Subtropical Jet over East Asia and its Impact on Temperature Extremes in China

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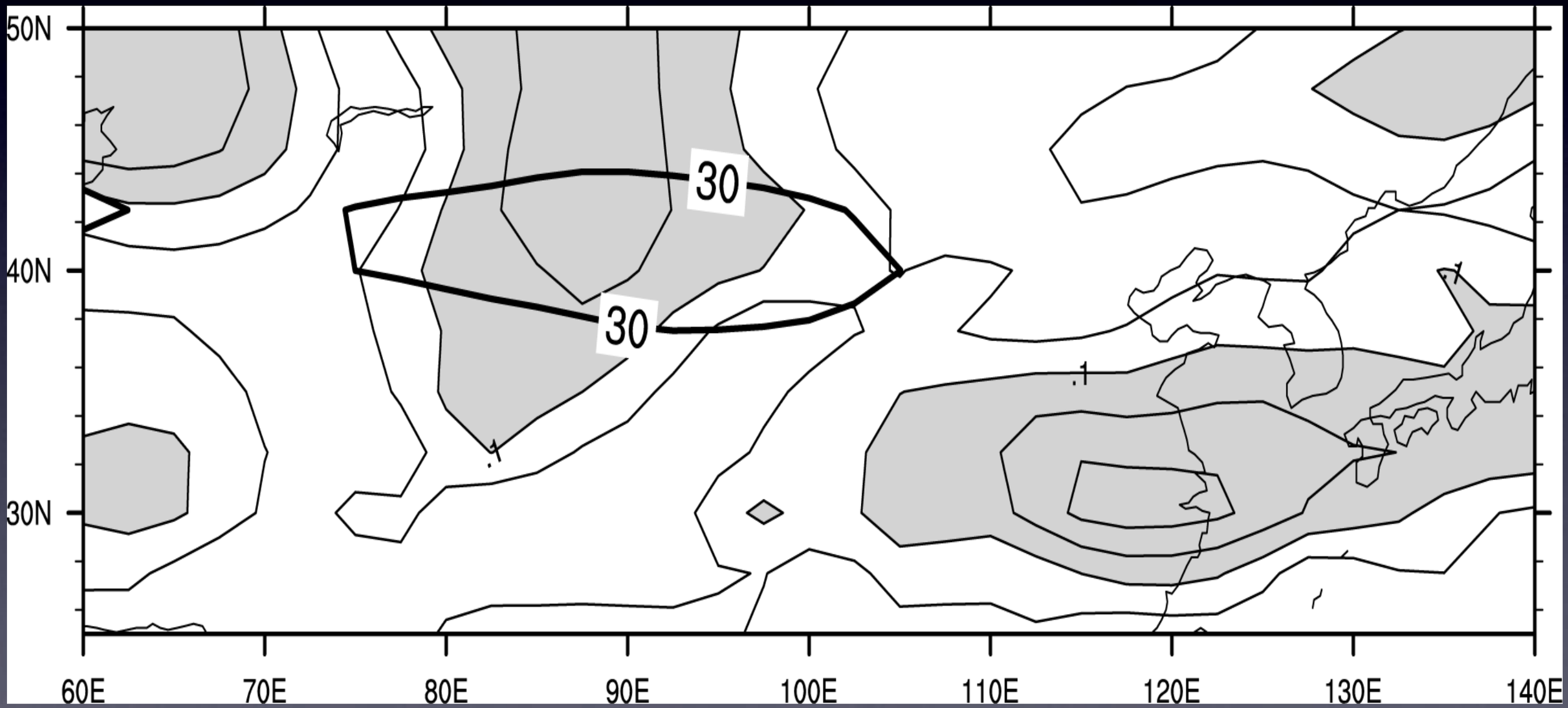
Data

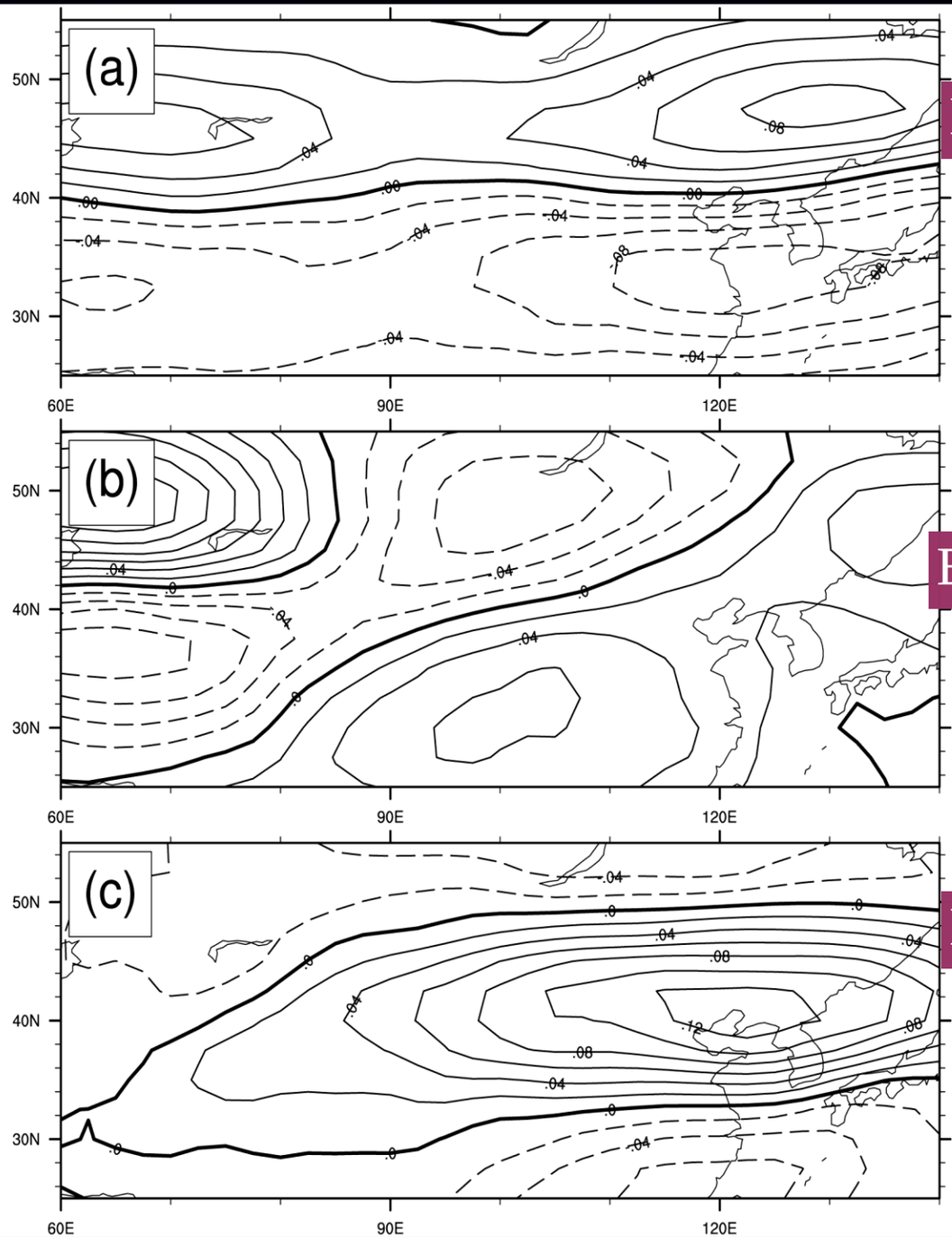
- ERA40 monthly reanalysis datasets during 1958-2001 (1000-200hPa wind, geopotential height, vertical velocity, temperature, and sensible heat flux)
- Daily maximum surface temperature of about 200 stations in China (1958-2001)

