: Climatic Research Unit (86)

Table S2: Different geographical areas used for Thailand

Province	Zone	Region	Province	Zone	Region	Province	Zone	Region
1: Amnat Charoen	Z10	North-Eastern	27: Nakhon Pathom	Z5	Central	52: Rayong	Z6	Central
2: Ang Thong	Z4	Central	28: Nakhon Phanom	Z8	North-Eastern	53: Roi Et	Z7	North-Eastern
3: Ayutthaya	Z4	Central	29: Nakhon Ratchasima	Z9	North-Eastern	54: Sa Kaeo	Z6	Central
4: Bangkok	Z0 : Bangkok	Central	30: Nakhon Sawan	Z3	Northern	55: Sakon Nakhon	Z8	North-Eastern
5: Buri Ram	Z9	North-Eastern	31: Nakhon Si Thammarat	Z11	Southern	56: Samut Prakan	Z6	Central
6: Chachoengsao	Z6	Central	32: Nan	Z1	Northern	57: Samut Sakhon	Z5	Central
7: Chai Nat	Z3	Northern	33: Narathiwat	Z12	Southern	58: Samut Songkhram	Z5	Central
8: Chaiyaphum	Z9	North-Eastern	34: Nong Bua Lamphu	Z8	North-Eastern	59: Saraburi	Z4	Central
9: Chanthaburi	Z6	Central	35: Nong Khai	Z8	North-Eastern	60: Satun	Z12	Southern
10: Chiang Mai	Z1	Northern	36: Nonthaburi	Z4	Central	61: Si Sa Ket	Z10	North-Eastern
11: Chiang Rai	Z1	Northern	37: Pathum Thani	Z4	Central	62: Sing Buri	Z4	Central
12: Chon Buri	Z6	Central	38: Pattani	Z12	Southern	63: Songkhla	Z12	Southern
13: Chumphon	Z11	Southern	39: Phang Nga	Z11	Southern	64: Sukhothai	Z2	Northern
14: Kalasin	Z7	North-Eastern	40: Phatthalung	Z12	Southern	65: Suphanburi	Z5	Central
15: Kamphaeng Phet	Z3	Northern	41: Phayao	Z1	Northern	66: Surat Thani	Z11	Southern
16: Kanchanaburi	Z5	Central	42: Phetchabun	Z2	Northern	67: Surin	Z9	North-Eastern
17: Khon Kaen	Z7	North-Eastern	43: Phetchaburi	Z5	Central	68: Tak	Z2	Northern
18: Krabi	Z11	Southern	44: Phichit	Z3	Northern	69: Trang	Z12	Southern
19: Lamphang	Z1	Northern	45: Phitsanulok	Z2	Northern	70: Trat	Z6	Central
20: Lamphun	Z1	Northern	46: Phrae	Z1	Northern	71: Ubon Ratchathani	Z10	North-Eastern
21: Loei	Z8	North-Eastern	47: Phuket	Z11	Southern	72: Udon Thani	Z8	North-Eastern
22: Lop Buri	Z4	Central	48: Prachin Buri	Z6	Central	73: Uthai Thani	Z3	Northern
23: Mae Hong Son	Z1	Northern	49: Prachuap Khiri Khan	Z5	Central	74: Uttaradit	Z2	Northern
24: Maha Sarakham	Z7	North-Eastern	50: Ranong	Z11	Southern	75: Yala	Z12	Southern
25: Mukdahan	Z10	North-Eastern	51: Ratchaburi	Z5	Central	76: Yasothon	Z10	North-Eastern
26: Nakhom Nayok	Z4	Central						

Table S3: Average percentage of variance in the 1 yr mode, 2-3 yr mode and 3-4 yr mode, for the different geographical areas used in the analyses of the Thailand dataset.

Areas	% of Variance in the: 1 yr; 2-3 yr; 3-4 yr bands	Areas	% of Variance in the: 1 yr; 2-3 yr; 3-4 yr bands	Areas	% of Variance in the: 1 yr; 2-3 yr; 3-4 yr bands
Whole Thailand	55.48; 14.27; 7.76	15: Kamphaeng Phet	45.77; 14.08; 11.30	46: Phrae	58.31; 7.91; 5.167
Northern	57.45; 13.72; 8.34	16: Kanchanaburi	33.36; 22.93; 16.88	47: Phuket	27.71; 19.00; 9.38
Central	44.35; 19.10; 10.63	17: Khon Kaen	50.61; 11.32; 8.33	48: Prachin Buri	60.14; 12.73; 6.85
North-Eastern	60.83; 10.29; 5.78	18: Krabi	39.55; 22.10; 11.72	49: Prachuap Khiri Khan	42.27; 20.16; 7.13
Southern	36.36; 22.44; 12.51	19: Lamphang	59.30; 11.02; 4.80	50: Ranong	47.22; 14.33; 5.97
Zone 1	34.68; 20.61; 11.57	20: Lamphun	50.84; 13.35; 8.72	51: Ratchaburi	45.16; 16.84; 11.05
Zone 2	64.38; 8.06; 5.73	21: Loei	55.03; 11.02; 10.11	52: Rayong	46.07; 19.38; 9.77
Zone 3	56.05; 15.96; 8.24	22: Lop Buri	38.73; 19.86; 14.65	53: Roi Et	58.58; 11.00; 4.36
Zone 4	38.90; 17.86; 14.32	23: Mae Hong Son	54.42; 8.01; 6.94	54: Sa Kaeo	38.64; 10.44; 15.36
Zone 5	44.80; 18.30; 10.31	24: Maha Sarakham	49.98; 11.93; 6.71	55: Sakon Nakhon	56.48; 10.97; 7.32
Zone 6	41.79; 16.66; 14.72	25: Mukdahan	55.11; 11.44; 8.34	56: Samut Prakan	26.25; 22.36; 12.97
Zone 7	51.60; 18.21; 8.63	26: Nakhom Nayok	57.49; 12.33; 5.95	57: Samut Sakhon	27.32; 14.58; 17.15
Zone 8	55.75; 10.55; 6.28	27: Nakhon Pathom	41.96; 16.35; 9.28	58: Samut Songkhram	27.78; 16.34; 15.74
Zone 9	59.49; 10.37; 8.54	28: Nakhon Phanom	54.54; 11.23; 8.15	59: Saraburi	51.14; 15.73; 8.36
Zone 10	57.03; 12.55; 5.93	29: Nakhon Ratchasima	52.21; 15.11; 7.24	60: Satun	24.37; 24.56; 15.58
Zone 11	65.63; 9.73; 3.62	30: Nakhon Sawan	35.51; 19.93; 14.20	61: Si Sa Ket	63.83; 10.85; 3.66
Zone 12	40.15; 23.51; 11.59	31: Nakhon Si Thammarat	28.16; 27.10; 14.14	62: Sing Buri	28.48; 24.22; 12.78
1: Amnat Charoen	42.71; 9.23; 7.72	32: Nan	60.94; 8.50; 4.64	63: Songkhla	24.05; 24.50; 14.68
2: Ang Thong	30.97; 19.94; 13.59	33: Narathiwat	34.32; 12.86; 7.96	64: Sukhothai	43.75; 16.80; 9.54
3: Ayutthaya	41.92; 17.89; 8.55	34: Nong Bua Lamphu	34.66; 10.92; 13.77	65: Suphanburi	25.61; 16.20; 17.44
4: Bangkok (Zone 0)	34.68; 20.61; 11.57	35: Nong Khai	61.70; 10.38; 6.28	66: Surat Thani	39.07; 22.83; 10.88
5: Buri Ram	54.09; 14.21; 5.24	36: Nonthaburi	34.69; 20.91; 11.38	67: Surin	60.00; 11.12; 5.02
6: Chachoengsao	58.53; 10.23; 7.06	37: Pathum Thani	39.56; 20.05; 9.60	68: Tak	59.44; 12.91; 6.25
7: Chai Nat	24.51; 25.91; 15.86	38: Pattani	24.28; 16.50; 15.74	69: Trang	37.07; 18.40; 14.55
8: Chaiyaphum	52.69; 9.57; 7.20	39: Phang Nga	43.68; 16.04; 7.94	70: Trat	50.08; 16.29; 7.02
9: Chanthaburi	57.60; 12.63; 7.35	40: Phatthalung	28.84; 21.74; 14.41	71: Ubon Ratchathani	61.83; 10.39; 4.22
10: Chiang Mai	58.61; 9.52; 6.83	41: Phayao	60.58; 9.63; 5.04	72: Udon Thani	52.39; 12.40; 8.75
11: Chiang Rai	60.64; 9.15; 5.15	42: Phetchabun	57.31; 14.60; 7.14	73: Uthai Thani	32.29; 22.25; 15.09
12: Chon Buri	38.36; 22.03; 9.43	43: Phetchaburi	42.74; 14.05; 15.37	74: Uttaradit	43.55; 15.52; 9.04
13: Chumphon	47.89; 15.15; 6.99	44: Phichit	36.46; 17.47; 11.52	75: Yala	26.94; 18.45; 15.06
14: Kalasin	51.34; 12.67; 7.22	45: Phitsanulok	43.71; 17.79; 11.65	76: Yasothon	63.92; 10.04; 3.58

Supplementary Figures

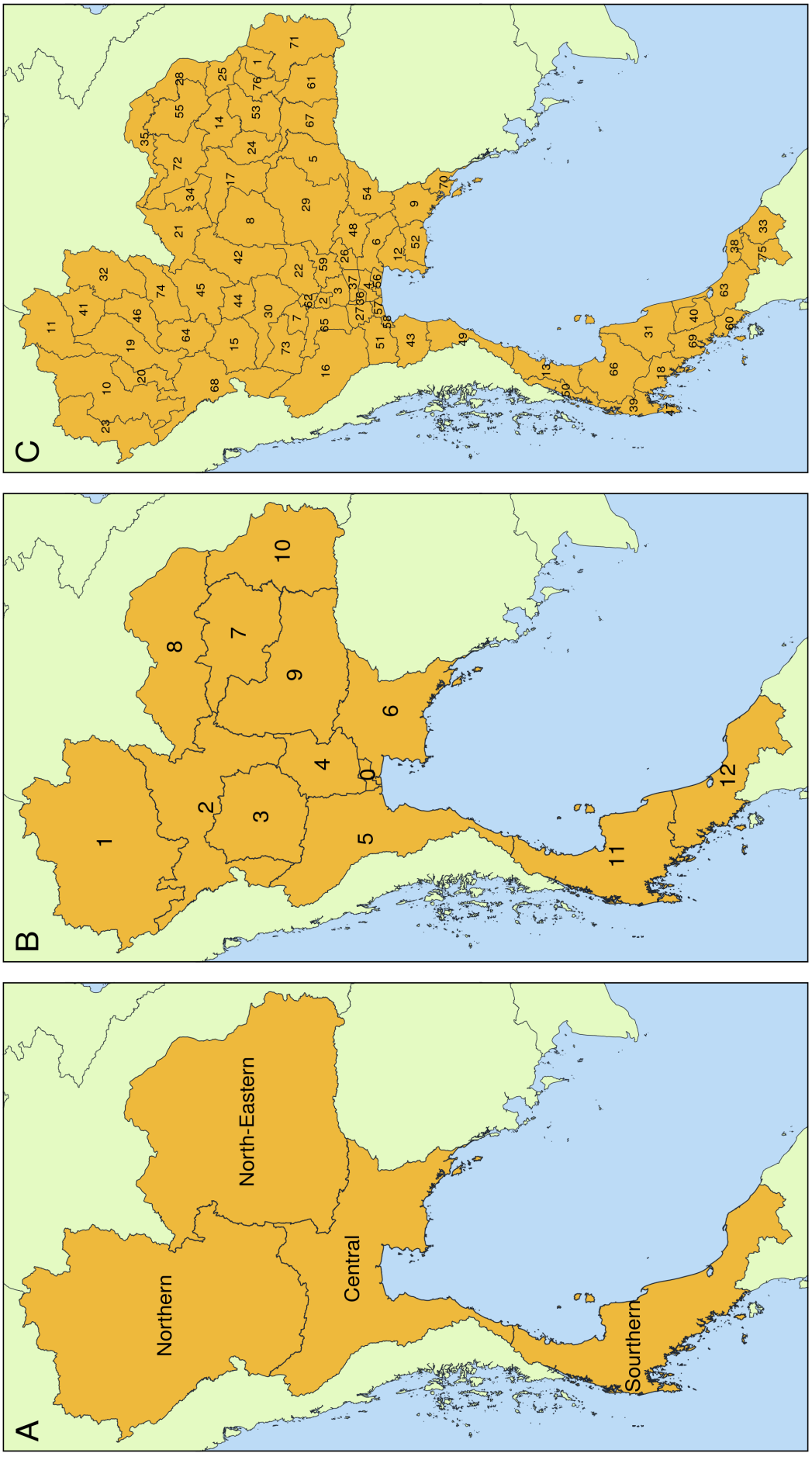

FIGURE S1 – Map of Thailand with the different geographical scales used for the analyses : A/ The four political regions ; B/ The twelve geographical zones used by The Ministry of Public Health ; C/ The 76 provinces (see Table S2 for the province names).

