



East Asian Summer Monsoon Activities and Its Impacts on China's Climate in 2015

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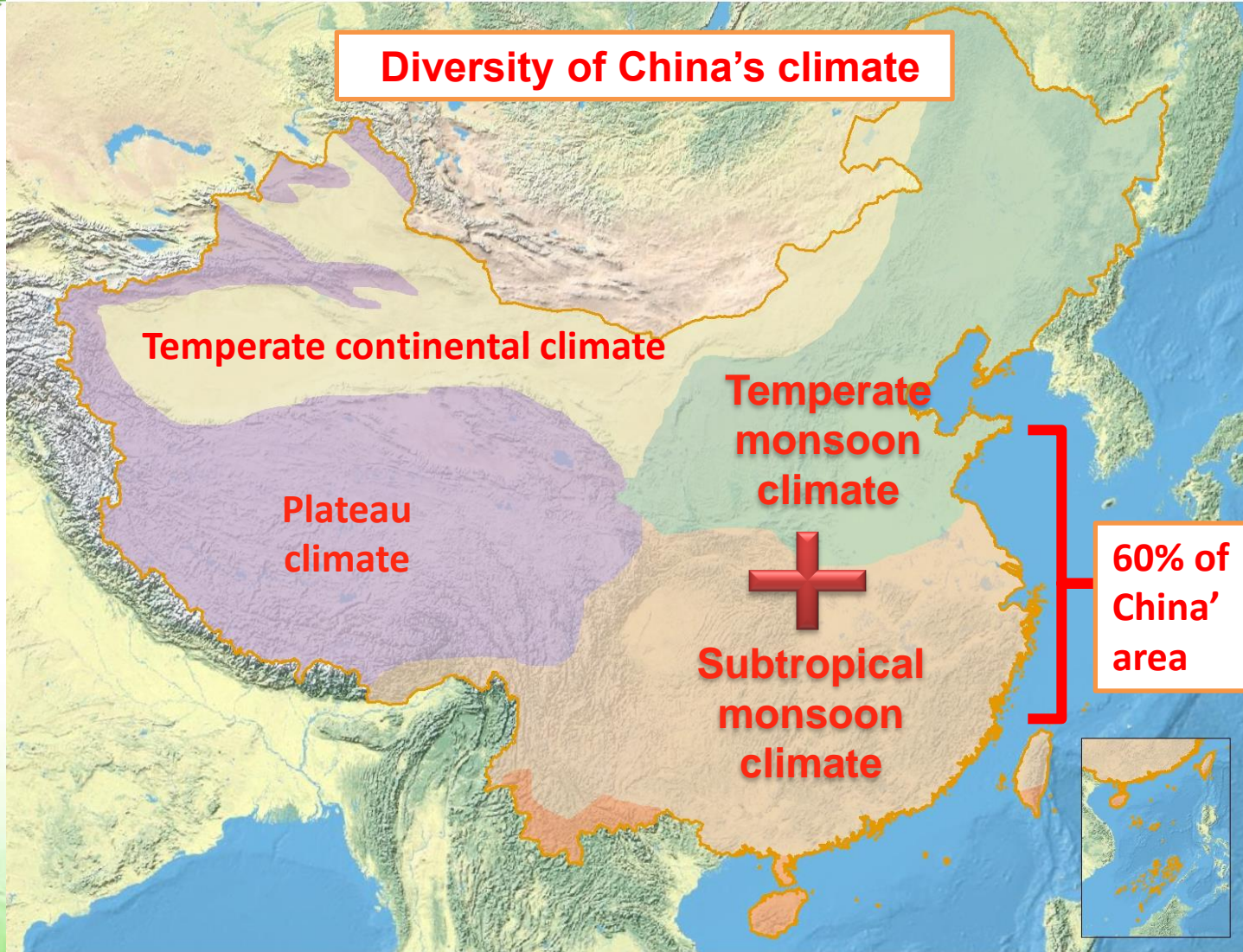


Outline

- Background of East Asian Summer Monsoon (EASM)
- EASM activities (SCSSM, WPSH)
- Impacts on China's climate (rainfall, wind)
- Factor responsible for EASM activities

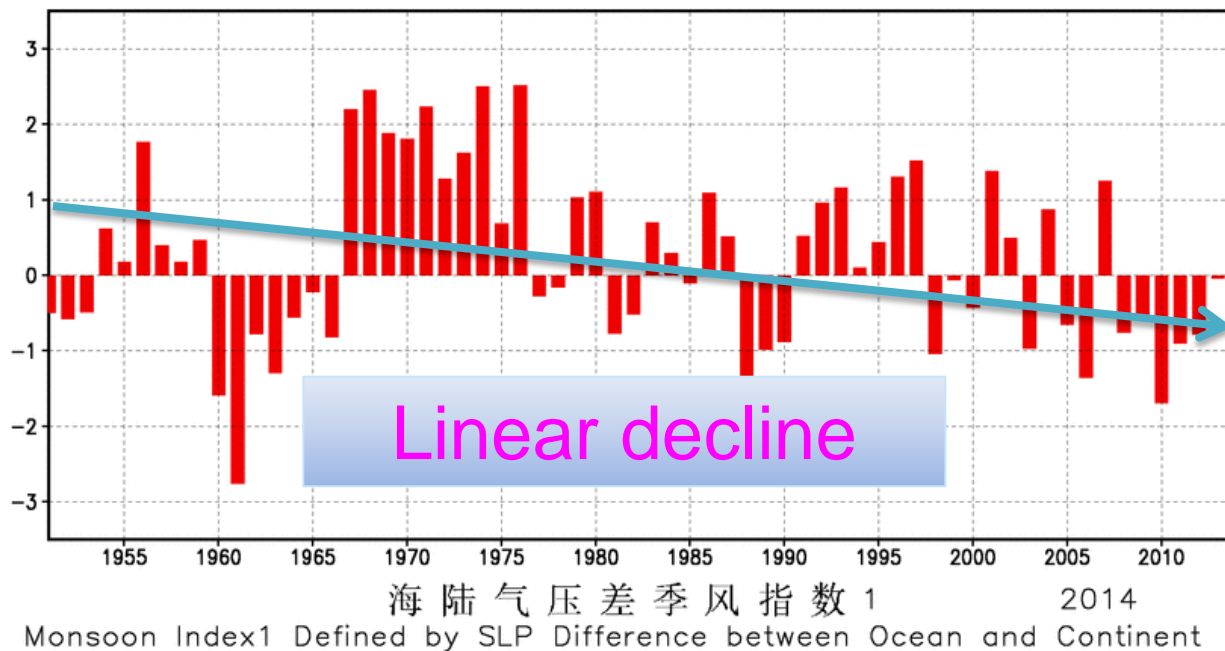


Diversity of China's climate





Intensity variation of EASM



A significant quasi-biennial oscillation in the interannual variations, and a prominent weakening trend in the interdecadal variations of EASM system from the late 1970s, which is particularly obvious in North China.