STD of the JJA U200



EOF of JJA U200

(1958-2001)



EOF1, 34%

EOF2, 17%

EOF3, 13%

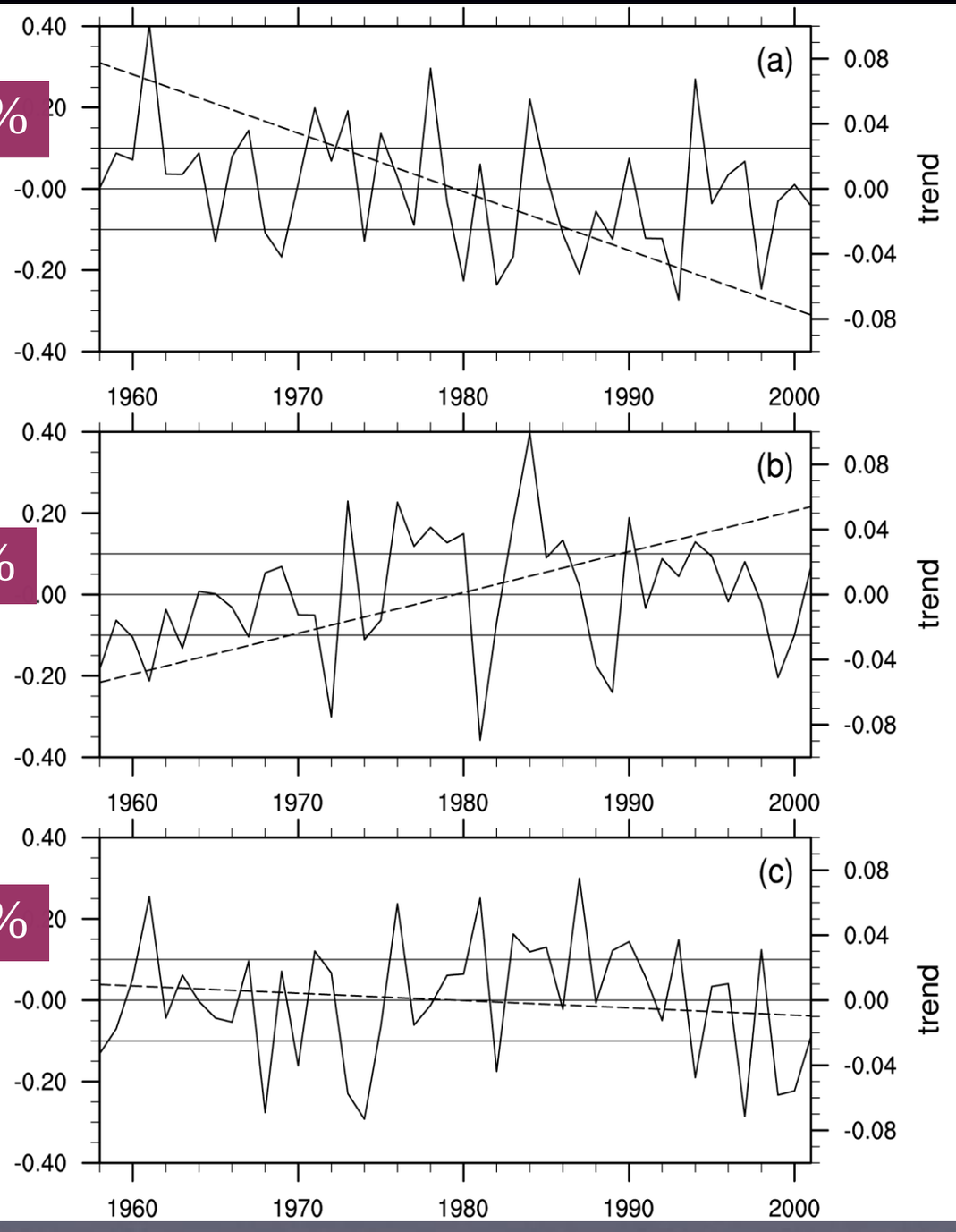
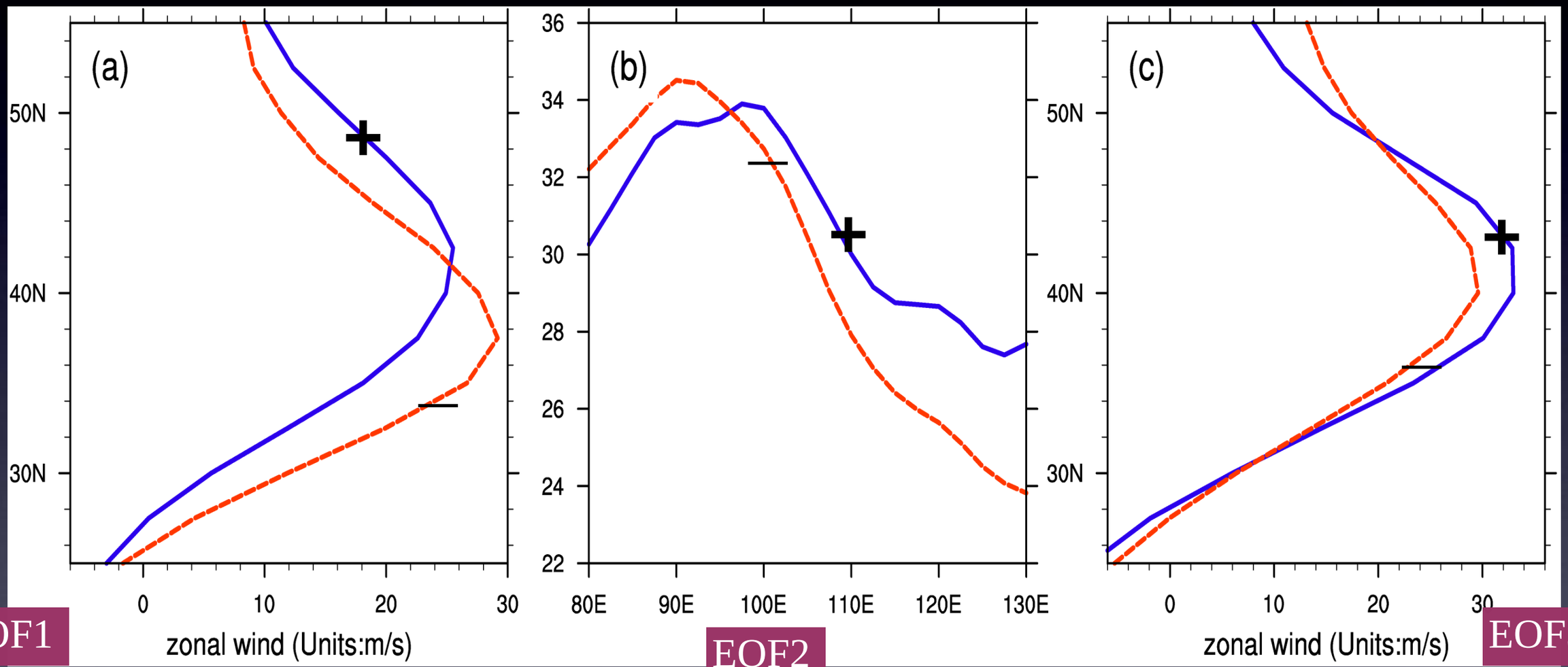