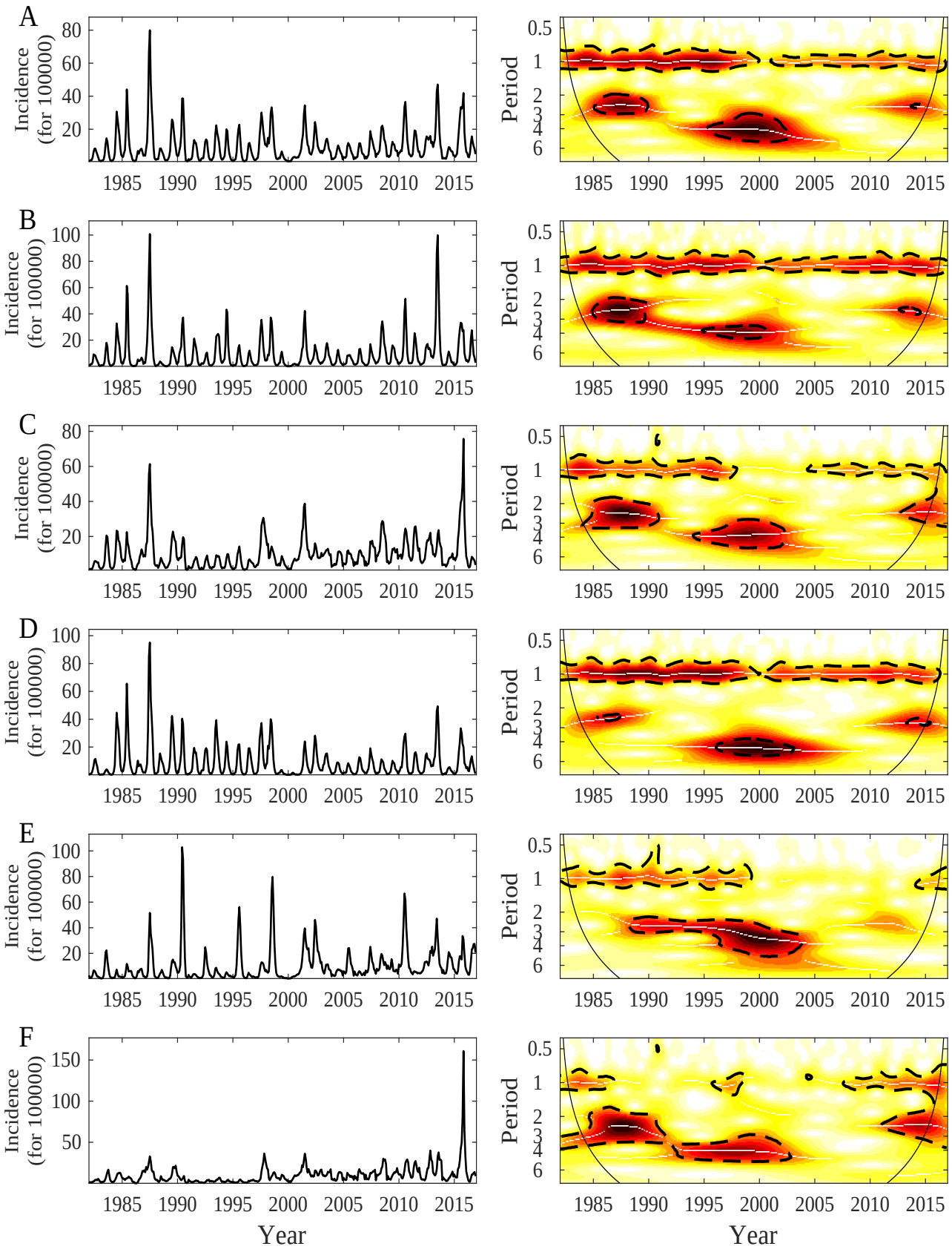

FIGURE S2 – Time series and Wavelet Power Spectra for dengue in Thailand at different geographical scales (Table S2) : A/ Whole Thailand ; B/ Northern Thailand ; C/ Central Thailand ; D/ North-Eastern Thailand ; E/ Southern Thailand ; F/ Bangkok or Zone 0. The left panels show the time series and the right panels show WPS. The color code for power values (variance) is from white (low power values) to dark red (high power values). The dot-black lines indicate the 95% and the 90% significance levels computed based on bootstrapped series that used a Markov model (62). For all the graphs the thin black line is the cone of influence delimiting regions with possible edge effect. We have used reported cases for DF (Dengue Fever), DHF (Dengue Hemorragic Fever) and DSS (Dengue Shock Syndrome), then we have added these cases before calculating incidence.

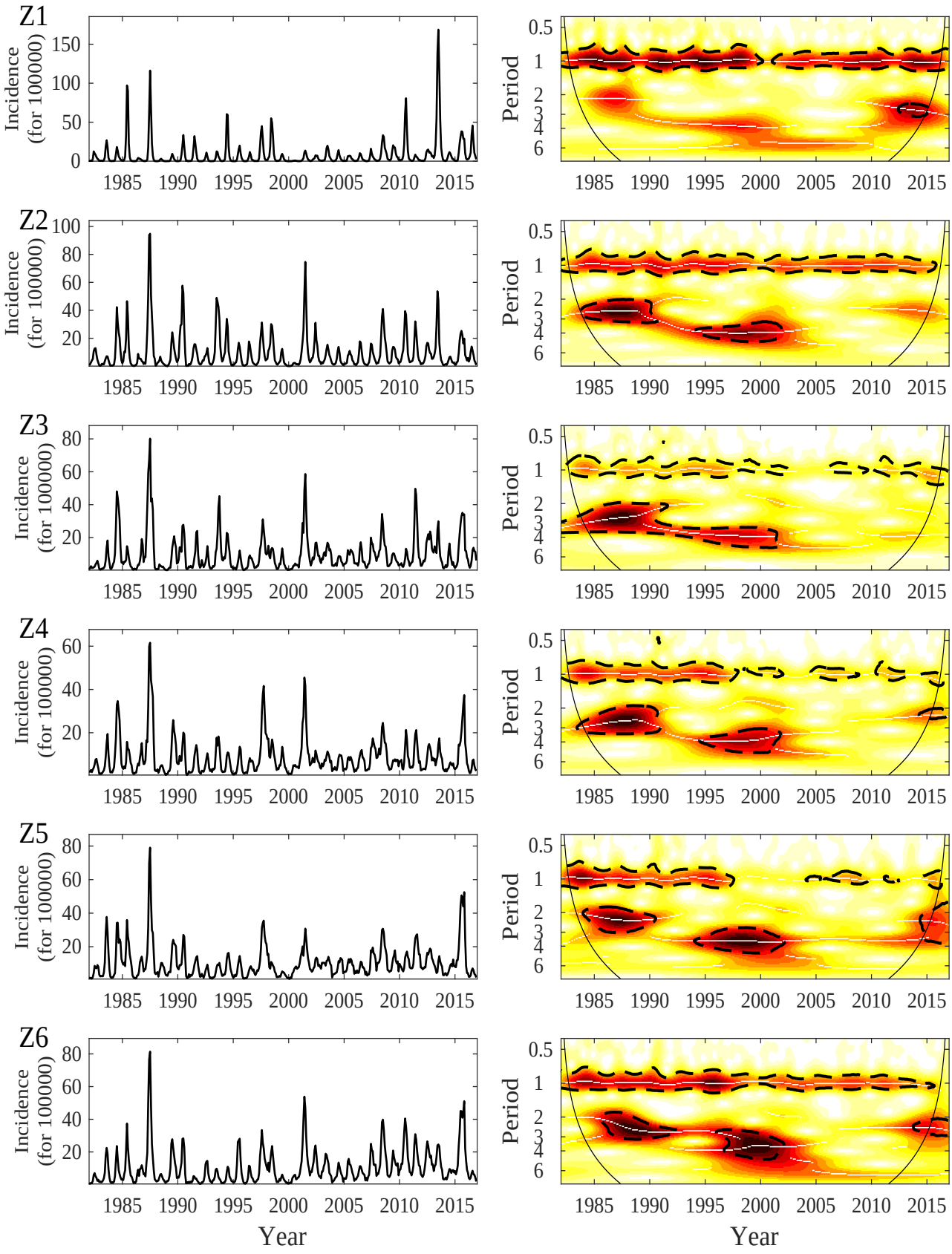

FIGURE S3 – Time series and Wavelet Power Spectra for dengue in Thailand for the twelve geographical zones indicated by the panel title Z#i (Table S2). The left panels show the time series and the right panels show WPS. The color code for power values (variance) is from white (low power values) to dark red (high power values). The dot-black lines indicate the 95% and the 90% significance levels computed based on bootstrapped series that used a Markov model (62). For all the graphs the thin black line is the cone of influence delimiting regions with possible edge effect. We have used reported cases for DF (Dengue Fever), DHF (Dengue Hemorragic Fever) and DSS (Dengue Shock Syndrome), then we have added these cases before calculating incidence.

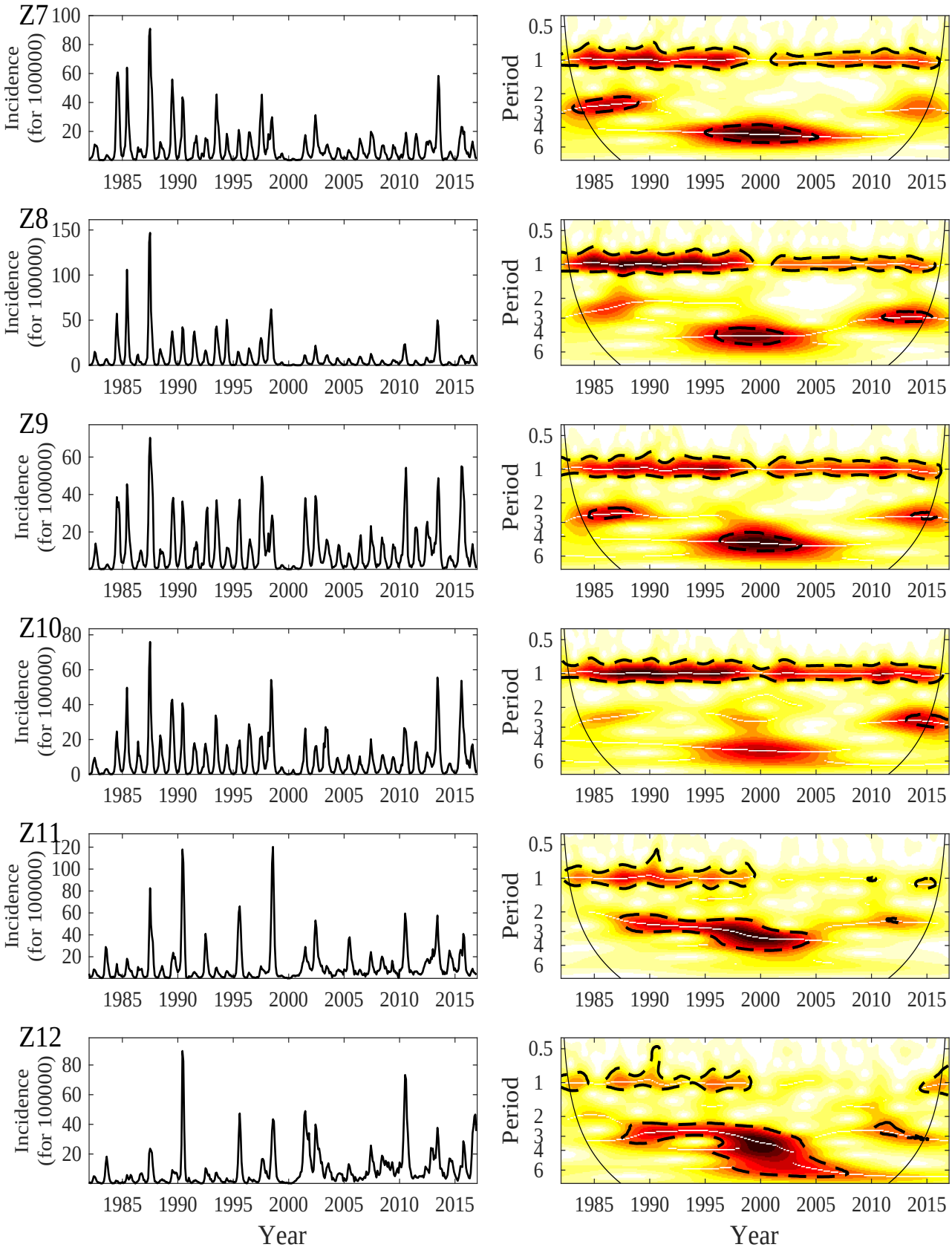

FIGURE S3 – (continued).

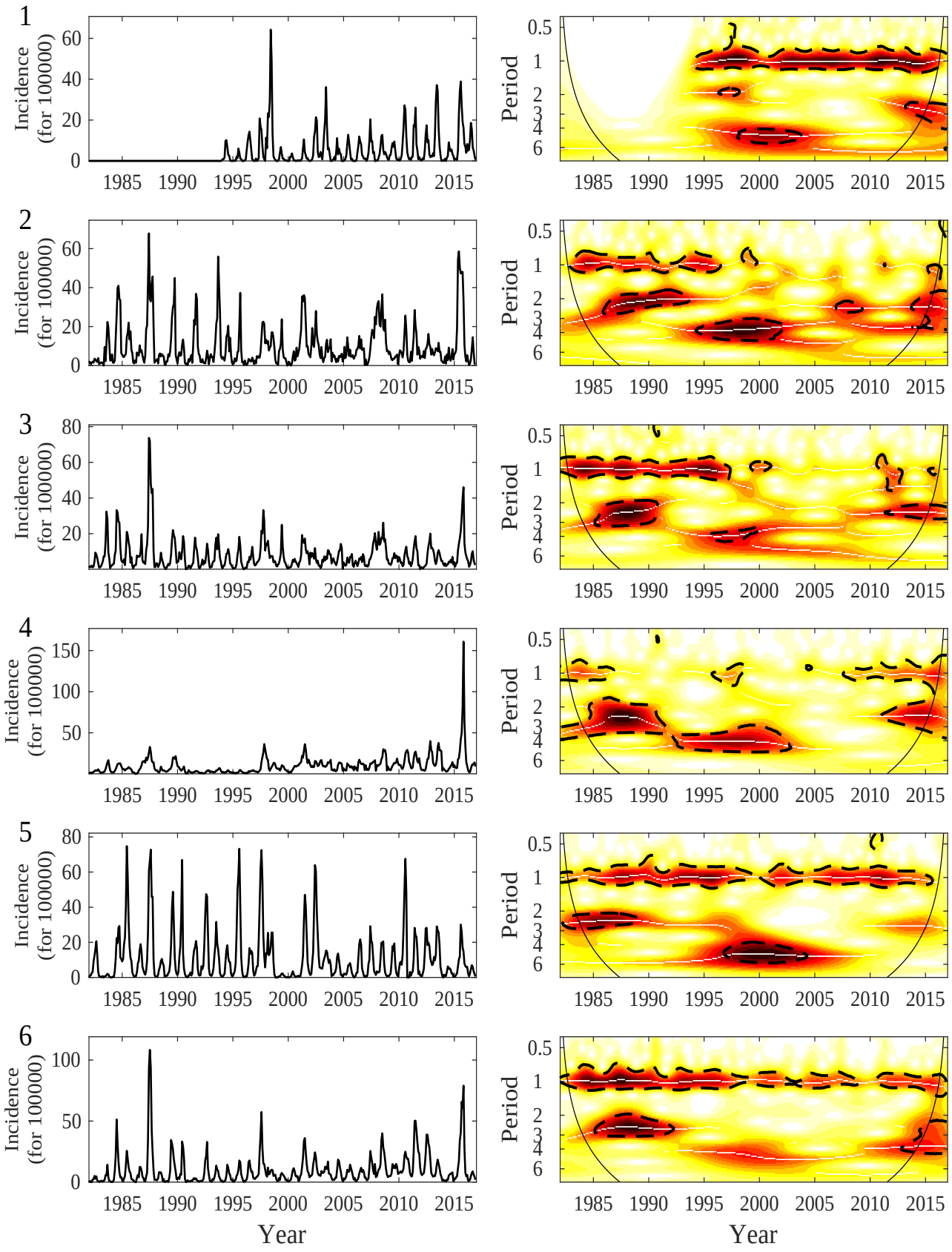

FIGURE S4 – Time series and Wavelet Power Spectra for dengue in Thailand for the 76 provinces indicated by the panel title #i (Table S2). The left panels show the time series and the right panels show WPS. The color code for power values (variance) is from white (low power values) to dark red (high power values). The dot-black lines indicate the 95% and the 90% significance levels computed based on bootstrapped series that used a Markov model (62). For all the graphs the thin black line is the cone of influence delimiting regions with possible edge effect. We have used reported cases for DF (Dengue Fever), DHF (Dengue Hemorragic Fever) and DSS (Dengue Shock Syndrome), then we have added these cases before calculating incidence.