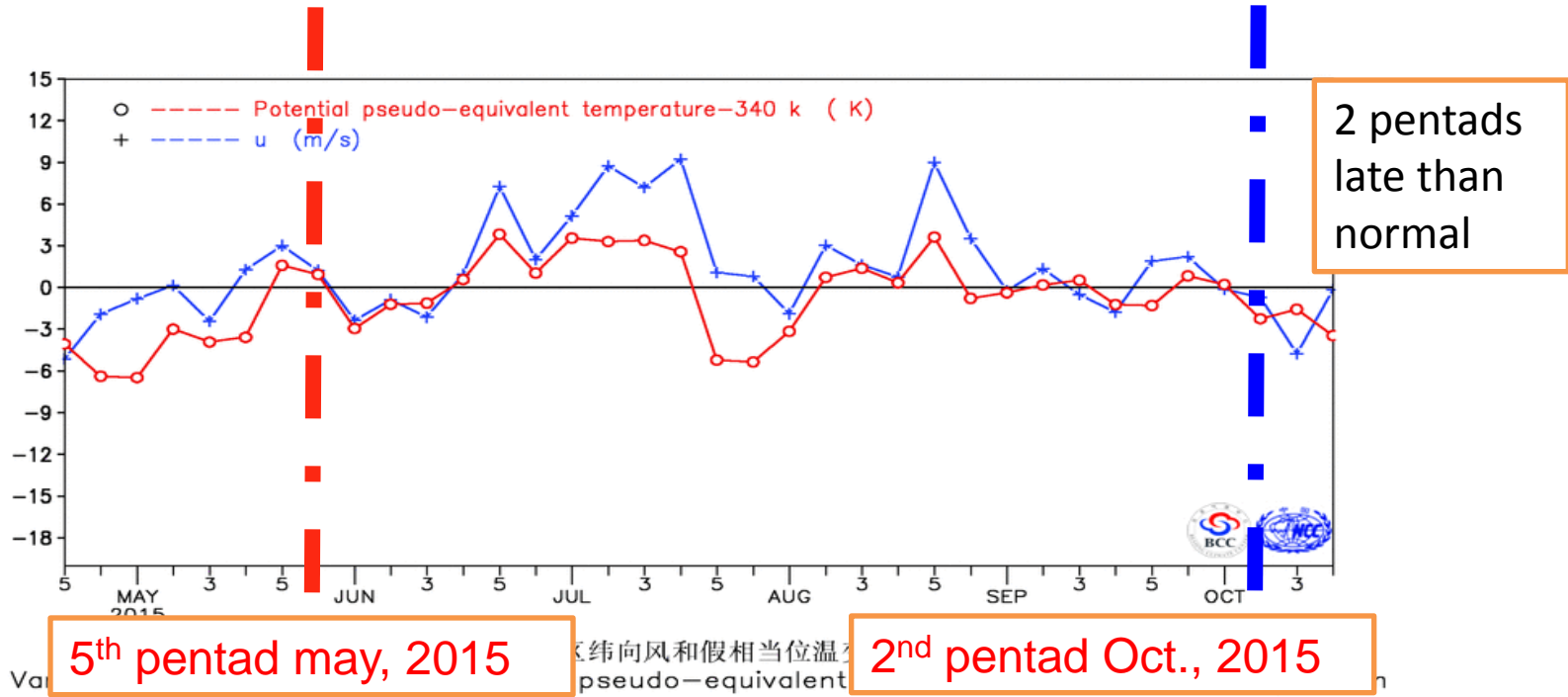
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Onset of South China Sea Summer Monsoon (SCSSM)

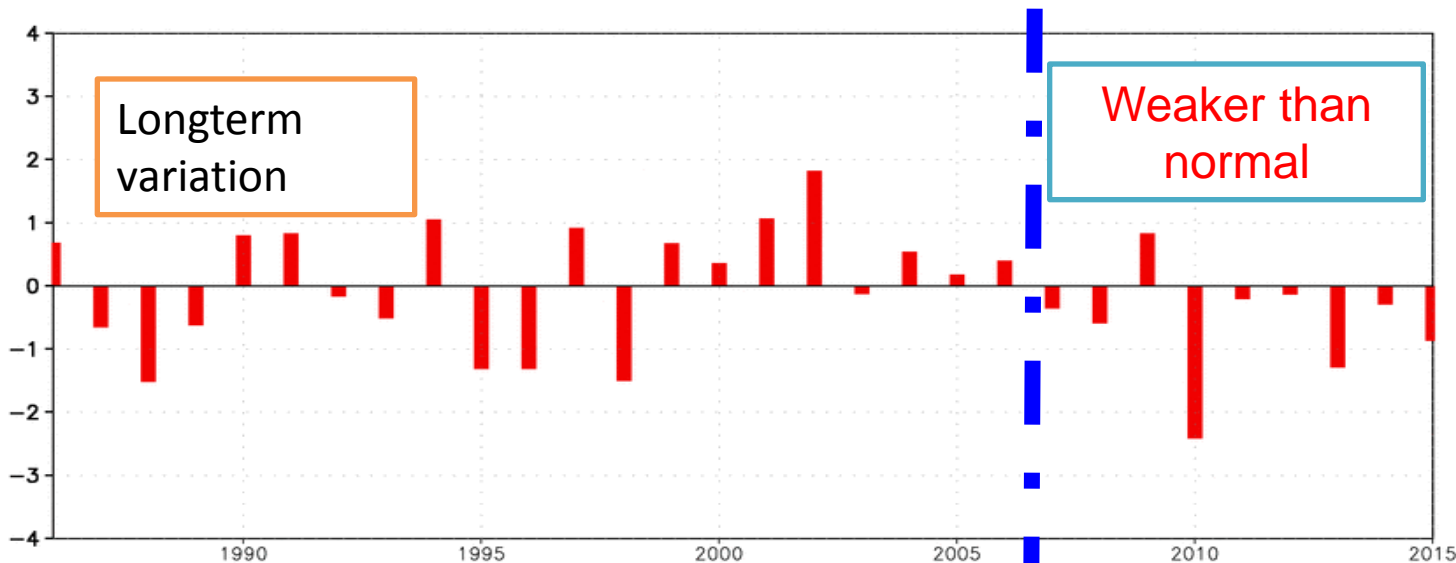
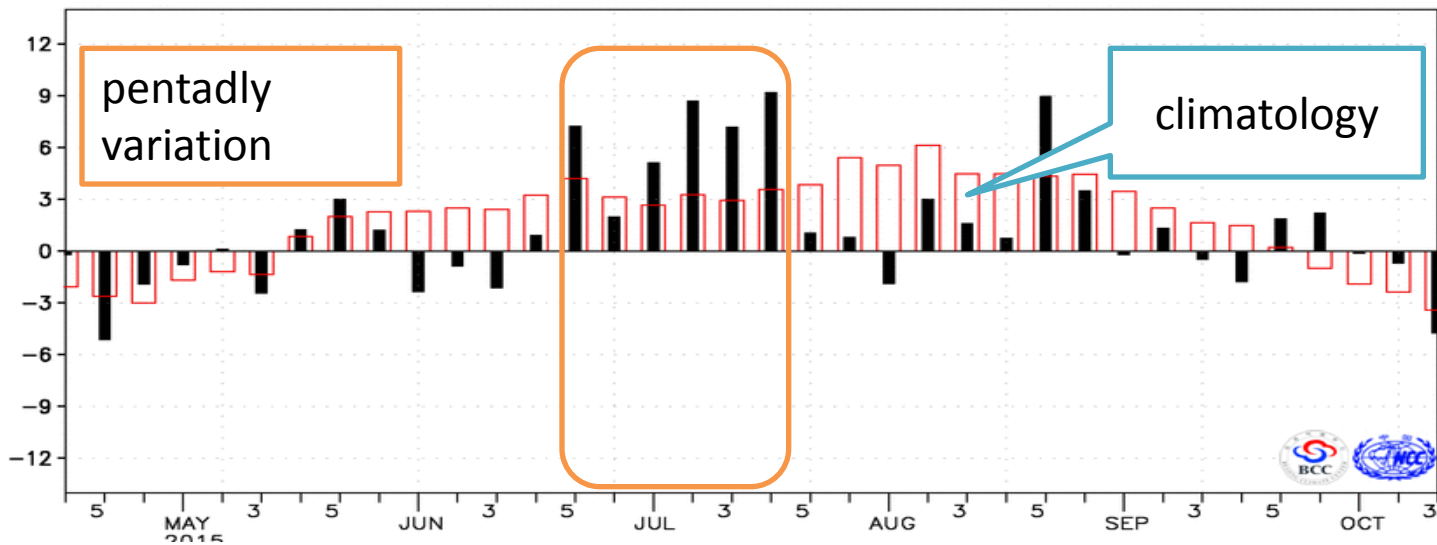