Table The year of dominant mode (1958-2001)

		Year
EOF1	+	1959,1961,1962,1964,1966,1967,1971,1973,1975,1978,1994,1996 (12)
	-	1965,1969,1977,1980,1982,1983,1986,1987,1991,1992,1993,1998 (12)
EOF2	+	1976,1979,1984,1990,1995 (5)
	-	1958,1960,1963,1972,1981,1988,1989,1999 (8)
EOF3	+	1985 (1)
	-	1968,1970,1974,1997,2000,2001 (6)

1960s~1970s: +EOF1; (Northward)
1980s~early1990s : - EOF1; (Southward)
mid-1990s: -EOF3 (Intensity weakened)

Composite of JJA U200 in the years with dominant modes



EOF1 EOF2 EOF3

(a) 110-130E

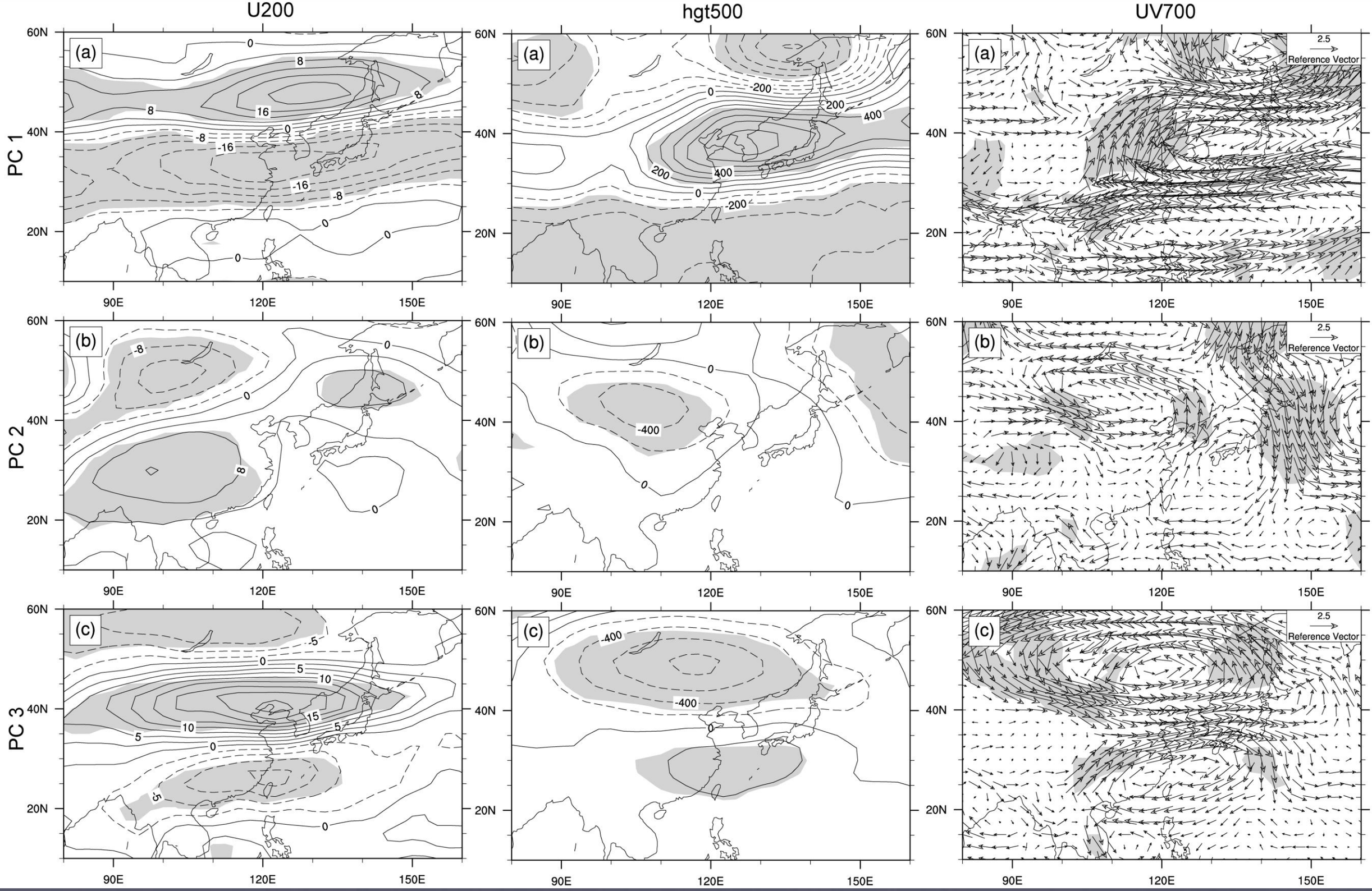
正位相时，急流偏北

(b) ~40N

正位相时急流向东偏移

(c) 70-110E

正位相时强度偏强

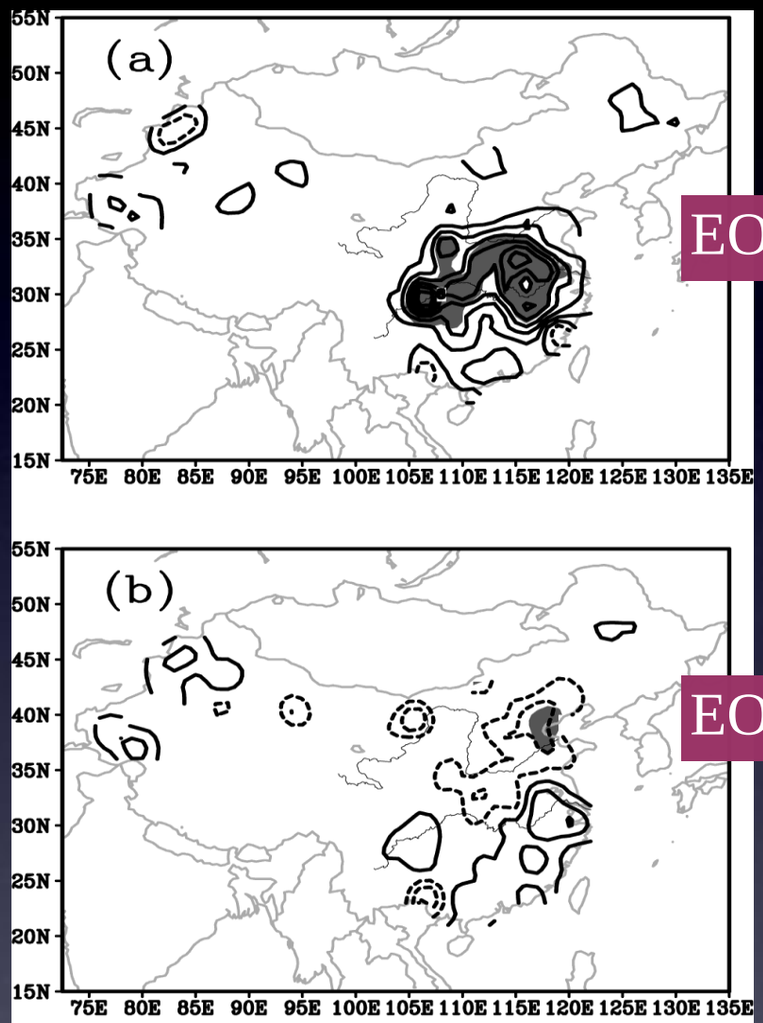


Regression patterns (3 PCs) in JJA

Composite of hot days with dominant modes

Linear correlation patterns of JJA hot days (>35C)with PC1 (a), PC2 (b), PC3 (c).

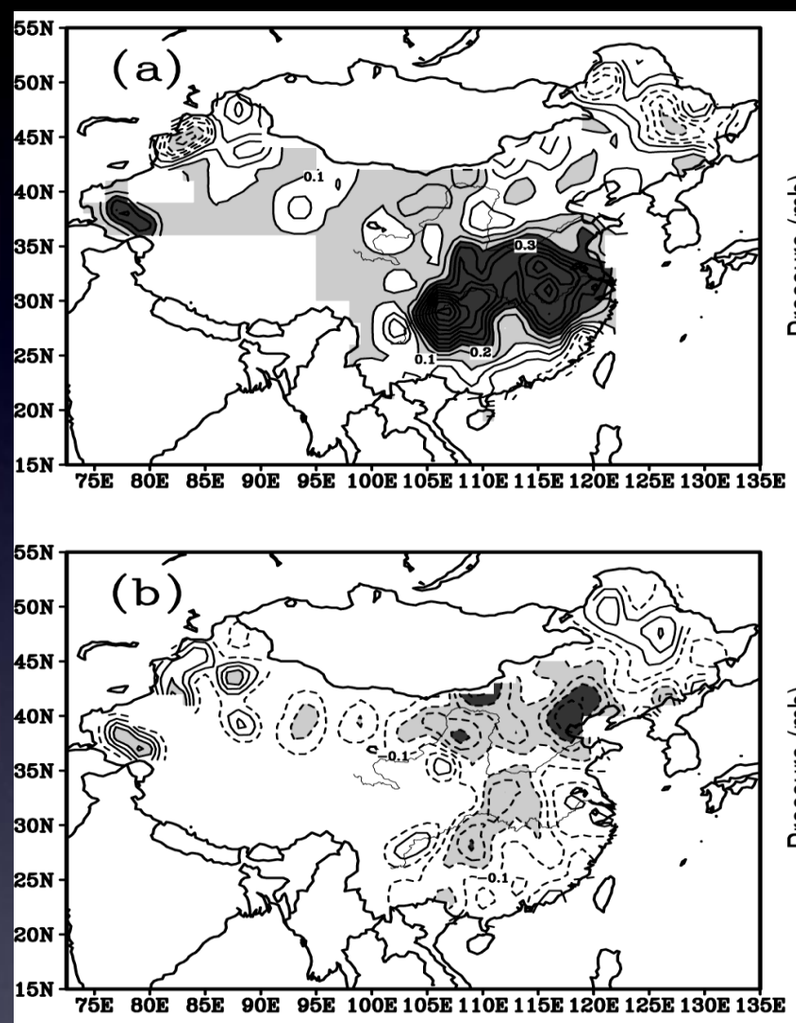
Regression of JJA divergent zonal wind and vertical velocity averaged (105-130E) against the 3 PCs