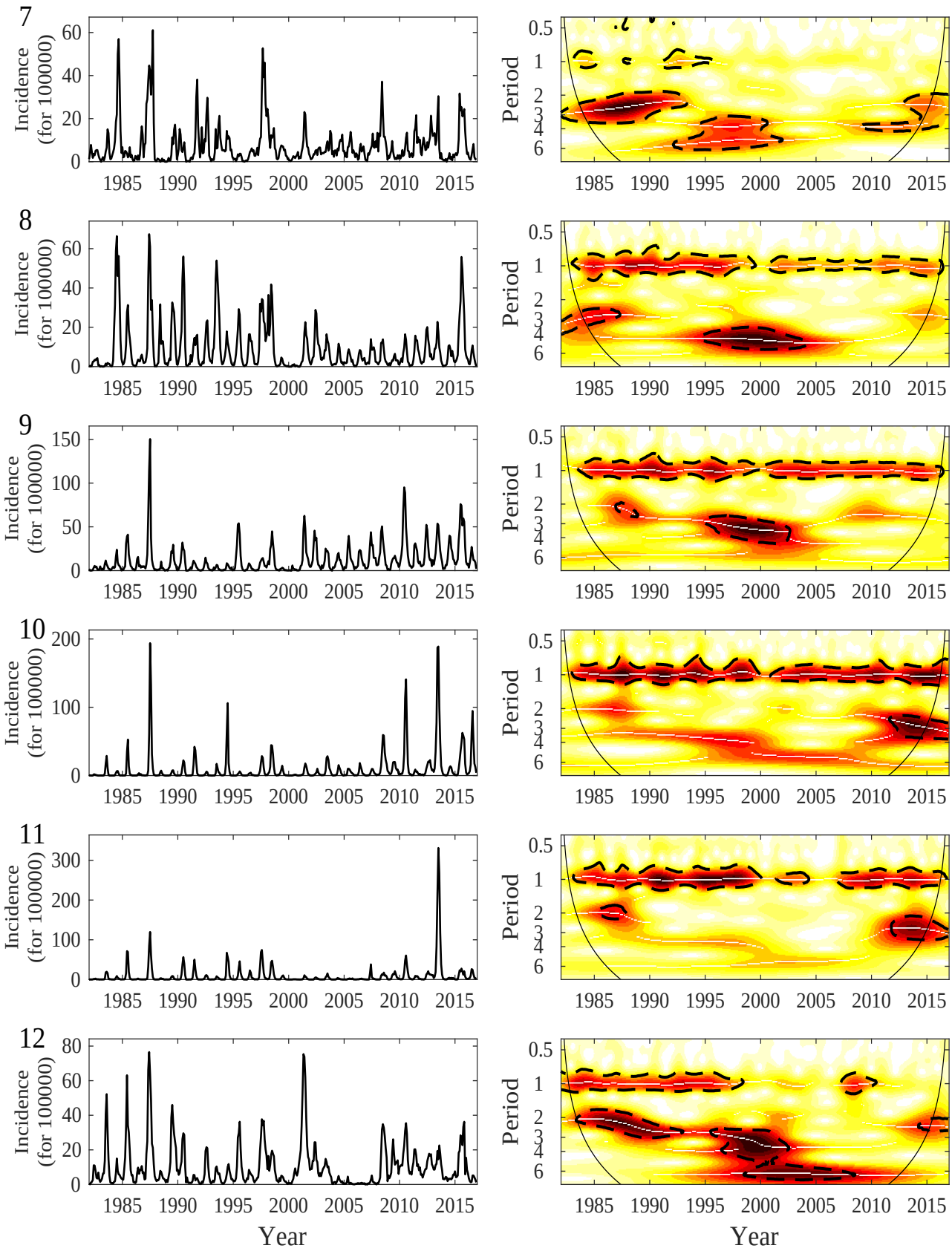

FIGURE S4 – (continued).

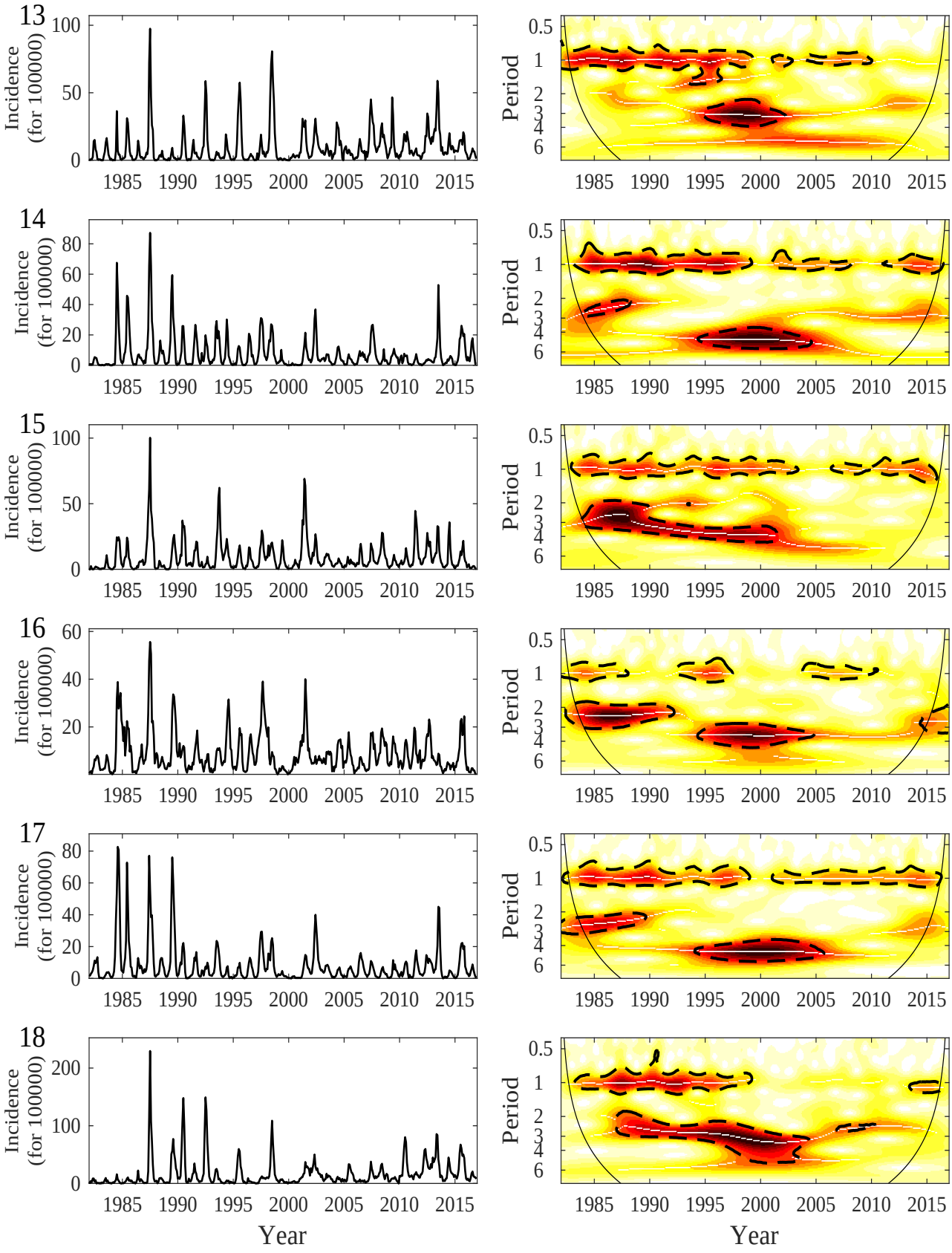

FIGURE S4 – (continued).

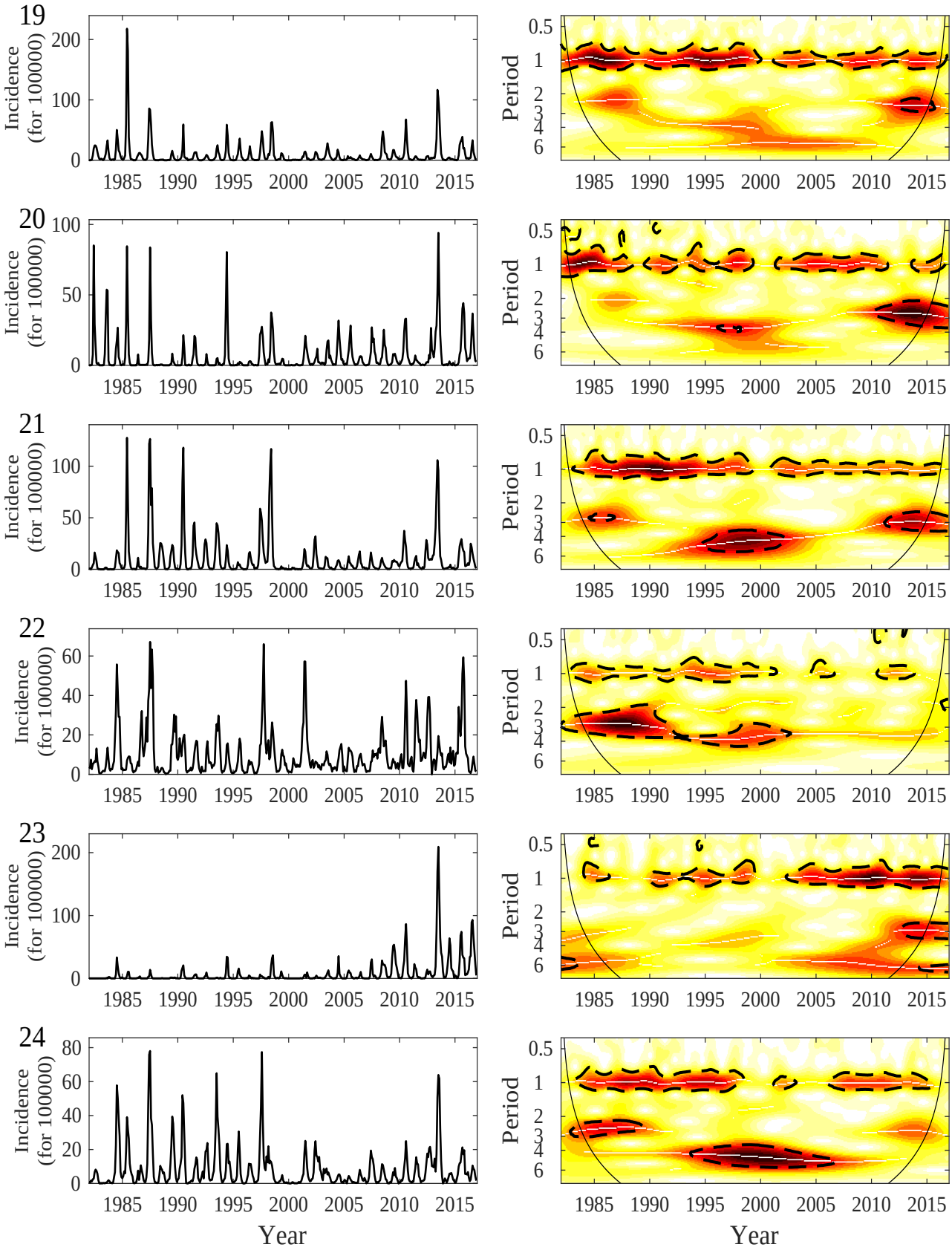

FIGURE S4 – (continued).