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Variation of SCSSM



南海夏季风指数(1)变化

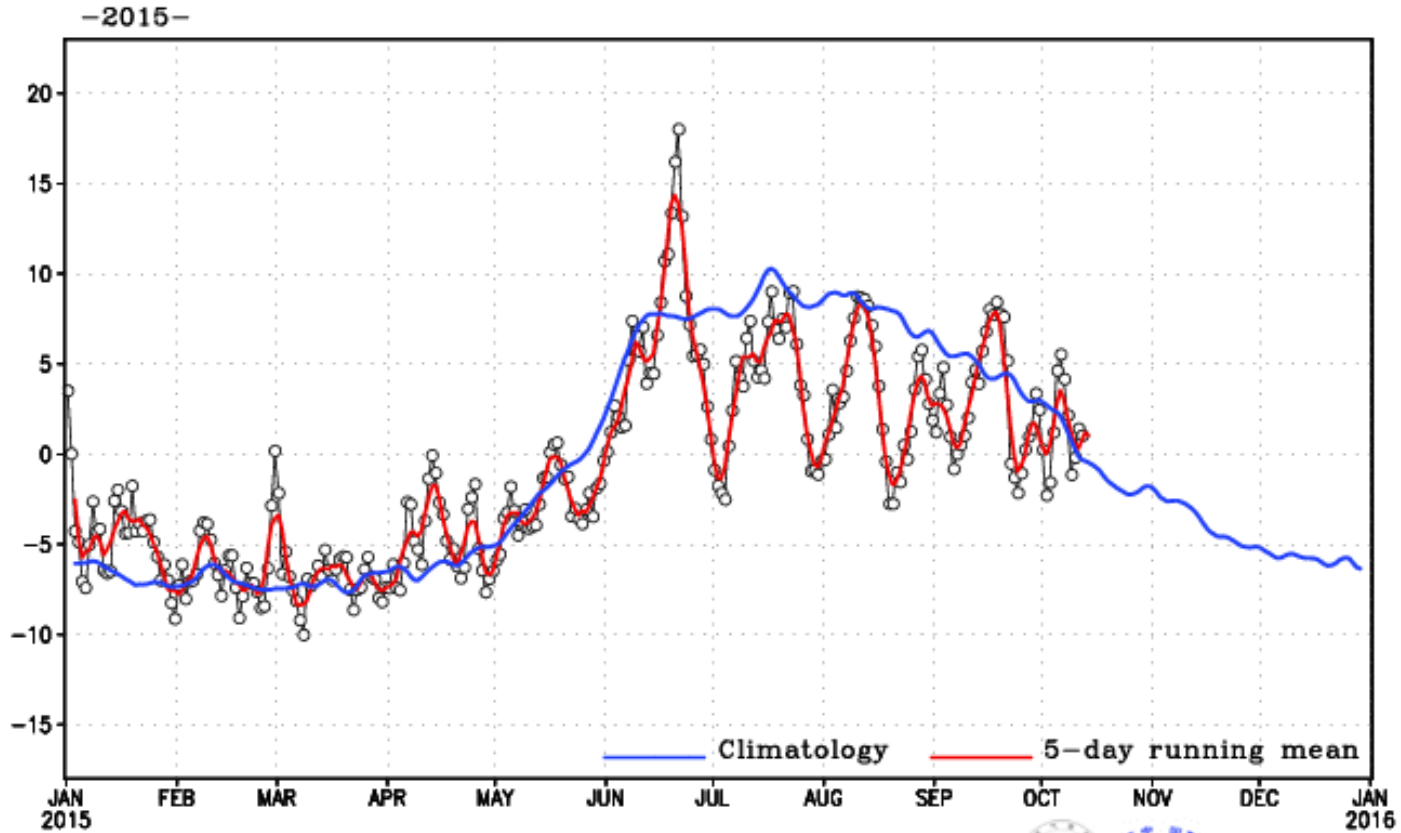
Variation of South China Sea summer monsoon index (1)





Variation of ISM

Indian Monsoon Index



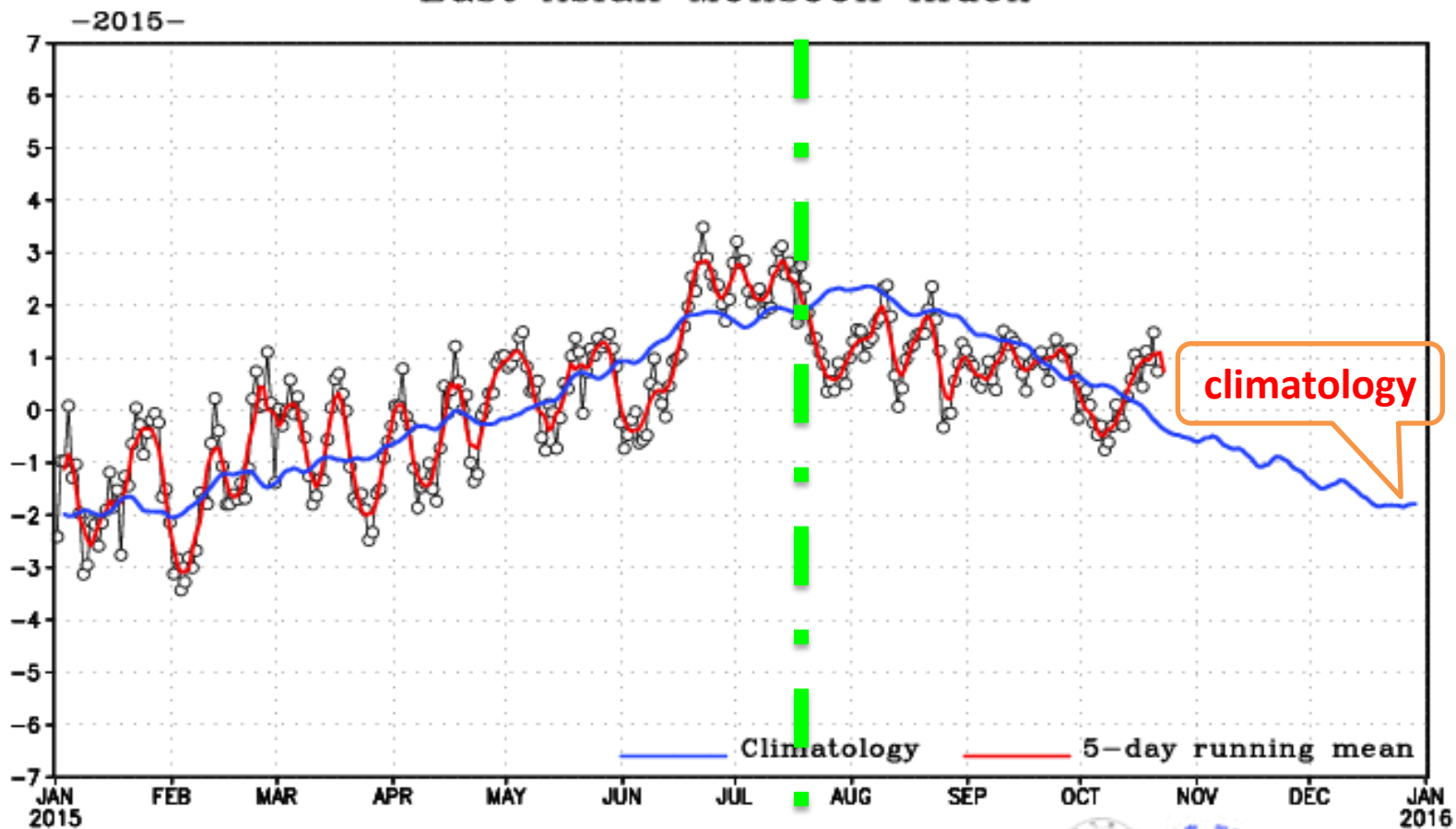
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Variation of EASM