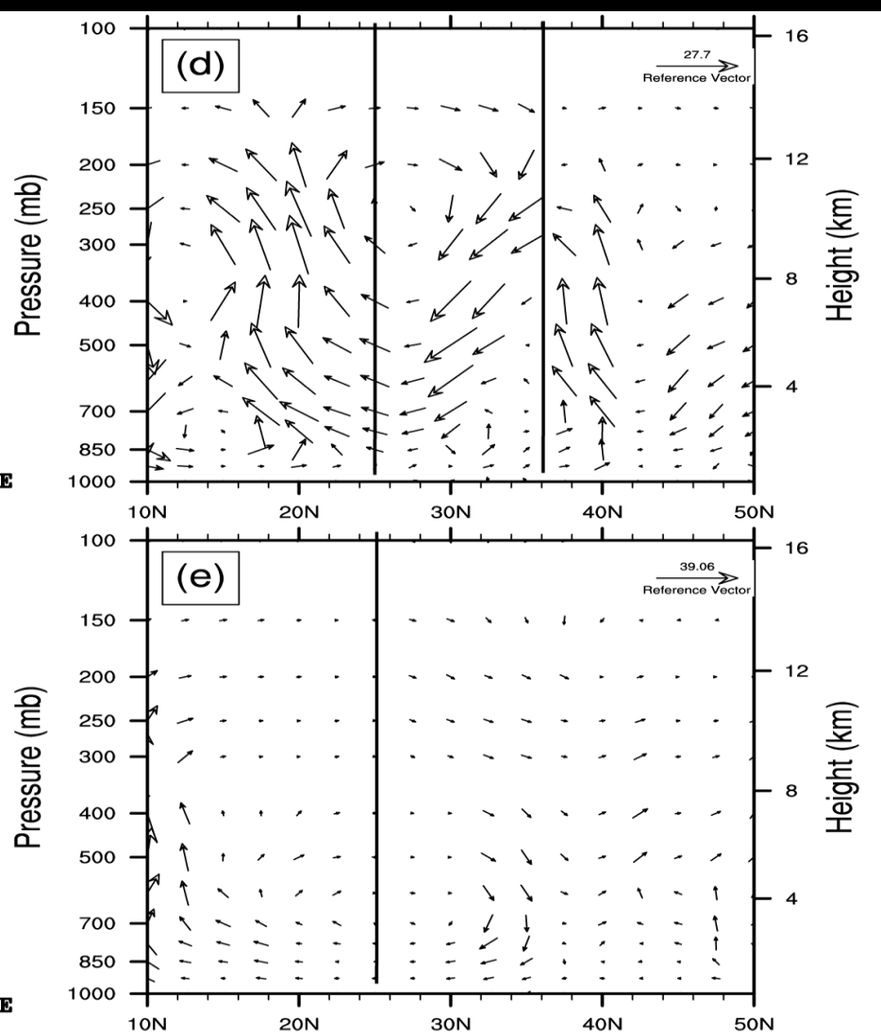


EOF1

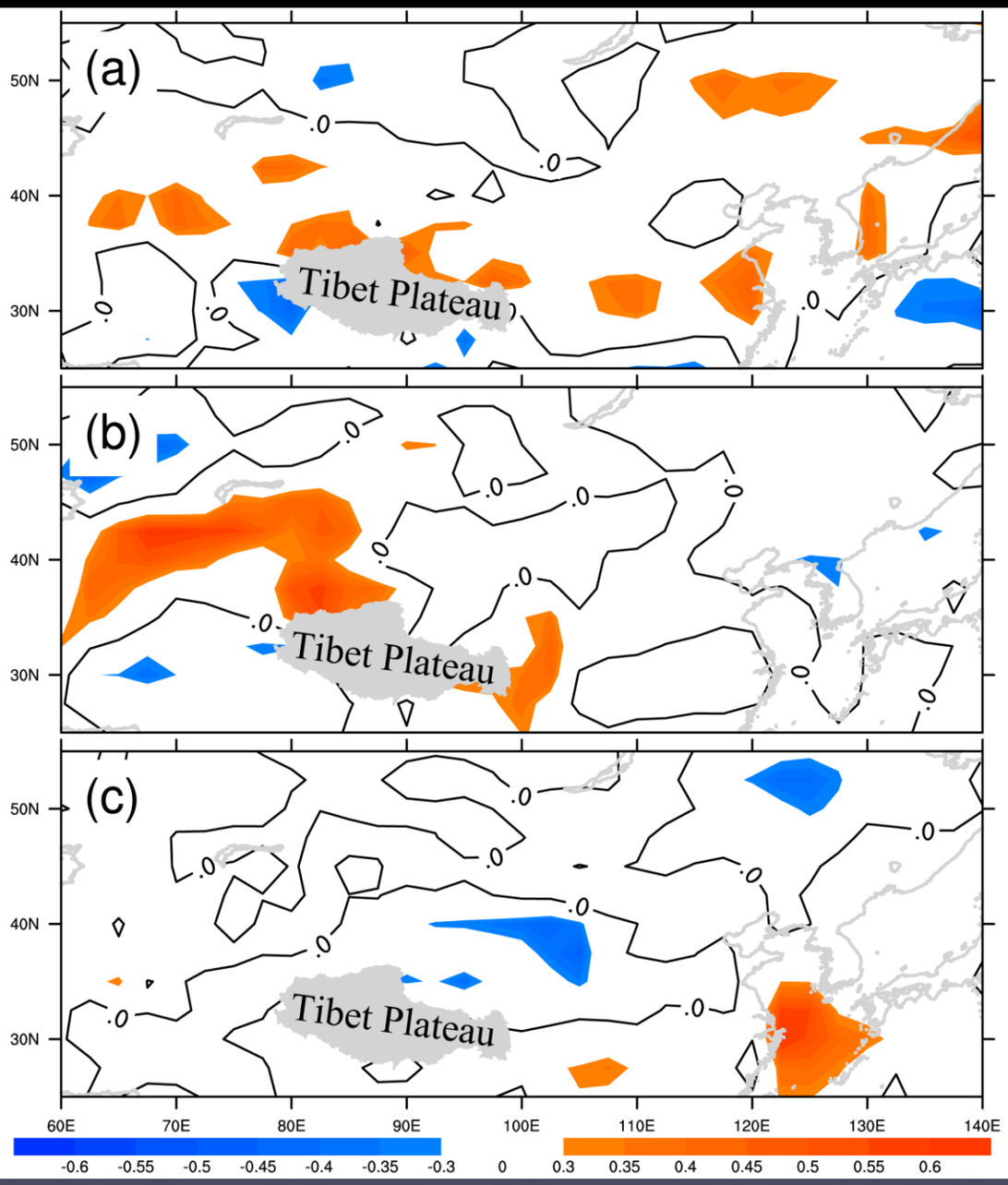
EOF2

EOF3





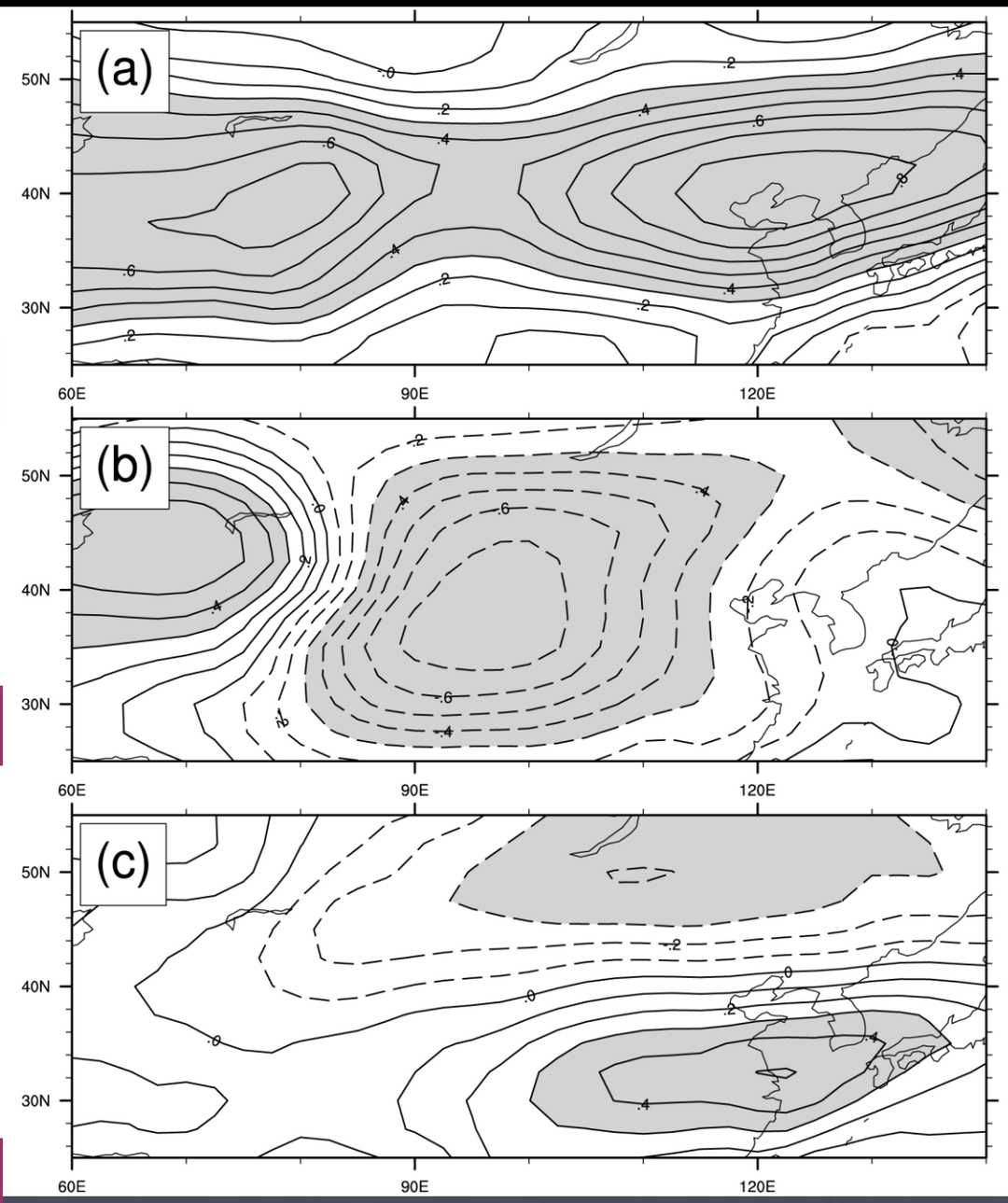
Sensible Heat & Temperature



EOF1

EOF2

EOF3



Correlation patterns between 3 PCs & sensible heat (9-point smoothing)