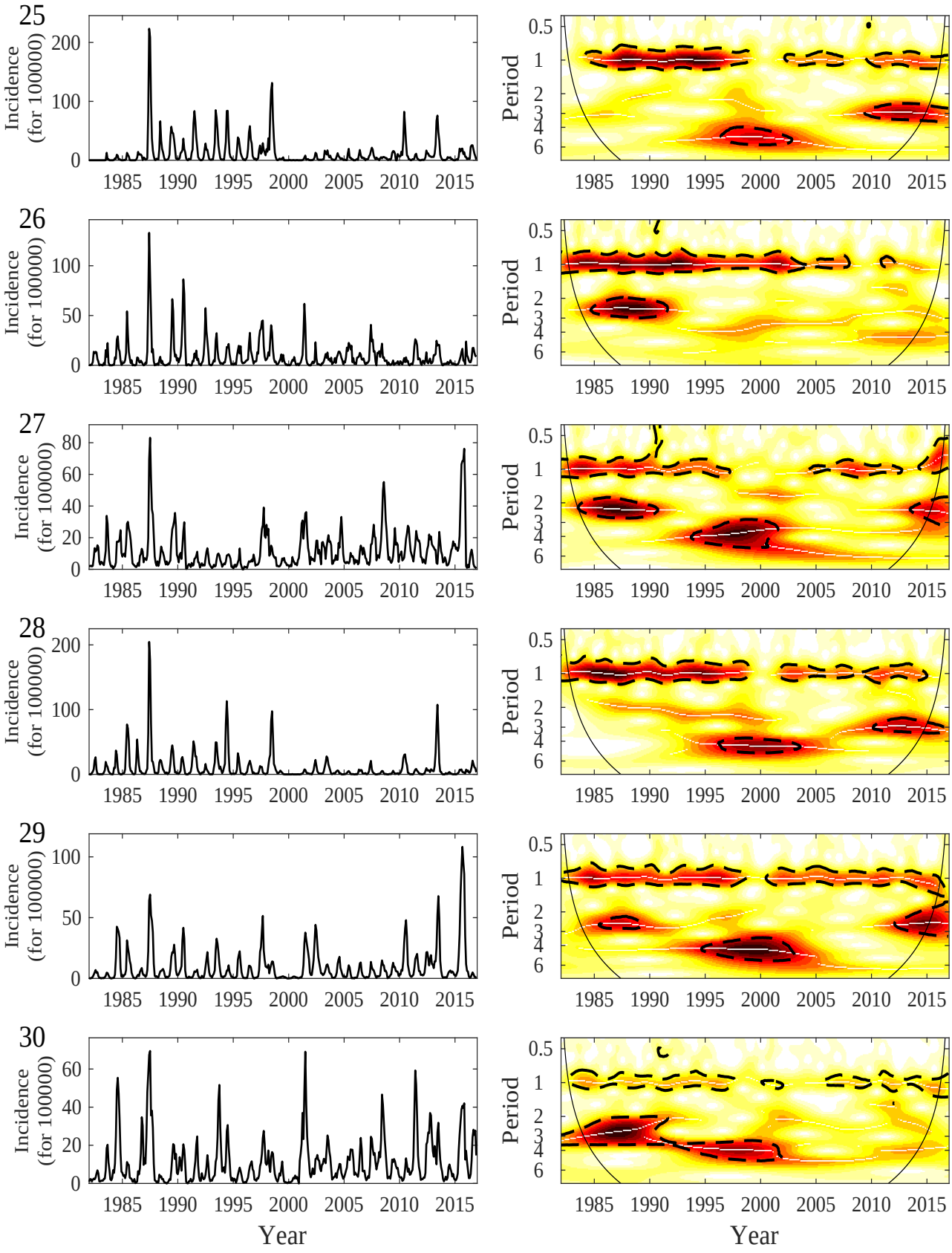

FIGURE S4 – (continued).

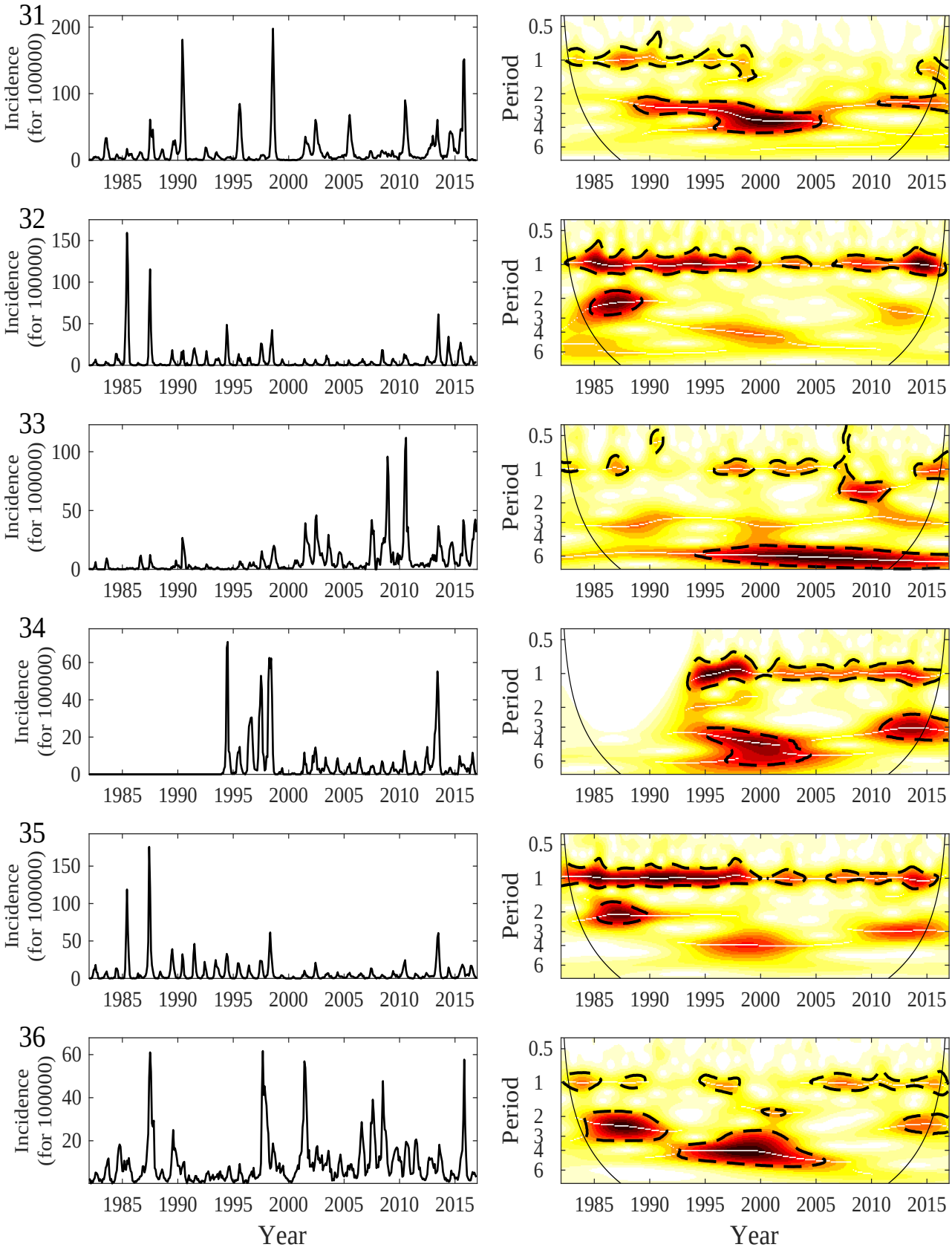

FIGURE S4 – (continued).

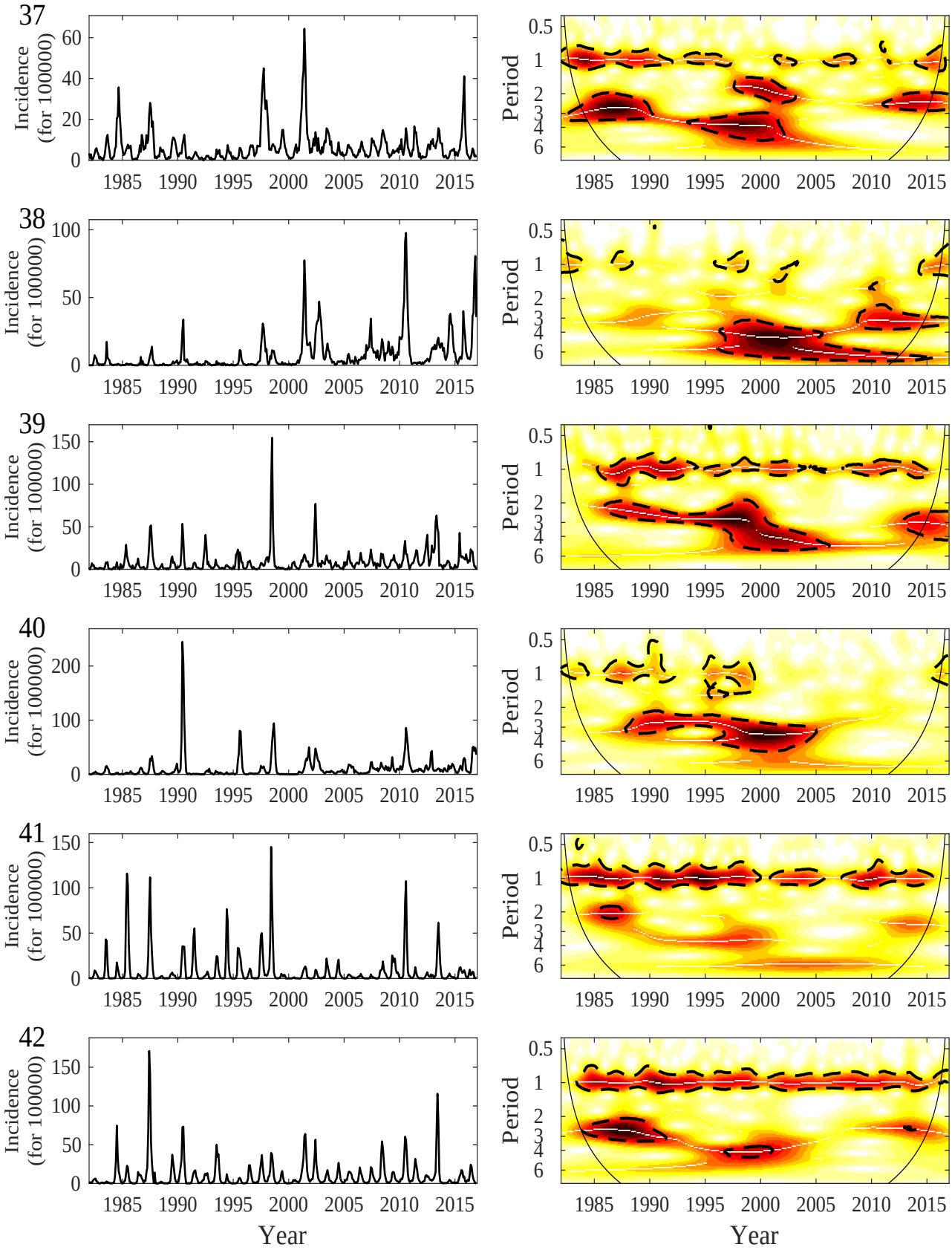

FIGURE S4 – (continued).

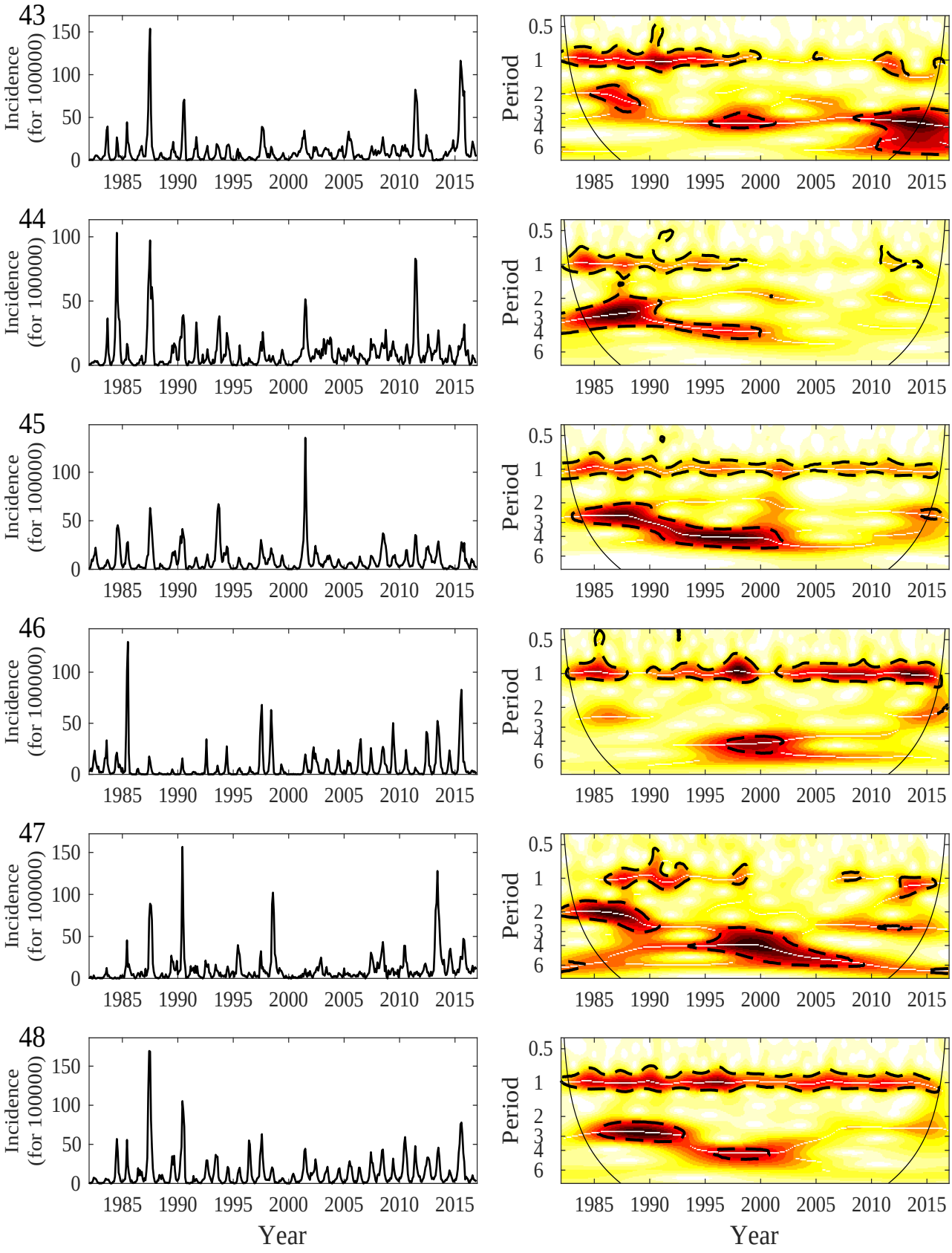

FIGURE S4 – (continued).