East Asian Monsoon Index

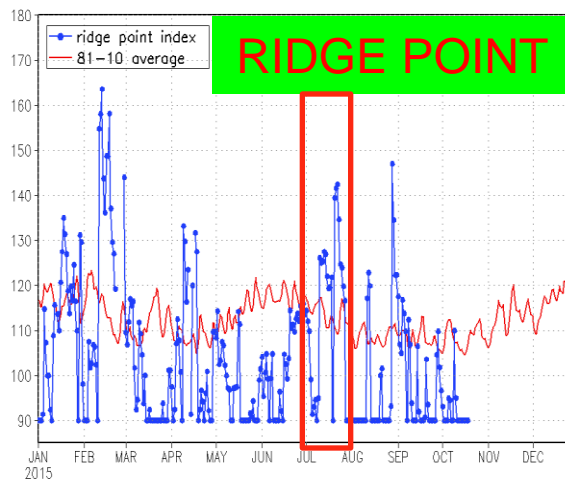
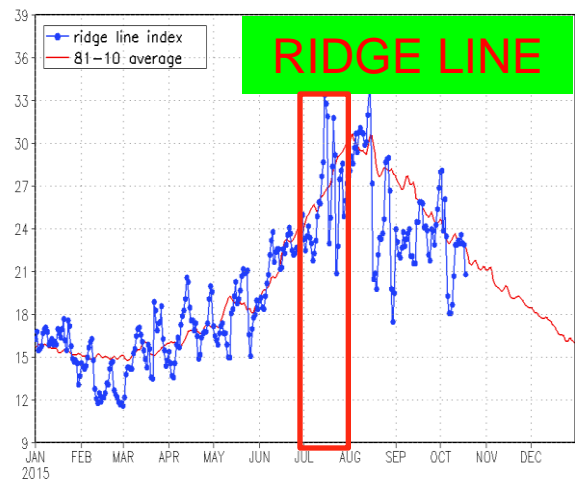
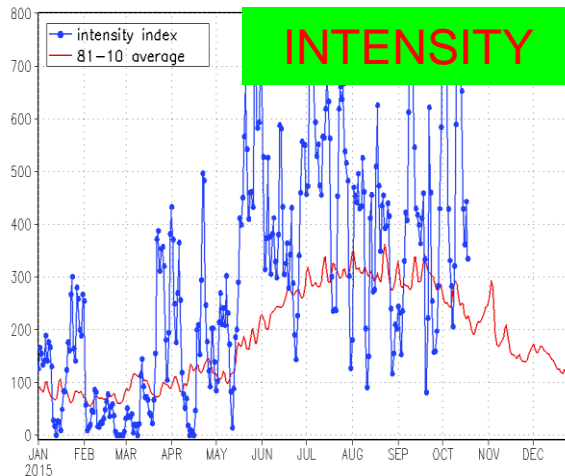
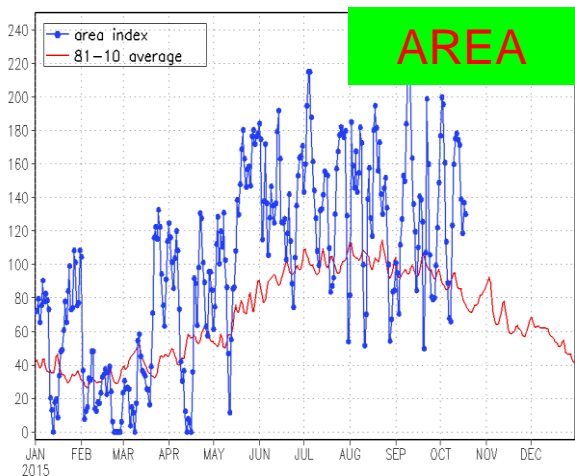


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Variation of West Pacific Subtropical High



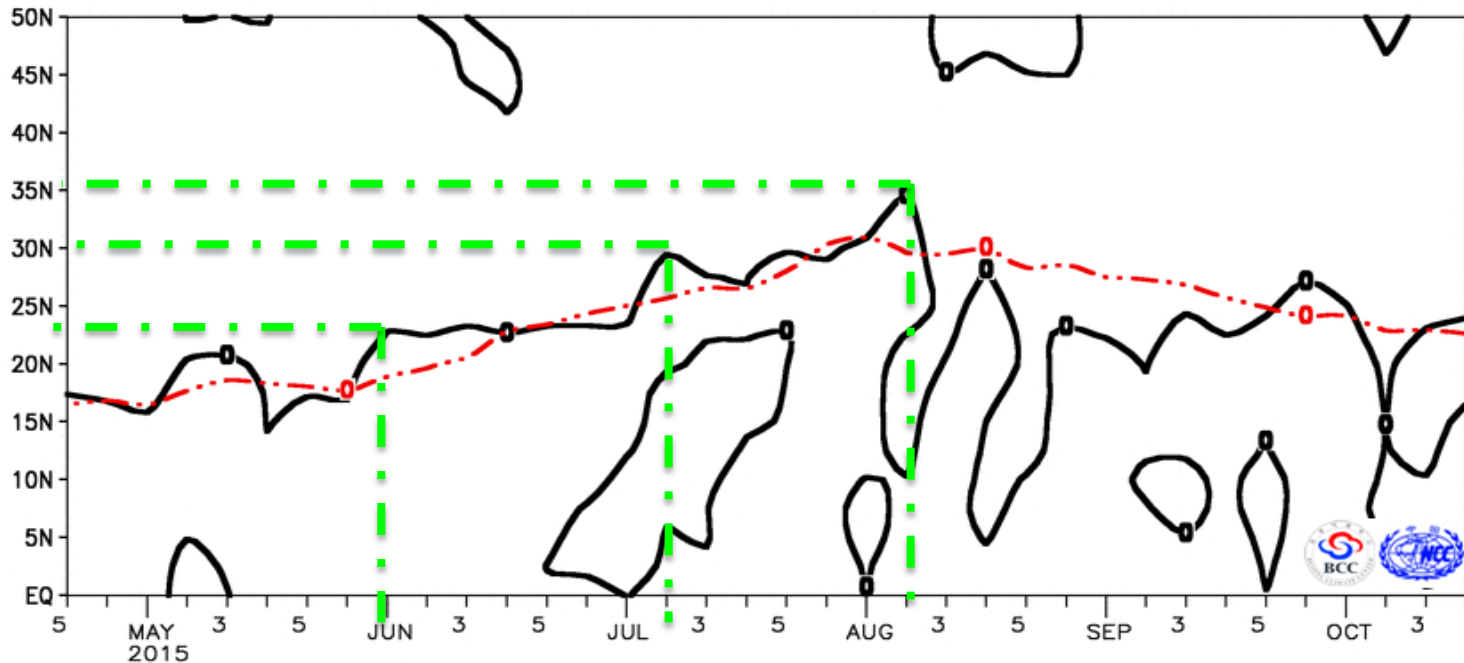
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Abrupt advance northward of WPSH



115-145E 平均500hPa副高脊线位置变化(虚线为气候平均值)