Correlation patterns between 3 PCs & 500-200hPa averaged temperature

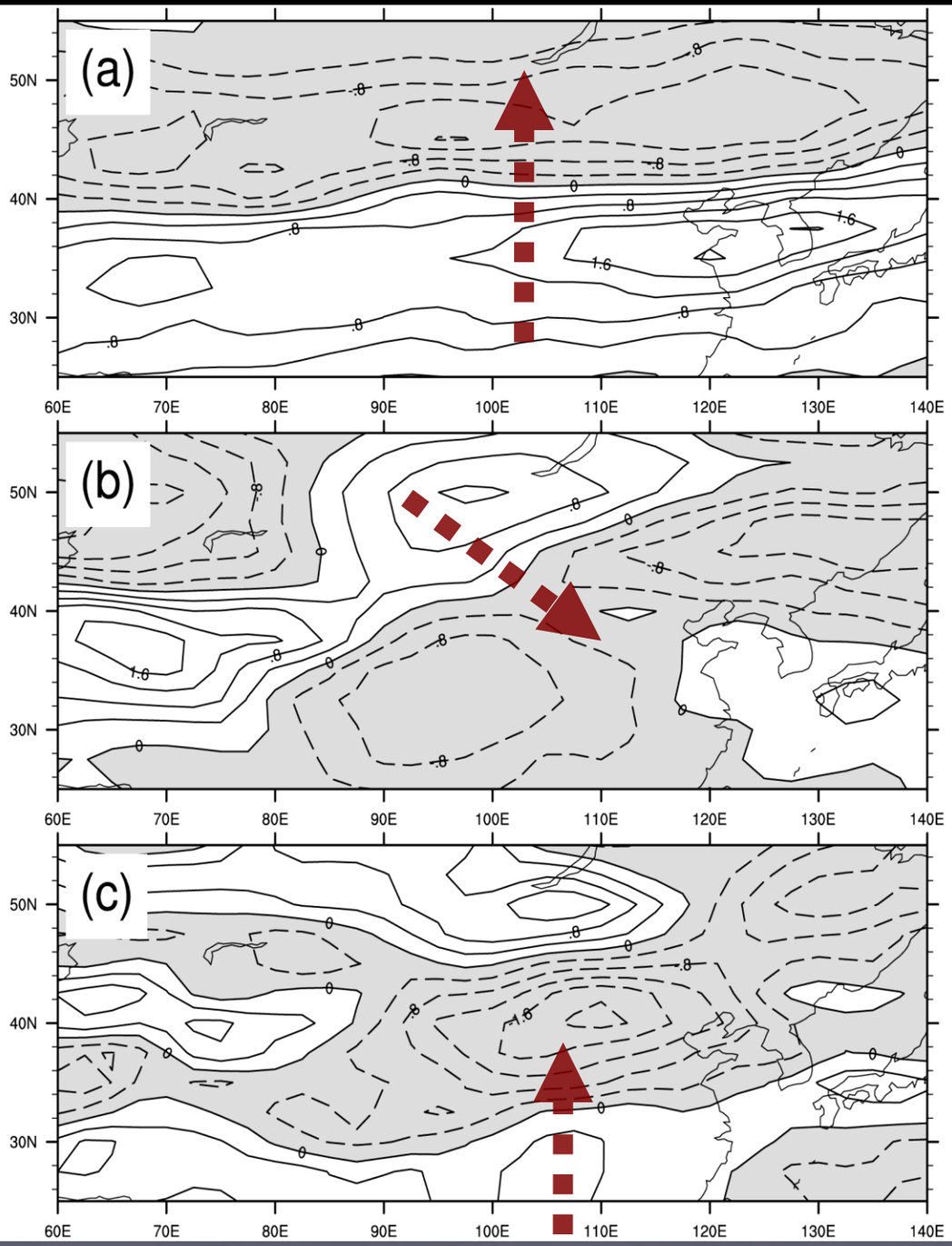
青藏高原在夏季对于大气是个热源，并且感热加热最强。

EOF1主要与青藏高原东部的感热有关，**EOF2**与青藏高原西北的感热有关，

EOF3与青藏高原东北的感热是负相关

Composites of temperature gradient (200-500hPa) in the dominant mode years

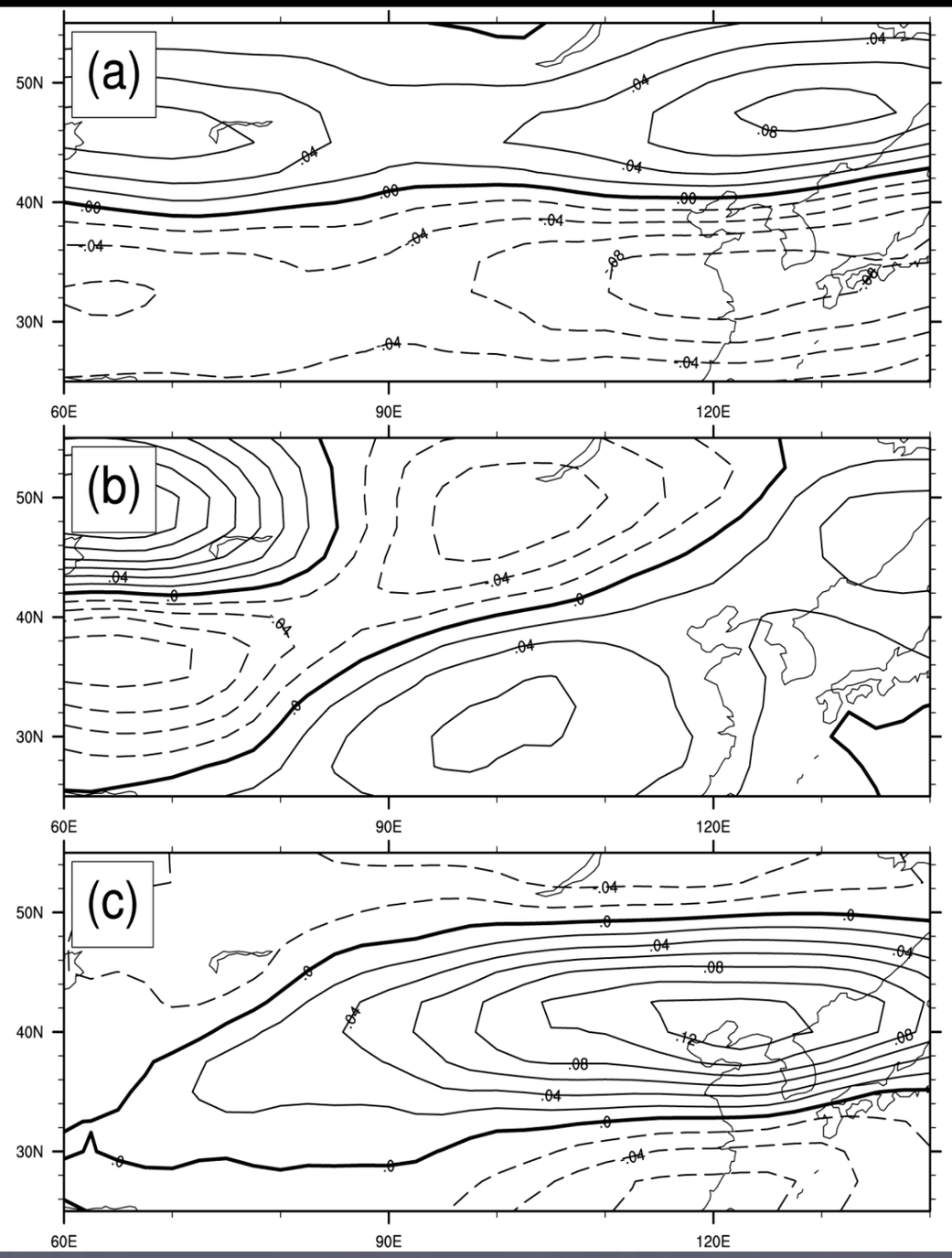
EOF of JJA U200



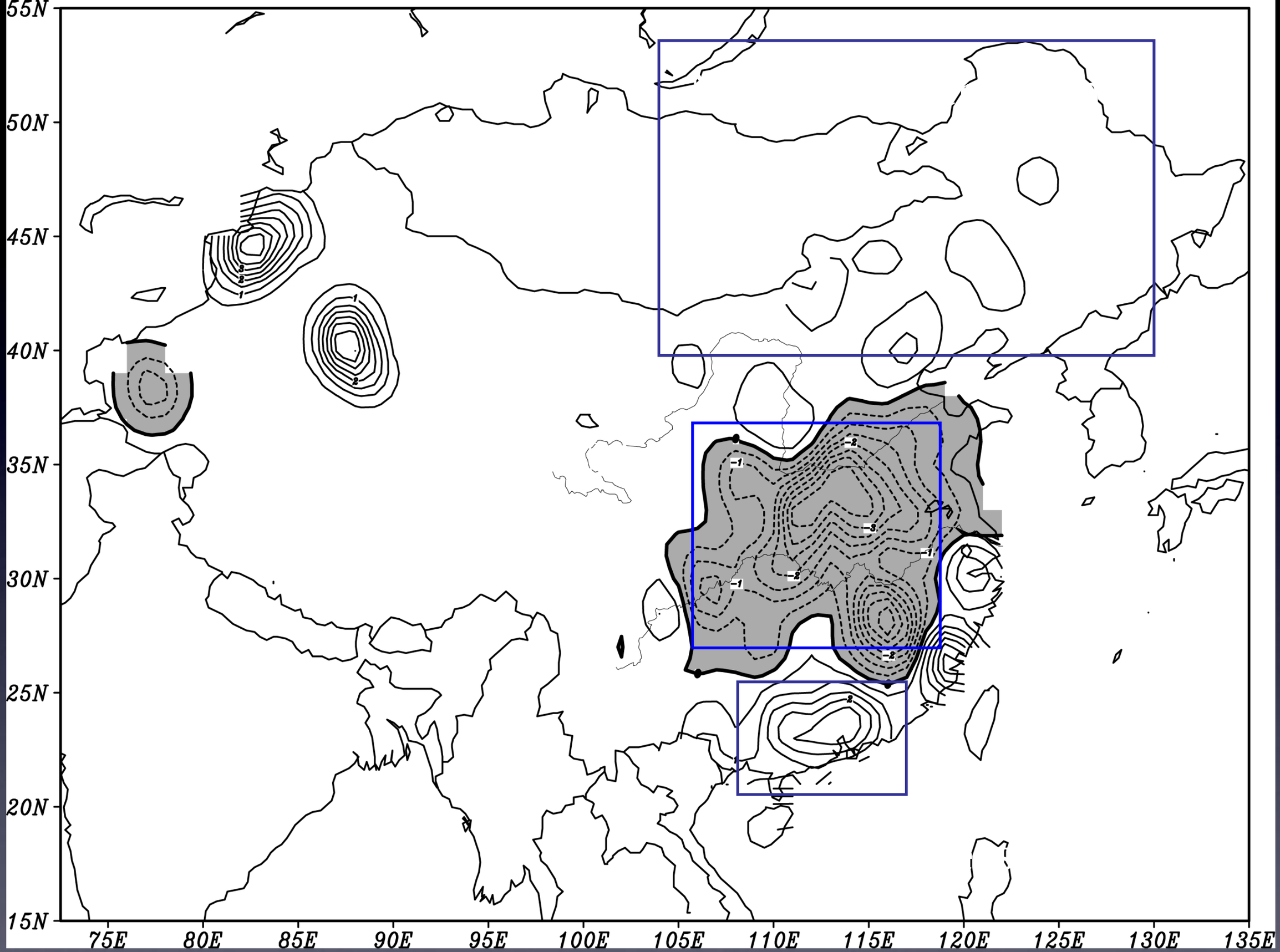
EOF1

EOF2

EOF3