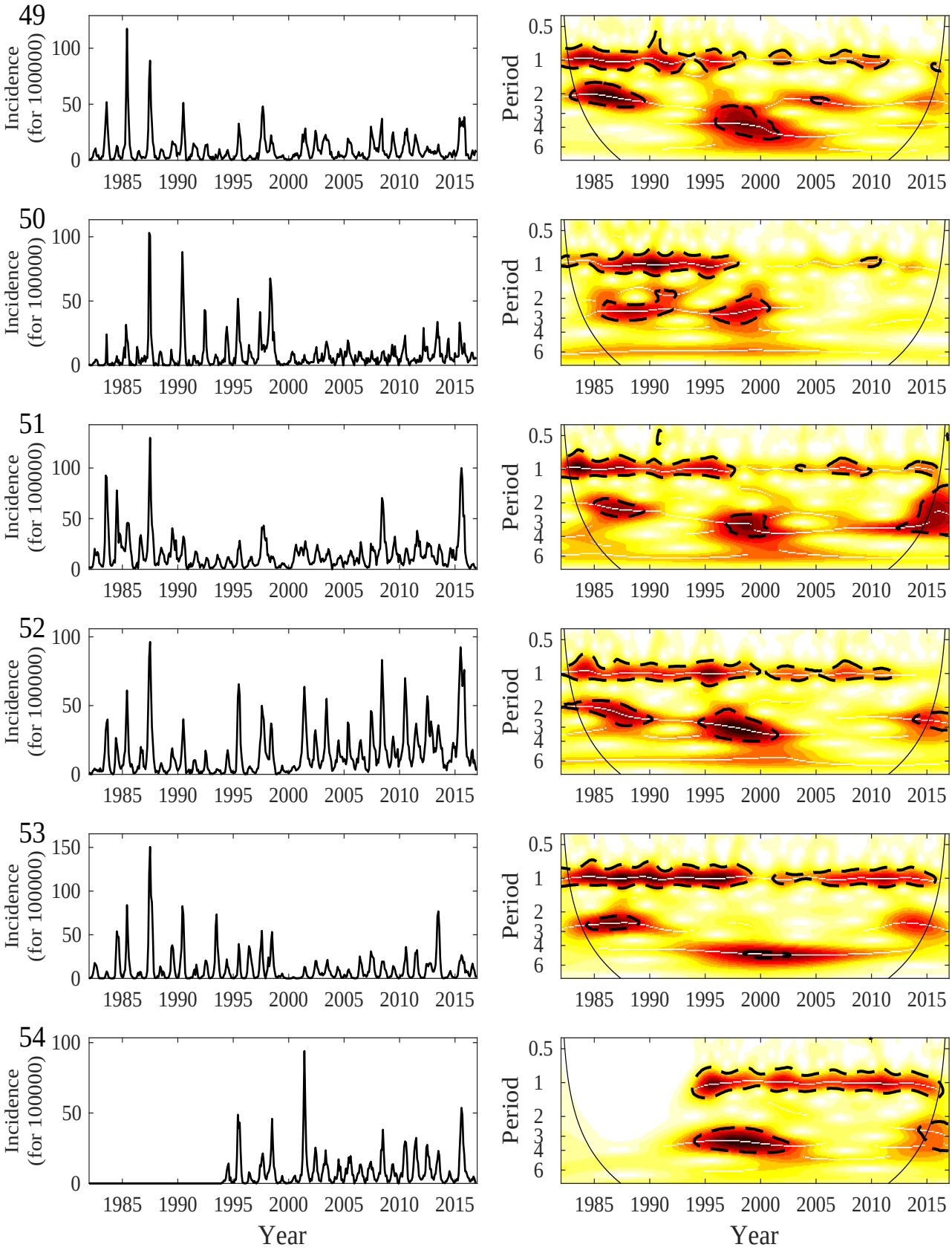

FIGURE S4 – (continued).

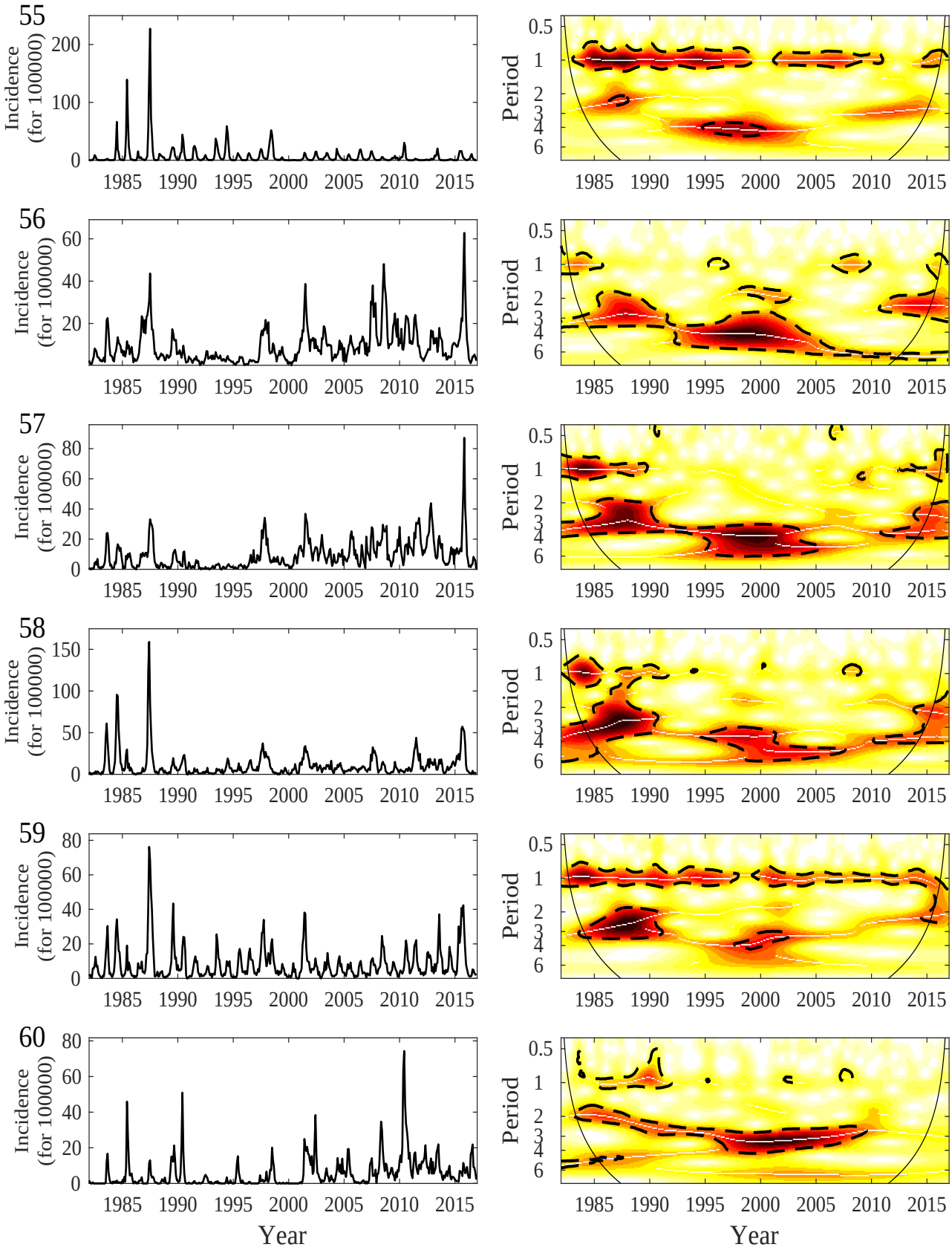

FIGURE S4 – (continued).

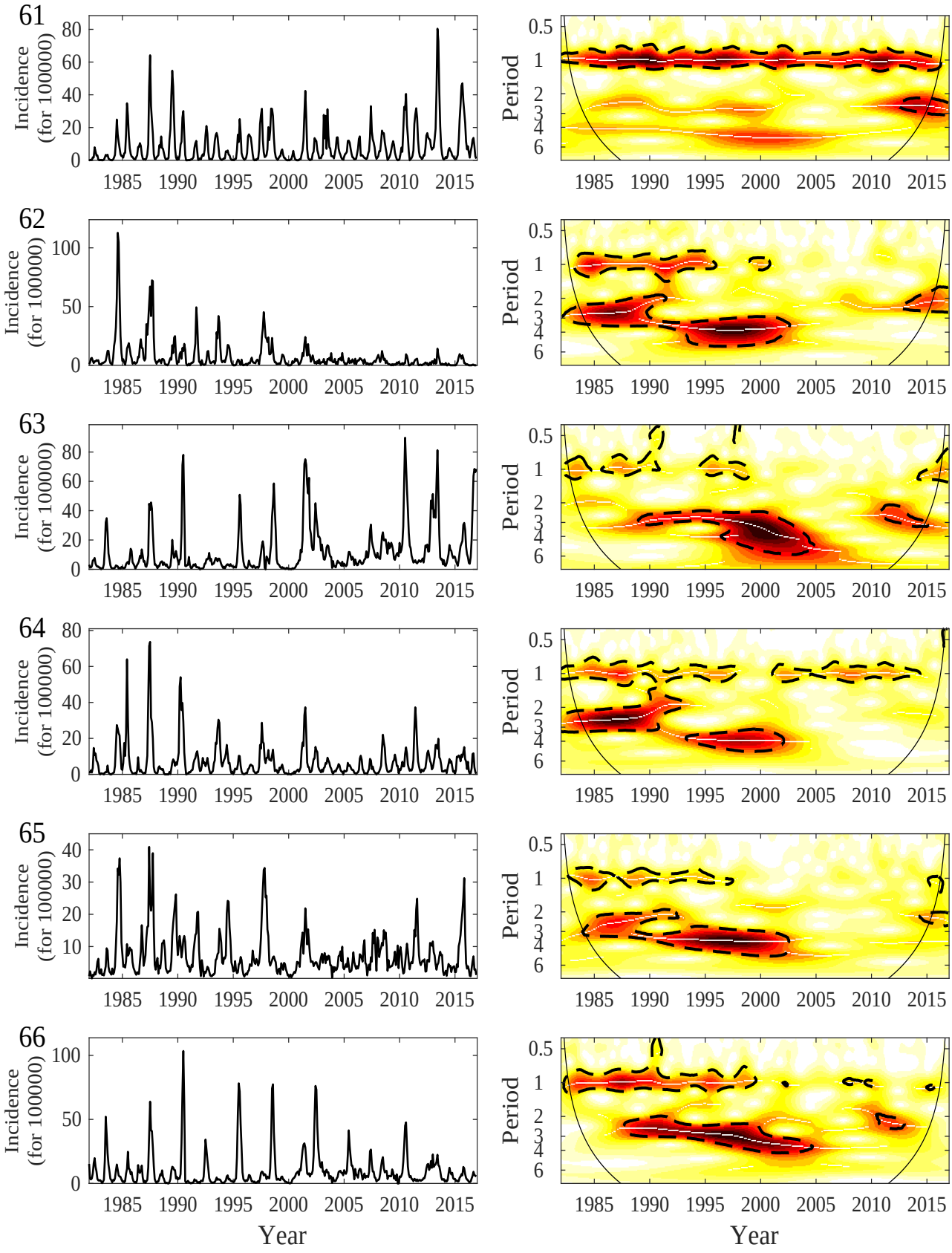

FIGURE S4 – (continued).

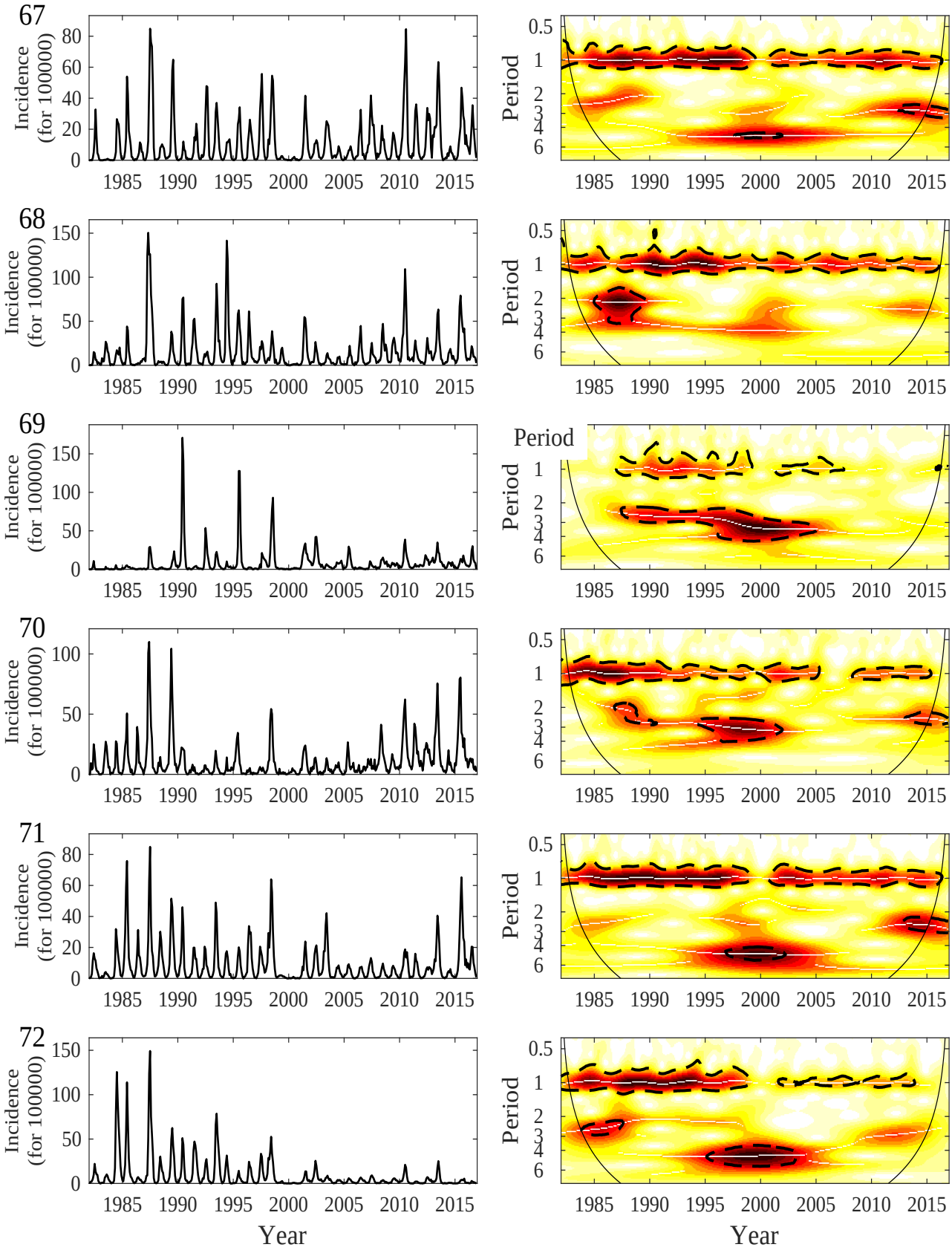

FIGURE S4 – (continued).