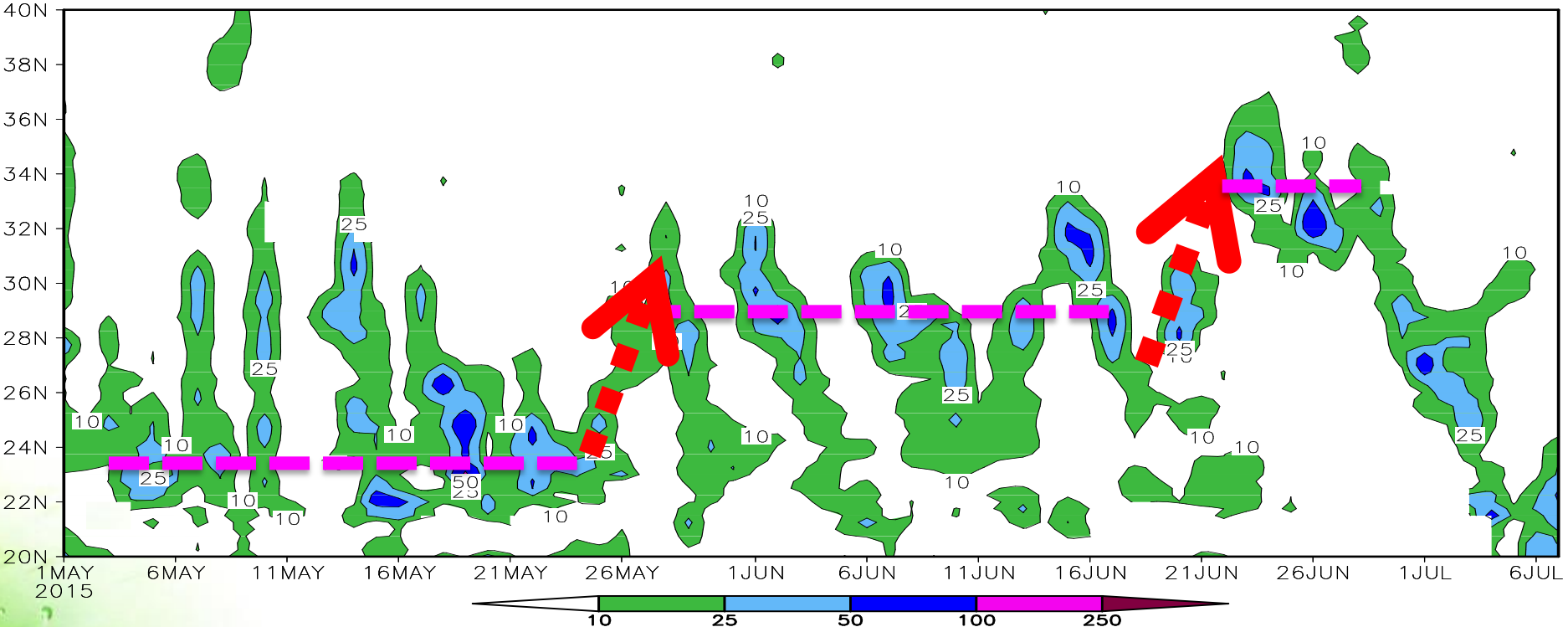
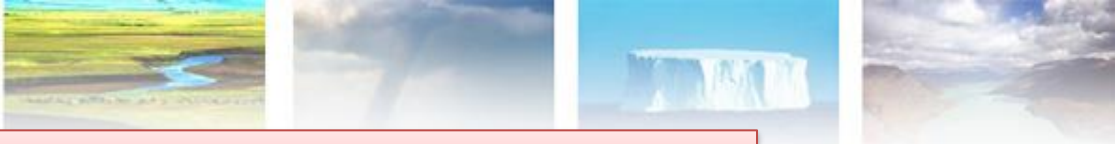
Variation of Mean 500hPa subtropical high ridge over 115-145E
(dashed line defined as climatological normals)

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Migration of the main rainband

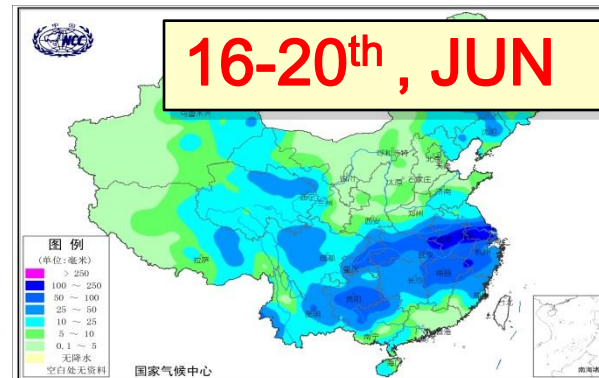
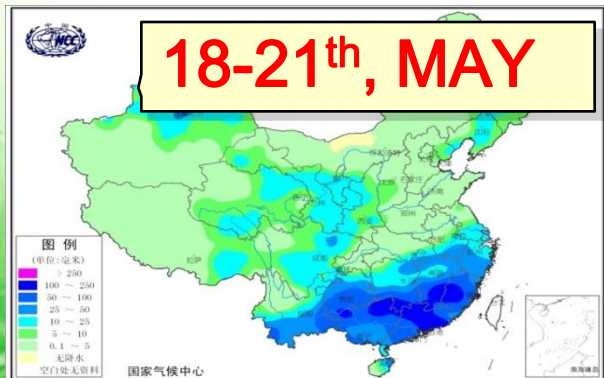
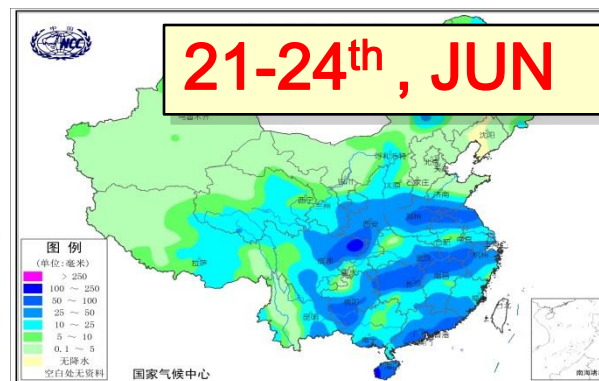
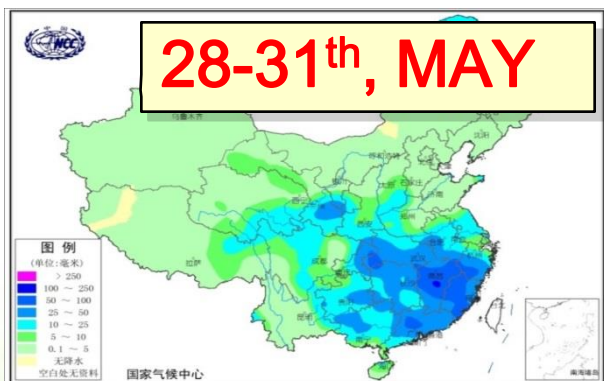
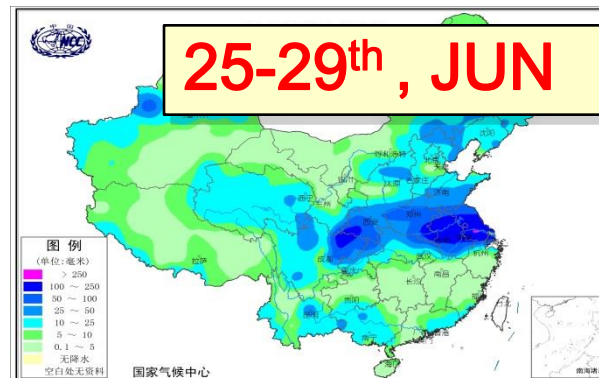
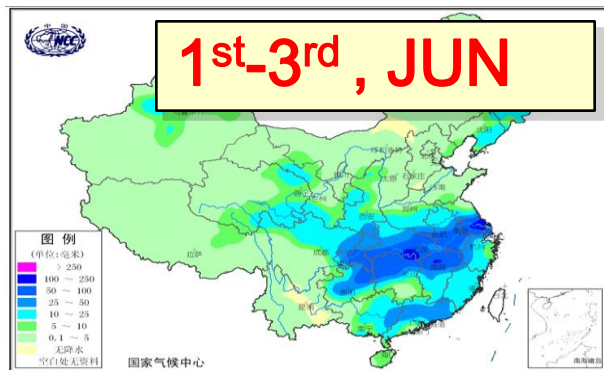


Latitude-time section of the main rain belt changes between May and July (ave: 110-120E)