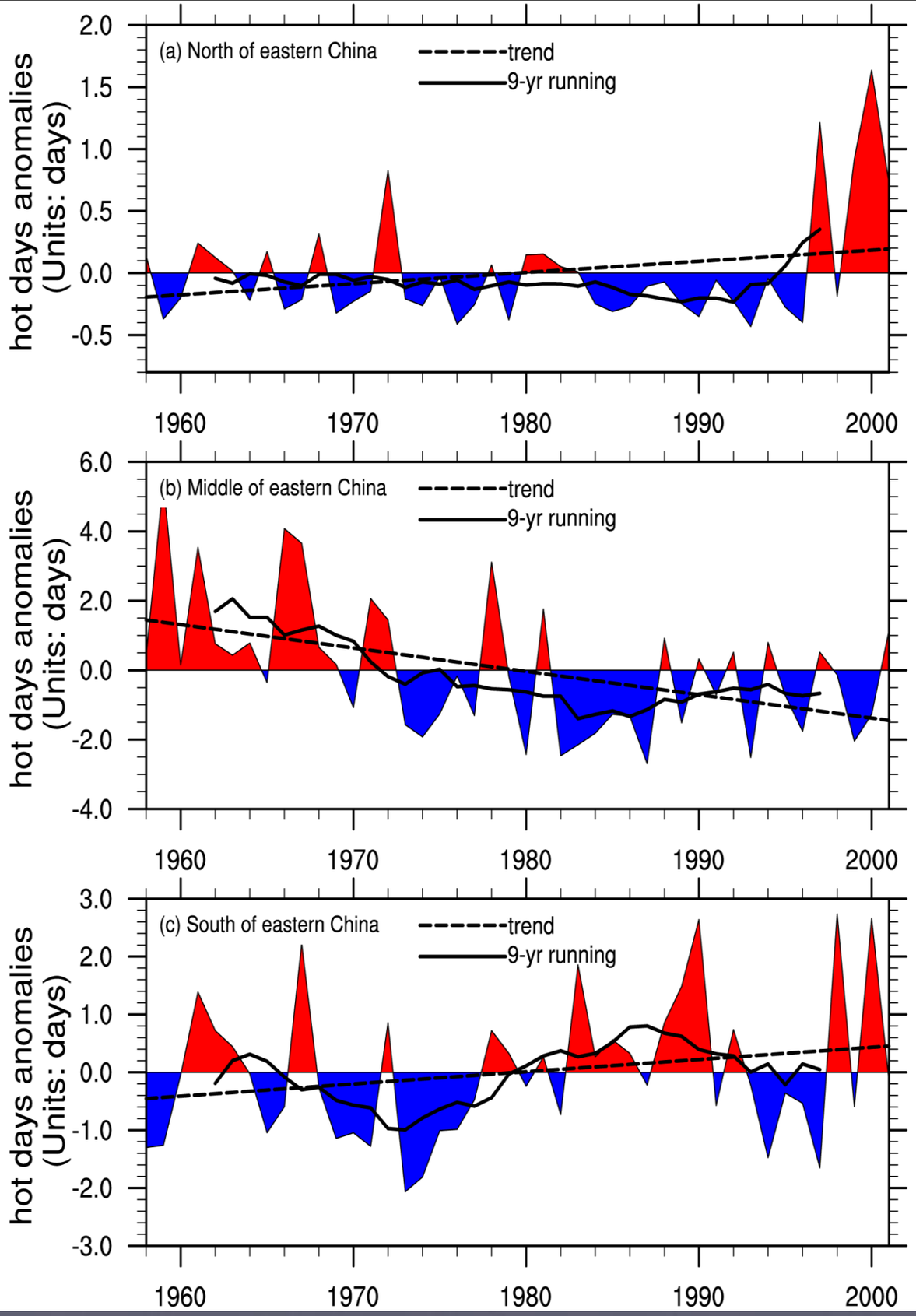
热成风： -▽T（×10^-6 K/meter） & EAJ



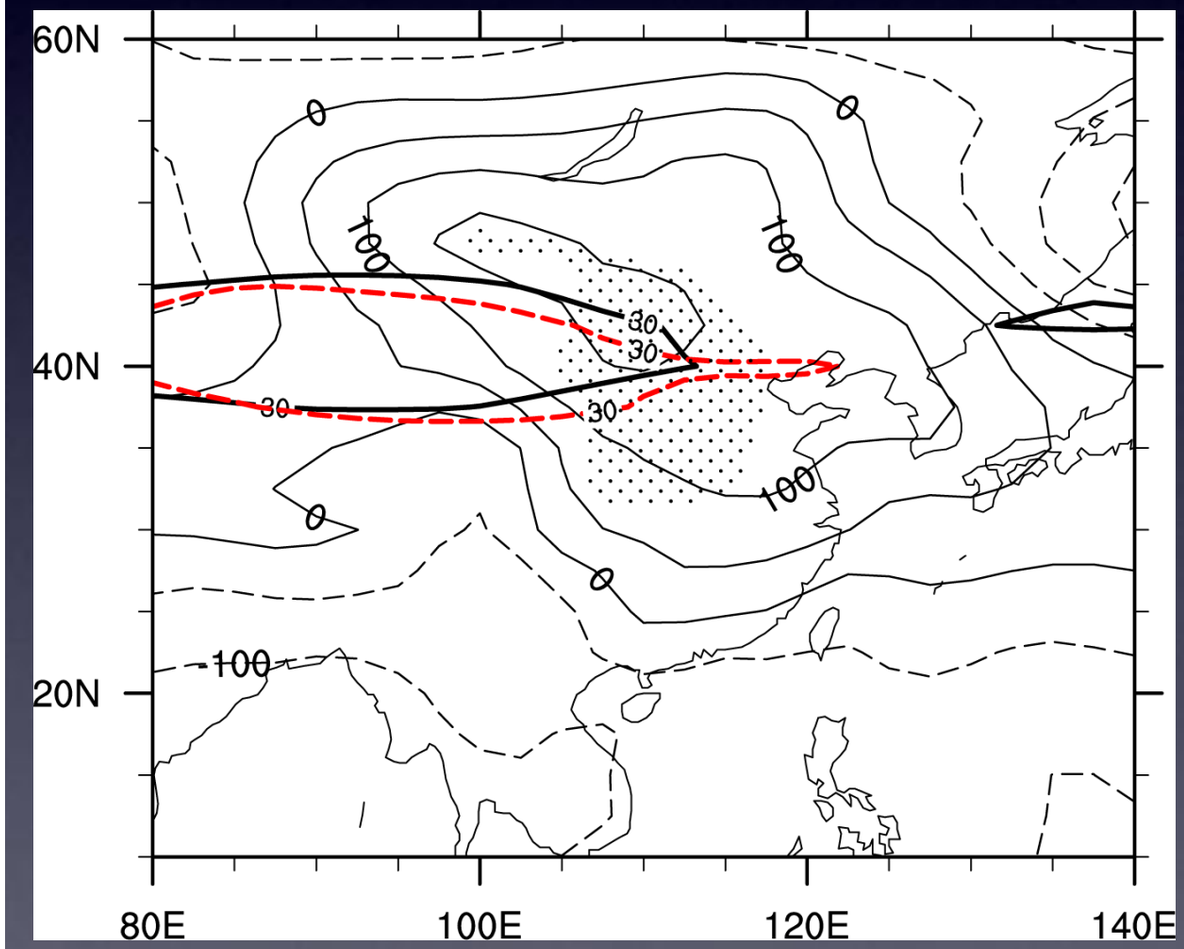
Trend of JJA hot days during (1958-2001) [days/(20yr)]

shading : negative trend

The number of JJA hot days anomalies over China(1958-2001)



	PC1	PC2	PC3
North China	0.07	**-0.3**	**-0.41**
Middle China	**0.57**	-0.26	0.06
South China	-0.03	-0.11	**0.43**



Difference in JJA 500hPa GHT between 1960-1970 ~1981-1991; The thick black solid (red dashed): JJA U200 during 1960-1970 (1981-1991). Shading: 95% significant.

Summary

- 夏季东亚急流的经向、纬向位置和强度具有明显的年际变化和趋势变化。
- 急流位置和强度的改变，造成局地**hadley**环流异常，引起异常的上升下沉运动，对我国高温的影响有差异，主要表现为急流的经向位置偏移与中国中东部高温日数有关，但是强度和纬向位置的偏移主要与北部和南部高温有关。
- 青藏高原附近的感热变化分布是引起东亚急流位置和强度变化 的可能原因。**EOF**1主要与青藏高原东部的感热有关，EOF2与青藏高原西北的感热有关，EOF3与青藏高原东北的感热是负相关。

END