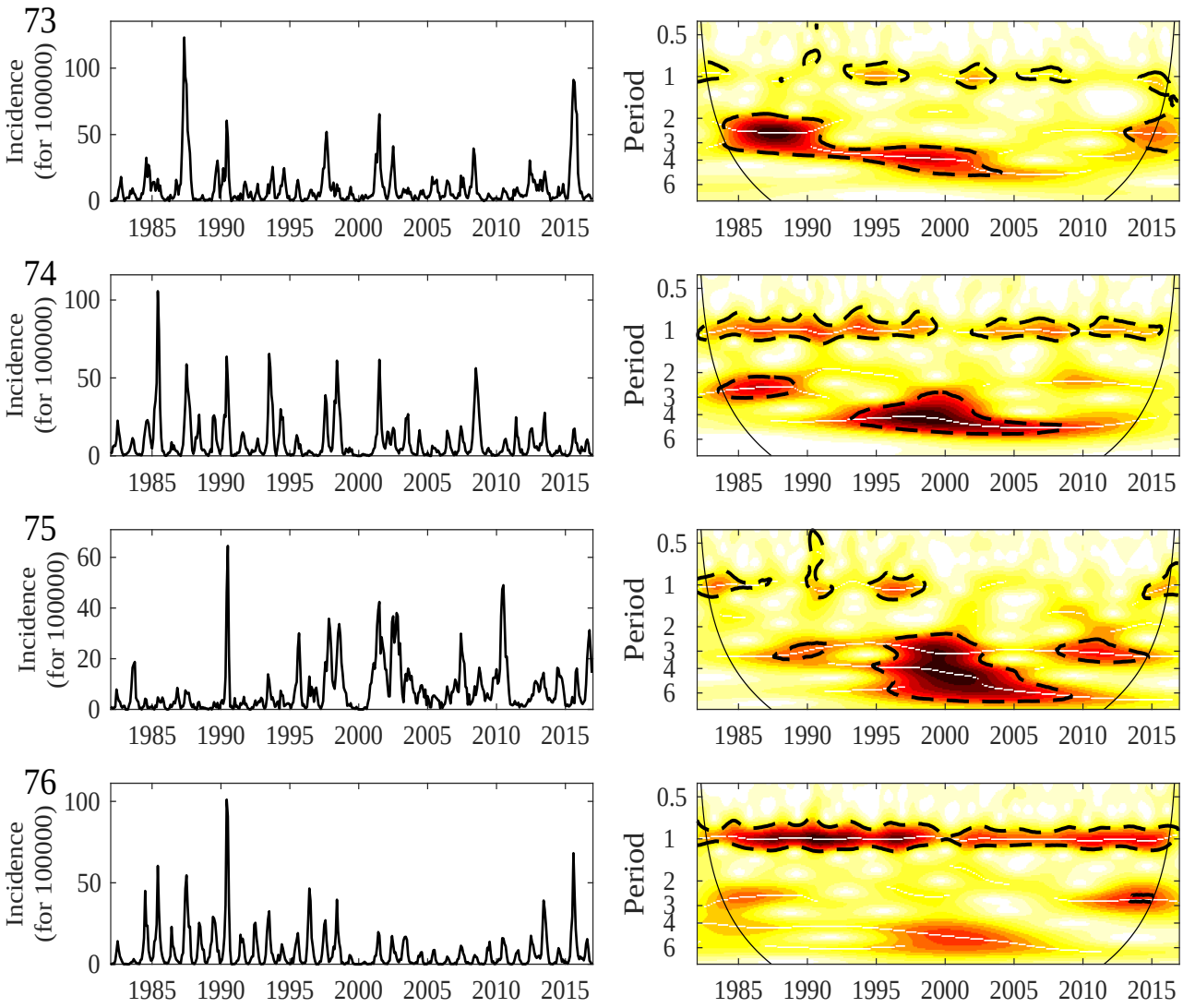

FIGURE S4 – (continued).

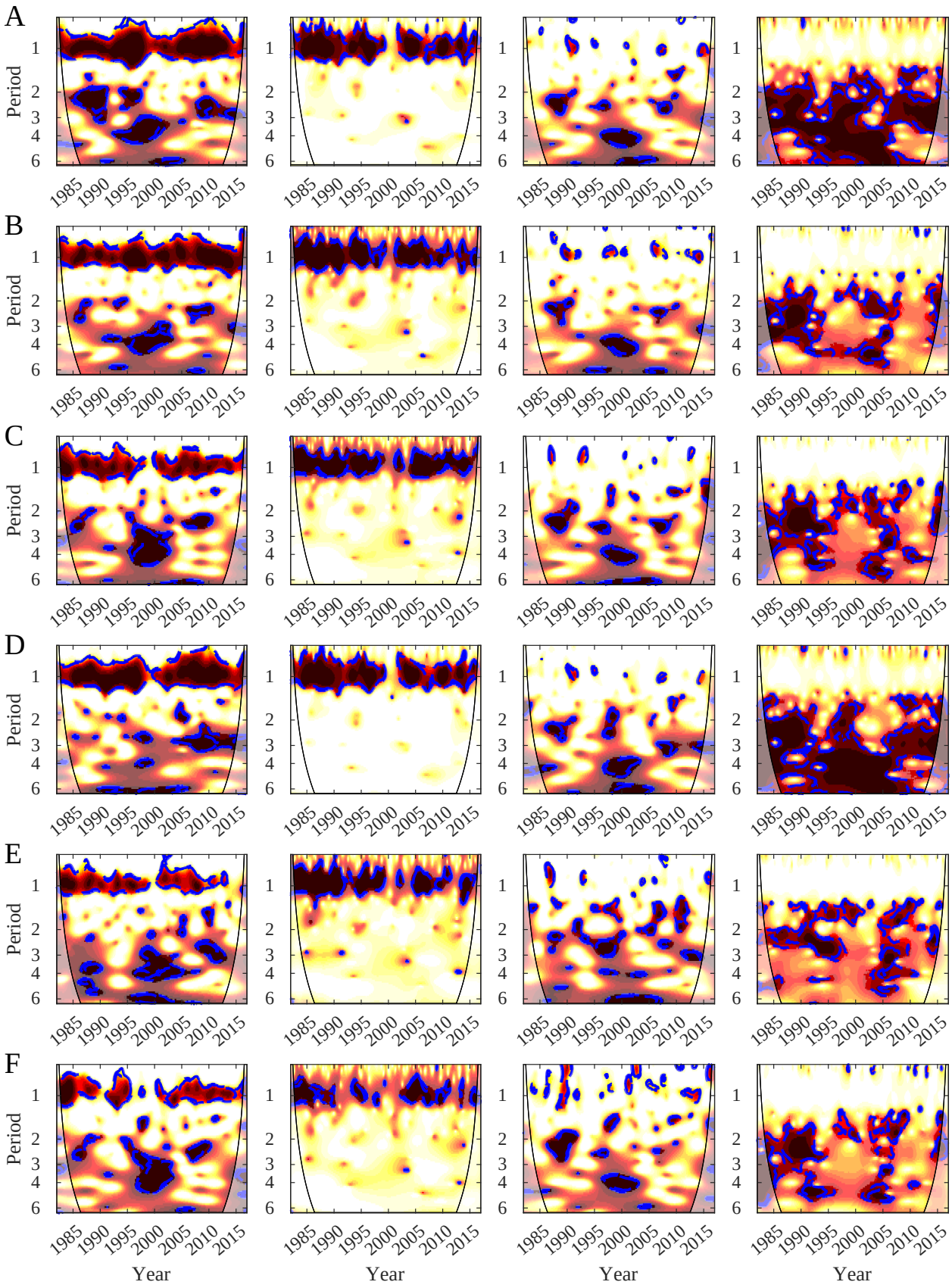

FIGURE S5 – Wavelet Coherence and Partial Wavelet Coherence between dengue in Thailand and local climate or global climate. The first column is the WC between incidence (or cases) and a local climatic variable. The second the PWC between incidence (or cases) and a local climatic variable. The third and fourth columns are WC and PWC respectively, but for global climatic variables. For the coherence, the colors are coded from white (no coherence) to yellow (low coherence) and to dark red (high coherence). The dotted-dashed blue lines show the 95% and the 90% significance levels computed based on bootstrapped series that used a Markov model (62). For all the graphs the thin black line is the cone of influence delimiting regions with possible edge effect. A/ Whole Thailand for rainfall and SOI. B/ Northern Thailand for maximum temperature and MEI. C/ Central Thailand for mean temperature and ONI. D/ North-Eastern Thailand for minimum temperature and ONI. E/ Southern Thailand for rainfall and SOI. F/ Bangkok for minimum temperature and MEI.

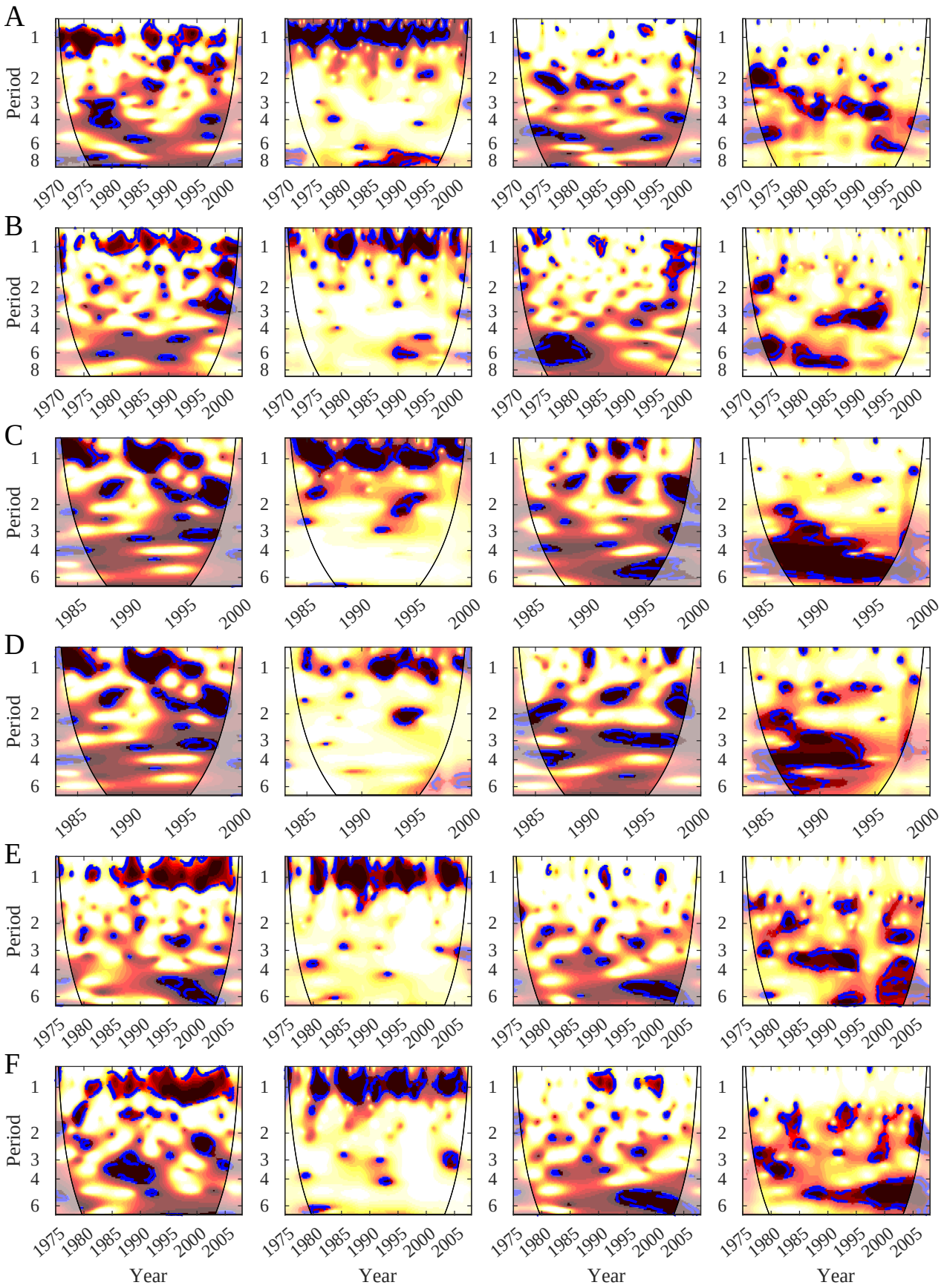

FIGURE S6 – Wavelet Coherence and Partial Wavelet Coherence between dengue for malaria in Kenya (19,20) and Ethiopia (21), and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Tea Plantation (African Highland Produce) for rainfall at Kaisugu and ONI. B/ Tea Plantation (Brooke Bond Farms) for rainfall at Kaisugu and DMI. C/ Kapsabet district for rainfall and Nino3. D/ Kisii district for rainfall and DMI. E/ Ethiopia (*P. falciparum*), for minimum temperature and SOI. F/ Ethiopia (*P. falciparum*), for maximum temperature and MEI.