Rainband leaps northward twice during 5-7





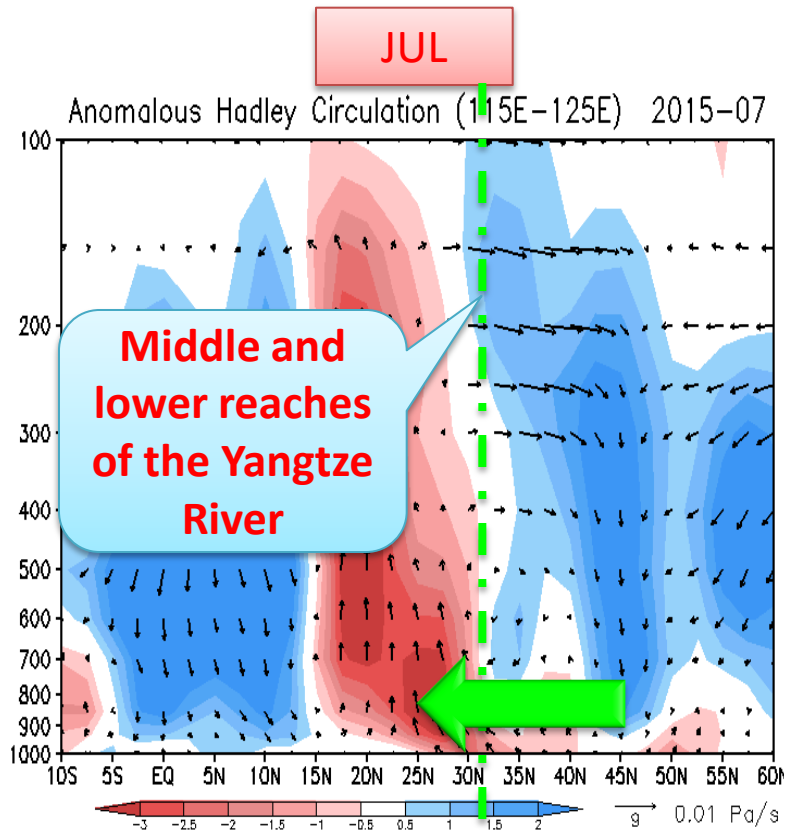
Outline



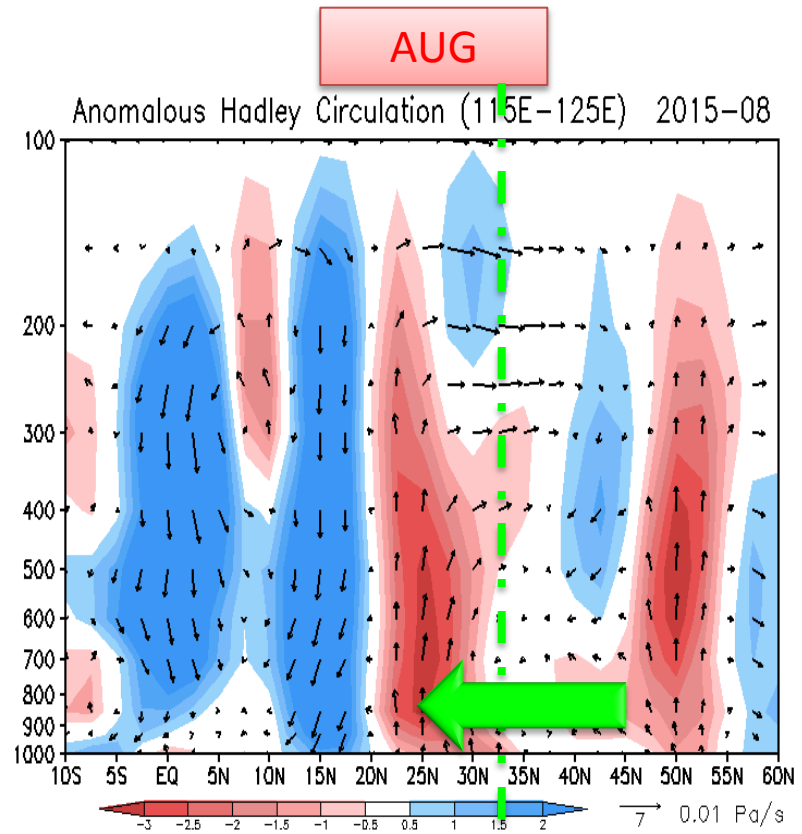
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Anomalous Hadley circulation



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Longitudinal ave: 115E-125E





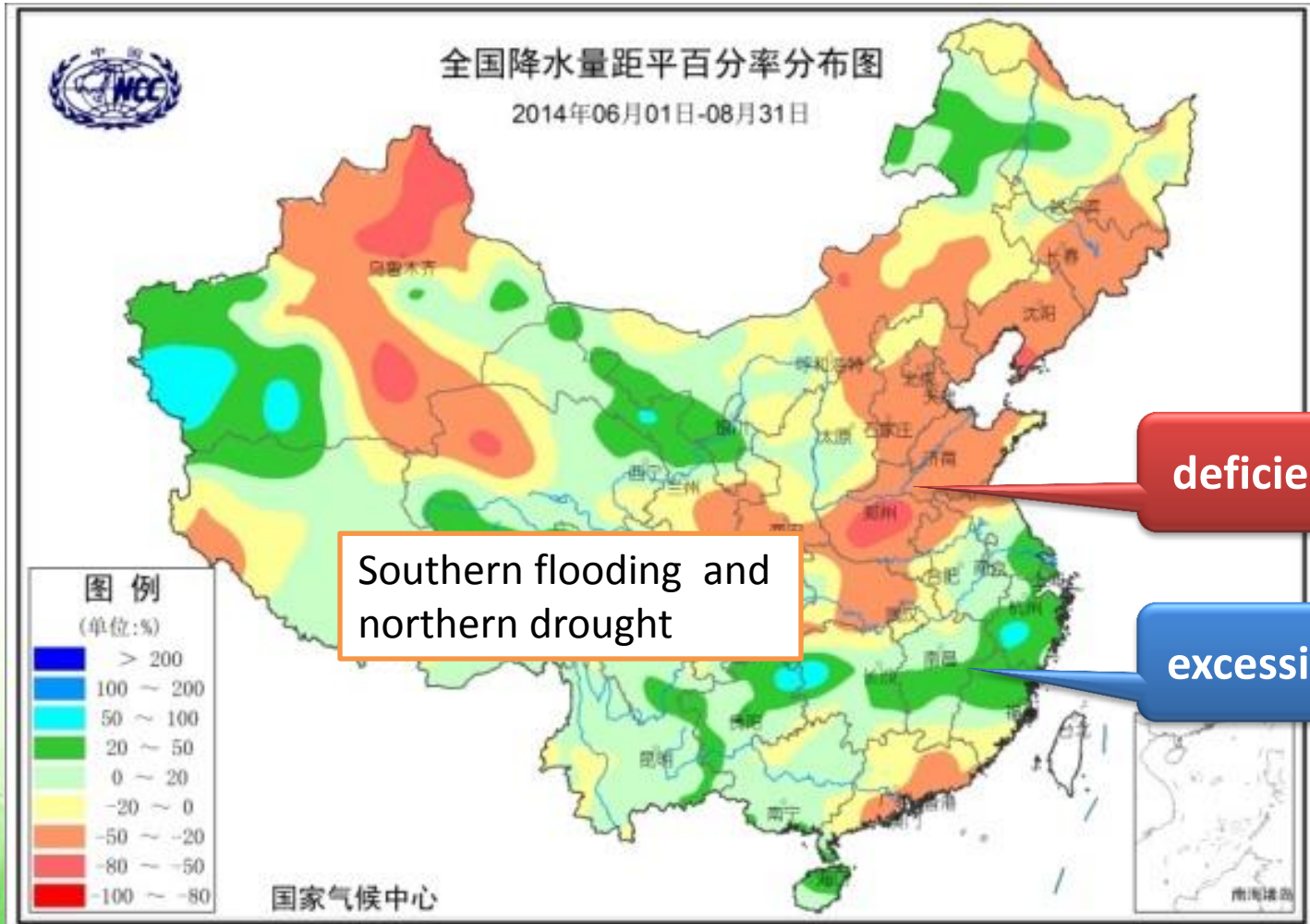
China rainy season monitoring

category	Start date	End Date	Duration time (days)	Accumulated precipitation (mm)	Deviation (%)
south of the Yangtze River rainy season	5.27 (early 12 days)	7.26 (late 18 days)	60 (30 days longer)	676	86
Yangtze valley rainy season	6.14 (equal)	7.27 (late 14 days)	43 (14 days longer)	380	36
Jianghuai Valley rainy season	6.24 (late 3 days)	7.25 (late 10 days)	31 (7 days longer)	387	47
North China rainy season	7.23 (late 5 days)	8.17 (early 1 days)	26 (6 days shorter)	65	-52



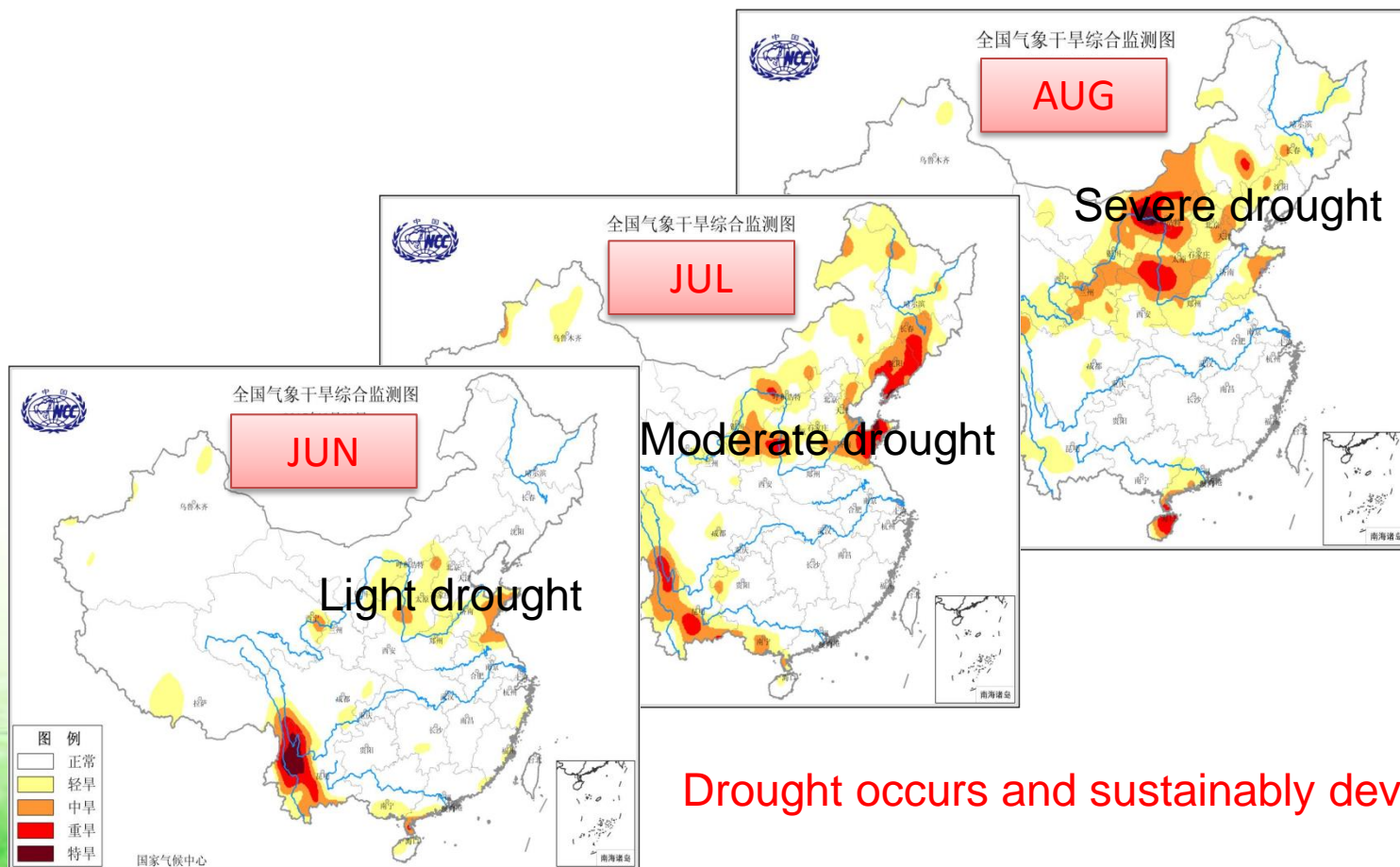


Percentage of precipitation in JJA





Drought monitoring



Drought occurs and sustainably developing





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An ongoing strong El Nino event

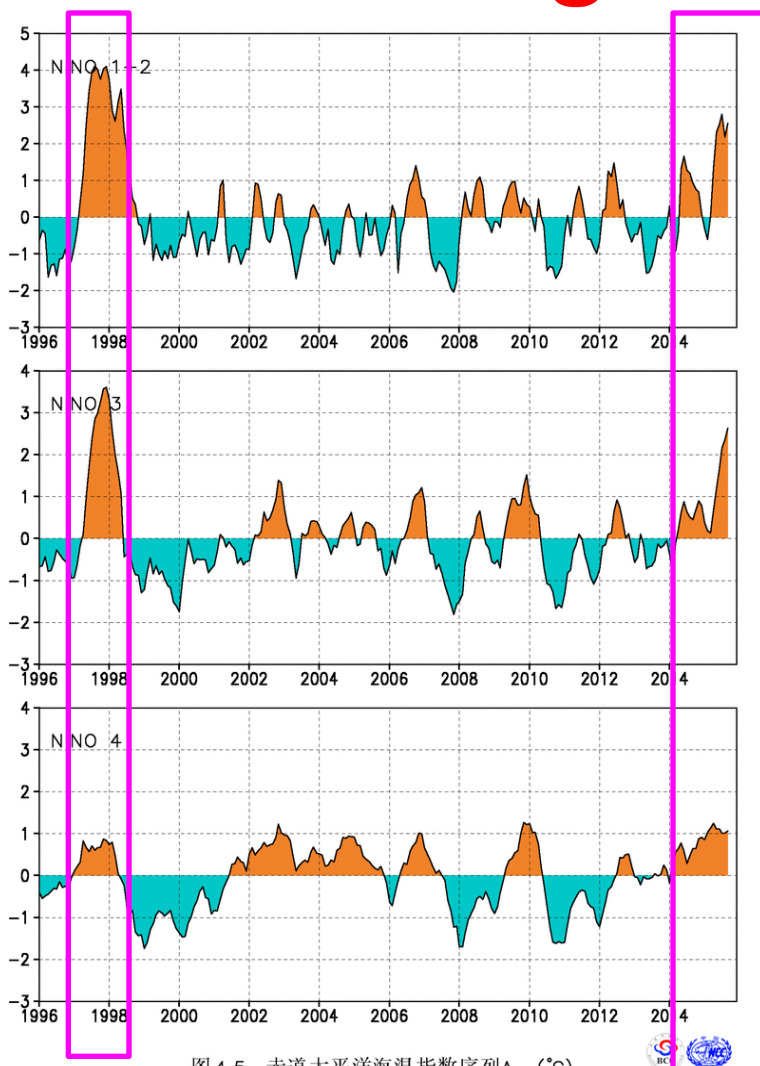


图 4.5 赤道太平洋海温指数序列A (°C)
Indices for Regional SSTA over the Equatorial Pacific (A)
Climate Diagnostics and Prediction Division /NCC/