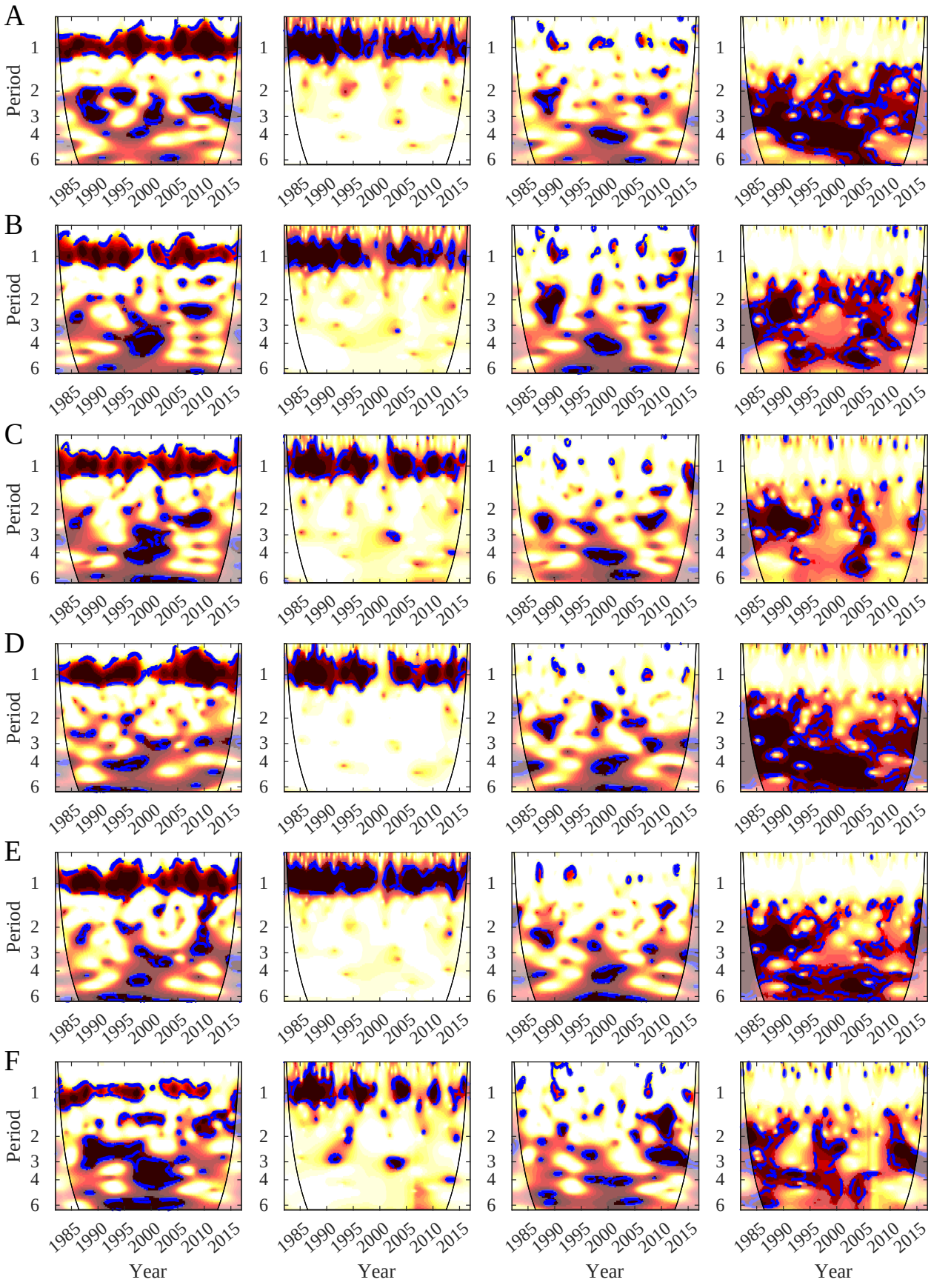

FIGURE S7 – Wavelet Coherence and Partial Wavelet Coherence between dengue for Thailand geographical zones and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Zone 2 for rainfall and MEI. B/ Zone 4 for mean temperature and MEI. C/ Zone 6 for mean temperature and SOI. D/ Zone 7 for rainfall and SOI. E/ Zone 9 for rainfall and ONI. F/ Zone 12 for minimum temperature and SOI.

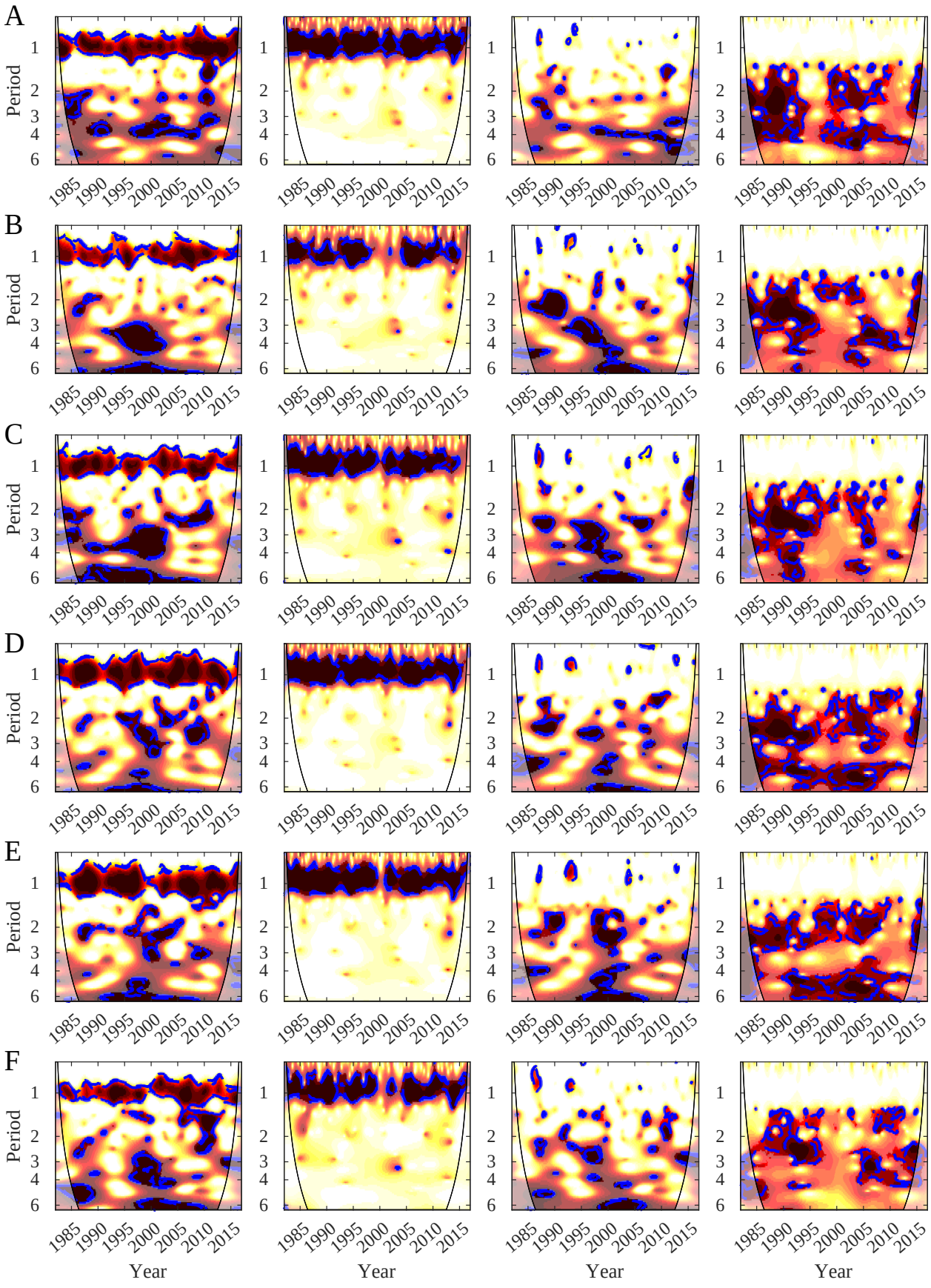

FIGURE S8 – Wavelet Coherence and Partial Wavelet Coherence between dengue for Thailand provinces and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Tak for mean temperature and ONI. B/ Kanchanaburi for mean temperature and ONI. C/ Rayong for mean temperature and ONI. D/ Si Sa Ket for mean temperature and ONI. E/ Ubon Ratchathani for mean temperature and ONI. F/ Trang for mean temperature and ONI.

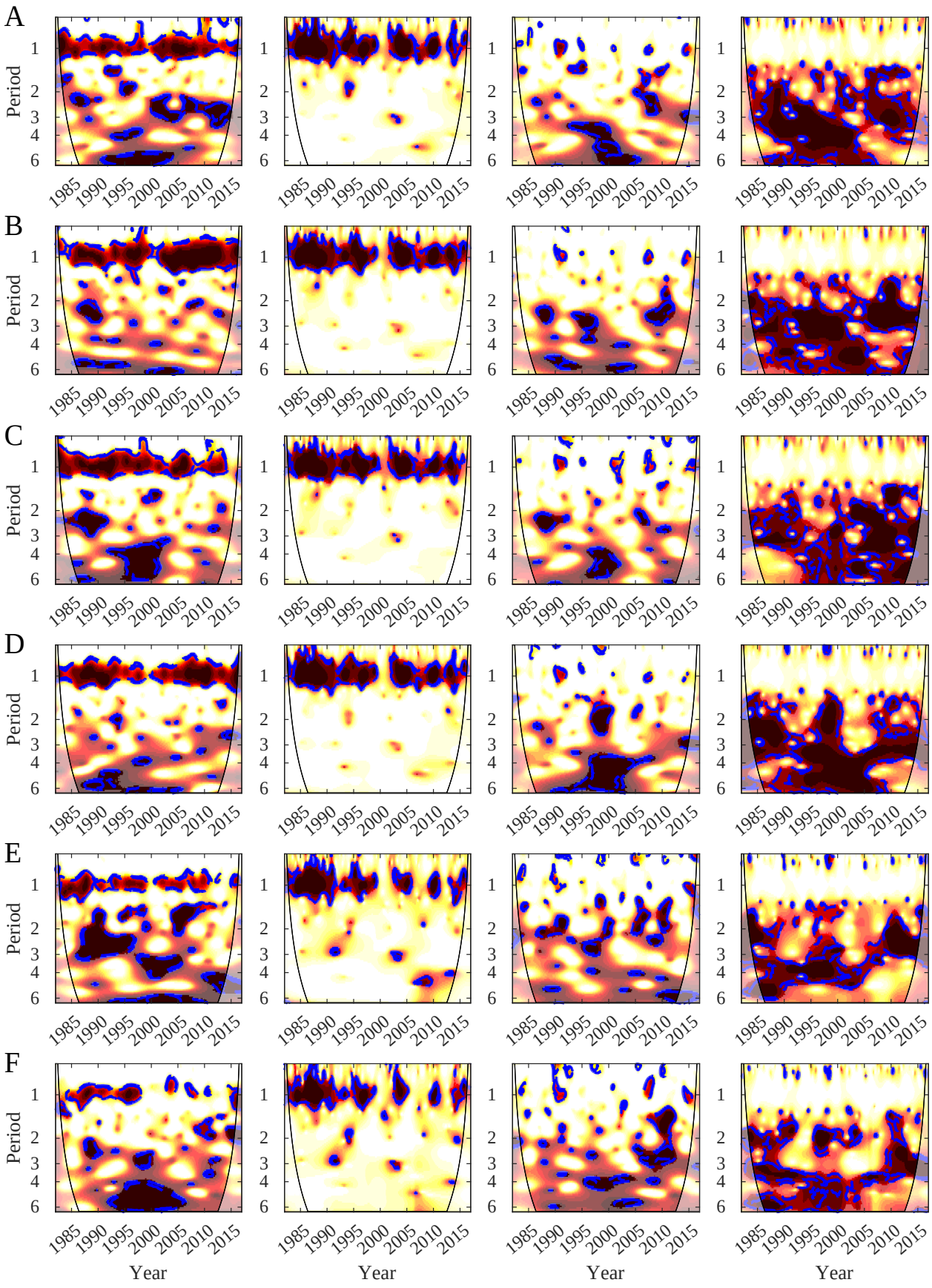

FIGURE S9 – Wavelet Coherence and Partial Wavelet Coherence between dengue for Thailand provinces and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Lamphun for rainfall and SOI. B/ Chanthaburi for rainfall and ONI. C/ Nakhom Nayok for rainfall and ONI. D/ Loei for rainfall and SOI. E/ Nakhon Si Thammarat for rainfall and ONI. F/ Pattani for rainfall and SOI.

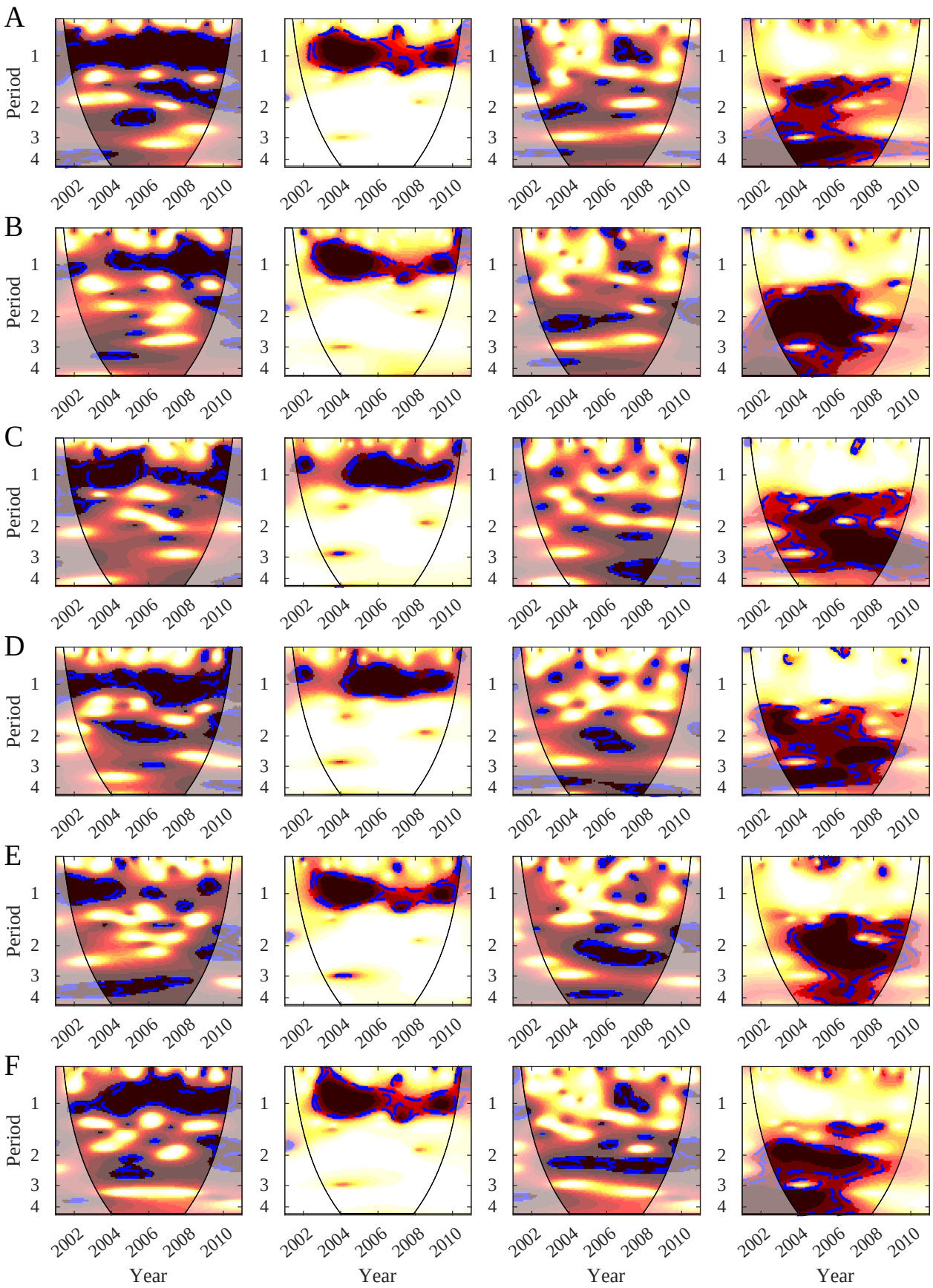

FIGURE S10 – Wavelet Coherence and Partial Wavelet Coherence between dengue for Southern Vietnam provinces (2) and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Southern Vietnam for rainfall and SOI. B/ Tay Ninh province for maximum temperature and MEI. C/ An Giang province for mean temperature and ONI. D/ Ba Ria Vung Tau province for rainfall and SOI. E/ Lam Dong province for minimum temperature and ONI. F/ Ho Chi Minh province for minimum temperature and MEI.

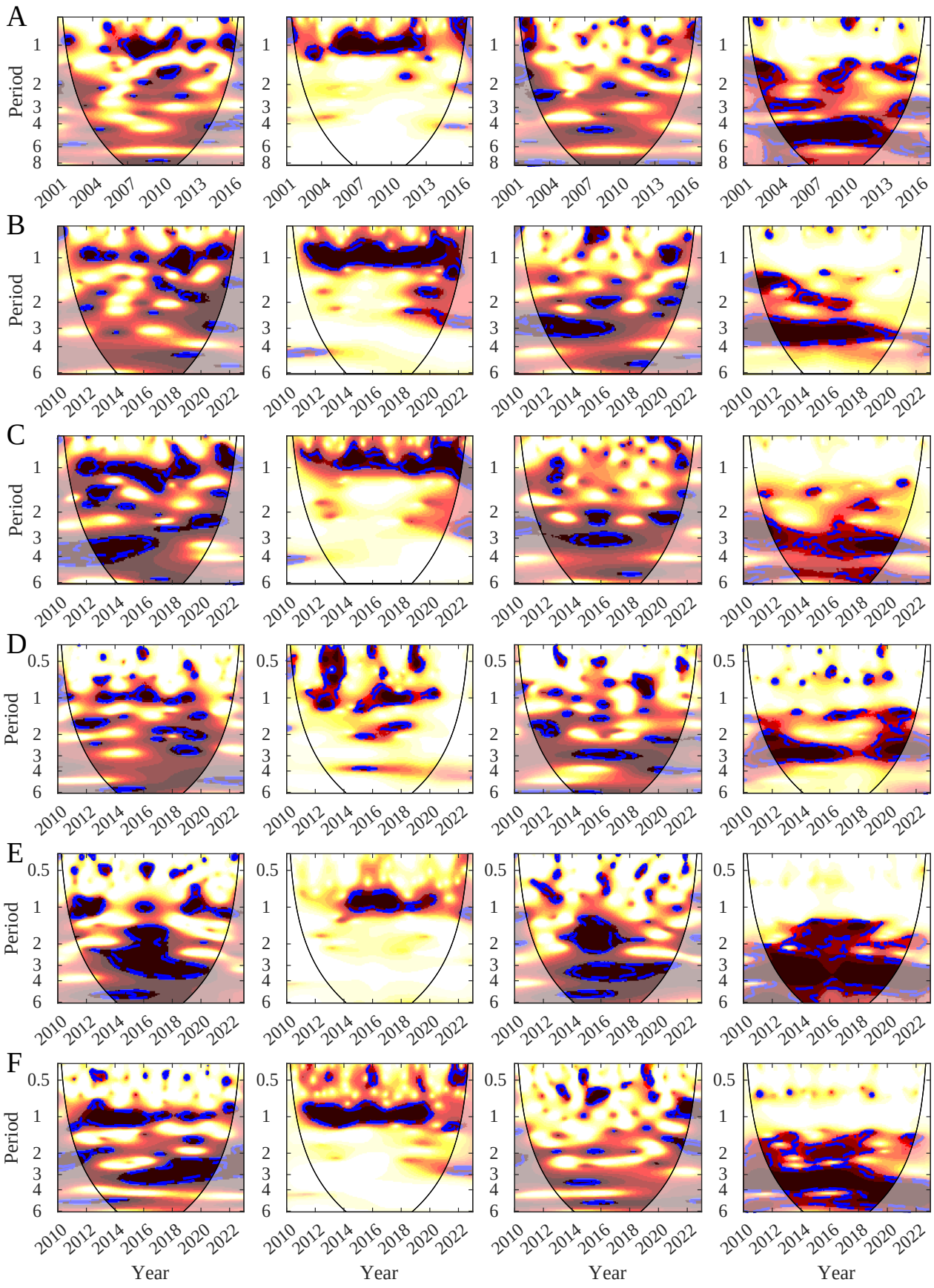

FIGURE S11 – Wavelet Coherence and Partial Wavelet Coherence between dengue for Brazil cities (12,13) and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Metropolitan Region of Recife (global level) for rainfall and NTA. B/ Cabo de Santo Agostinho (Metropolitan Region of Recife) for mean temperature and MEI. C/ Jaboatão dos Guararapes (Metropolitan Region of Recife) for minimum temperature and ONI. D/ Capital of Minas Gerais State (Belo Horizonte) for maximum humidity and TSA. E/ Capital of Paraná State (Curitiba) for minimum temperature and ONI. F/ Capital of Tocantins State (Palmas) for maximum humidity and MEI.

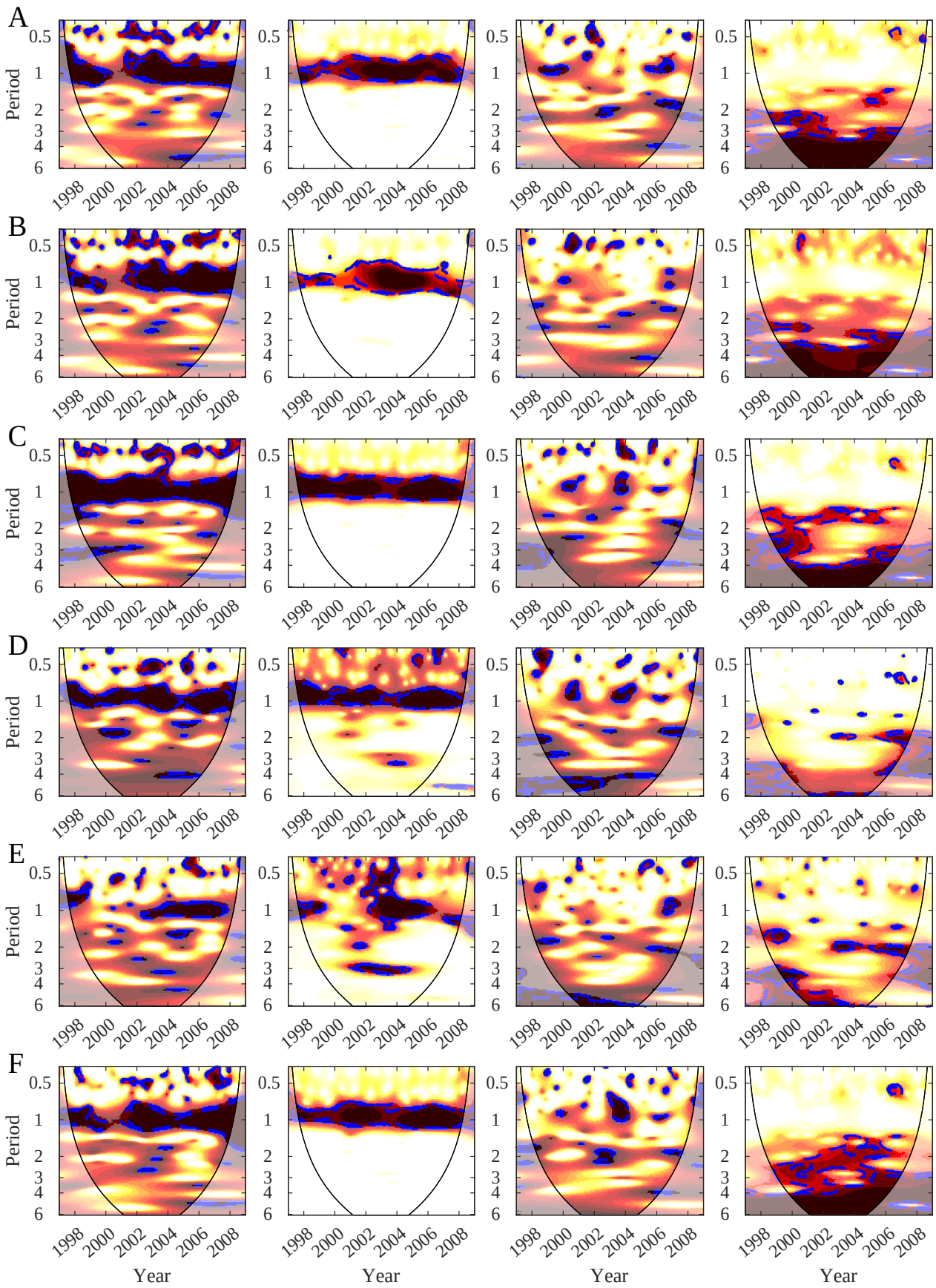

FIGURE S12 – Wavelet Coherence and Partial Wavelet Coherence between dengue for malaria in Anhui province (China) (14) and local climate or global climate. The description of the different columns is as in Figure S5 (see that caption for details). A/ Anhui province for mean temperature and MEI. B/ Beng Bu district for mean temperature and SOI. C/ Chi Zhou district for mean temperature and MEI. D/ Lu An district for rainfall and MEI. E/ Ma An Shan district for rainfall and SOI. F/ Huai Nan district for mean temperature and MEI.

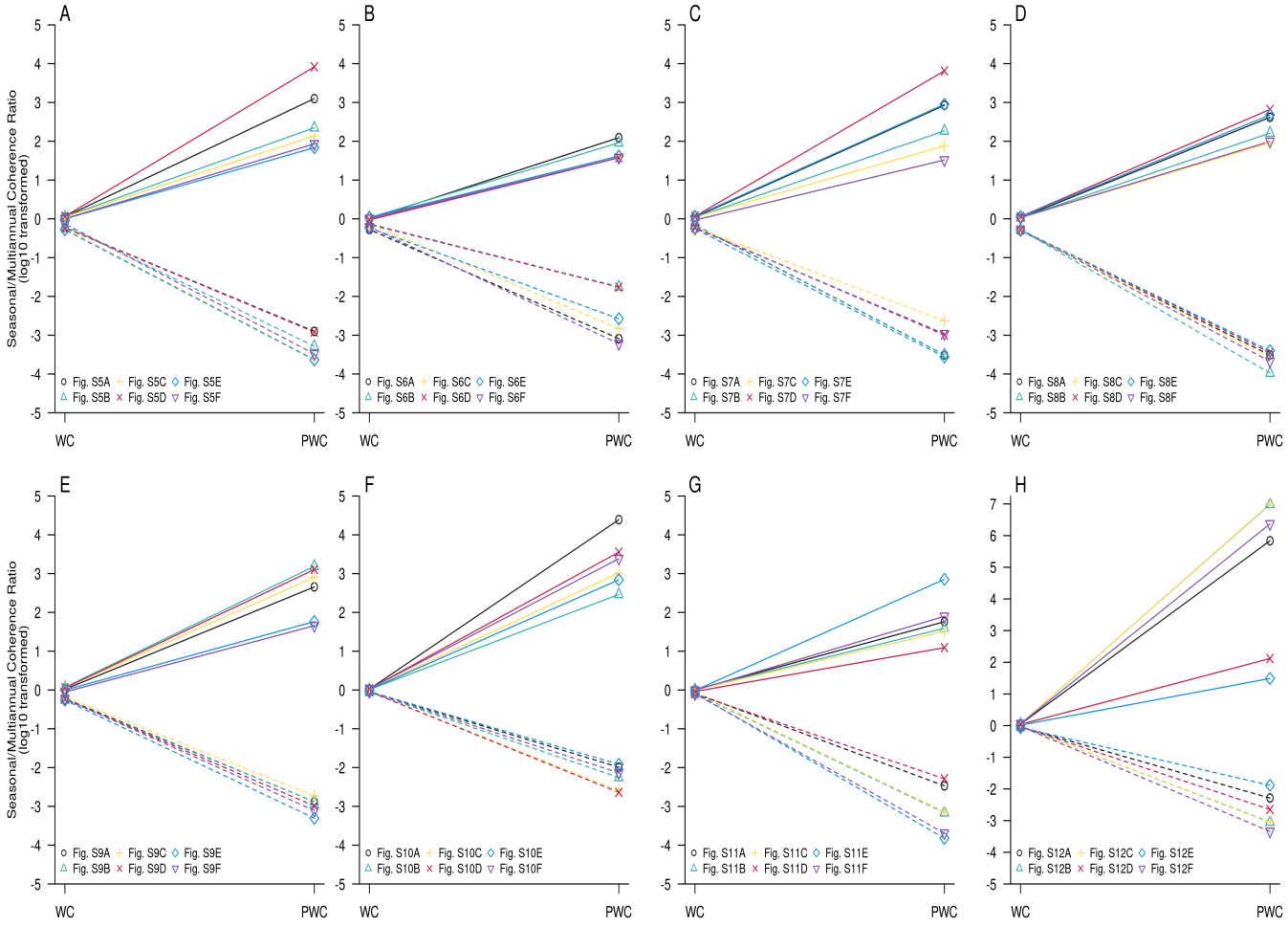

FIGURE S13 – Ratio of the average coherence computed for the seasonal mode (0.8-1.2 yr) and for the multiannual mode (2-4 yr). These average ratios have been computed for WC or PWC, for both the local climate variables variables (solid lines) and the global climate variables (dashed lines) for the data used in Fig. S5 (A), Fig. S6 (B), Fig. S7 (C), Fig. S8 (D), Fig. S9 (E), Fig. S10 (F), Fig S11 (G) and Fig.12 (H).

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