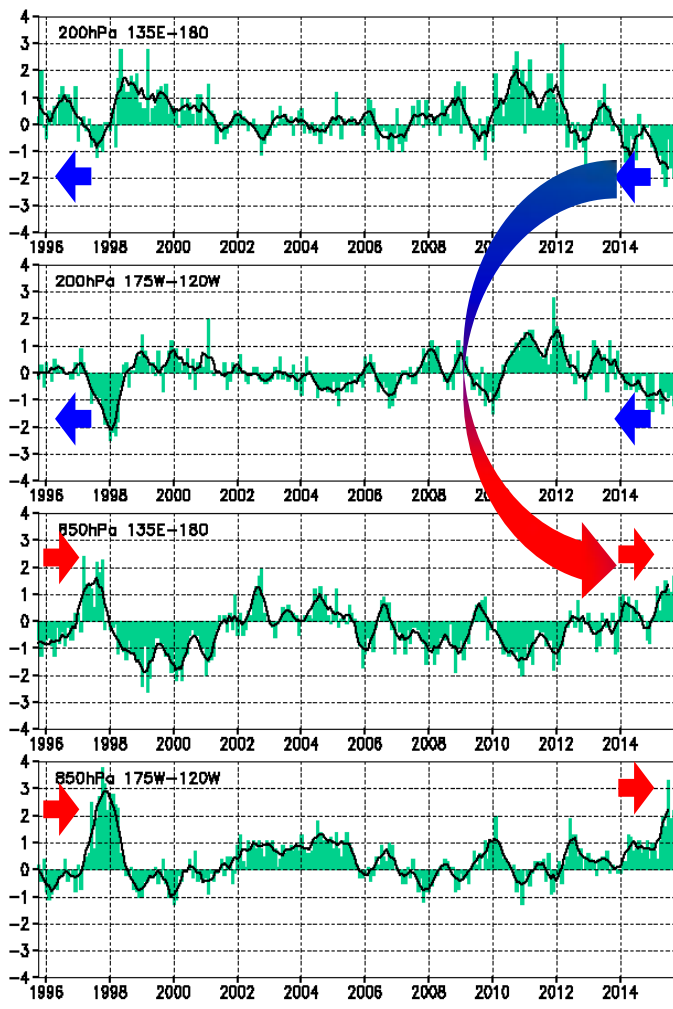
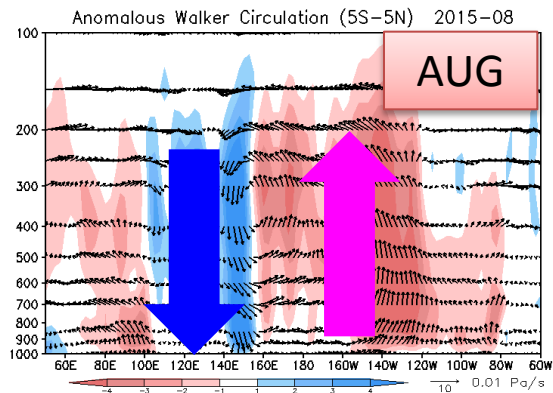
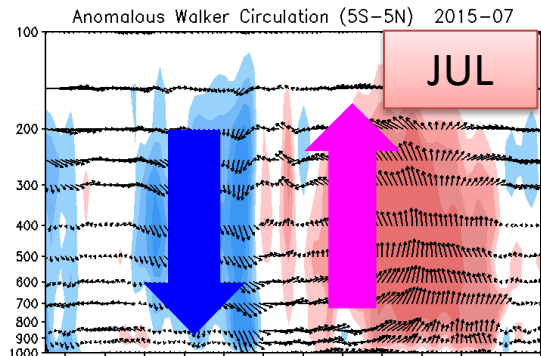
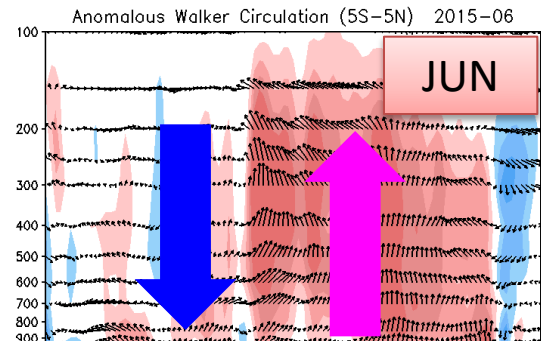


图 4.13 赤道太平洋纬向风指数序列
Indices for Regional Zonal Wind over the Equatorial Pacific
Climate Diagnostics and Prediction Division/NCC/CMA

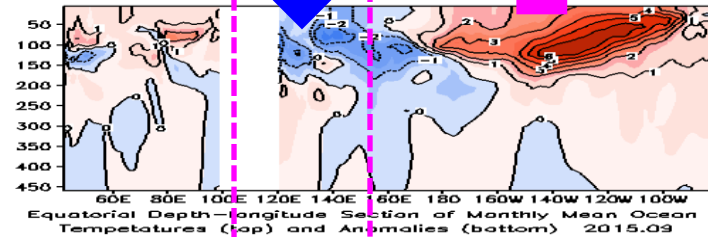
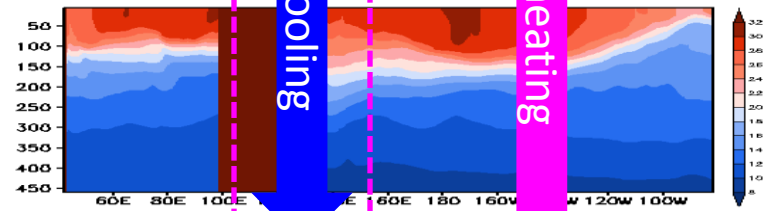
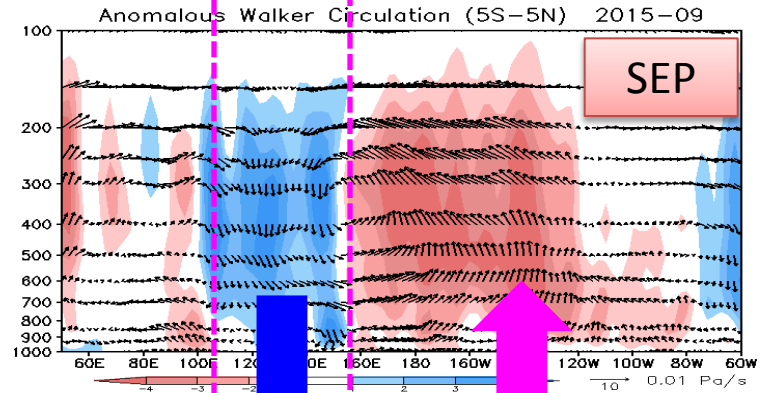




Anti-walker circulation and air-sea interaction



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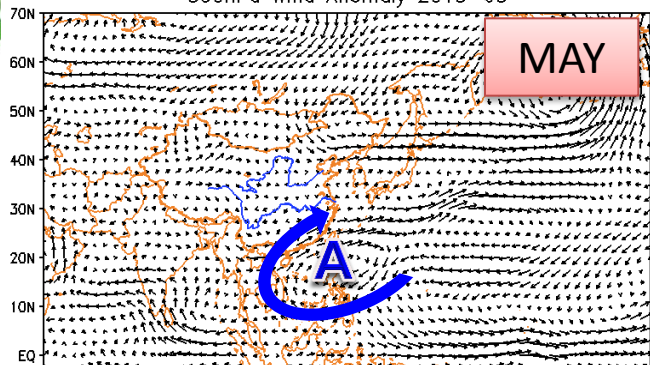


Equatorial Depth-Longitude Section of Monthly Mean Ocean Temperatures (top) and Anomalies (bottom) 2015.09



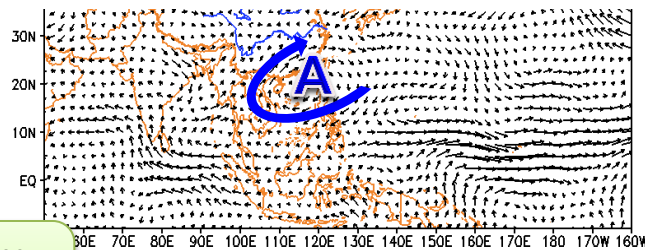
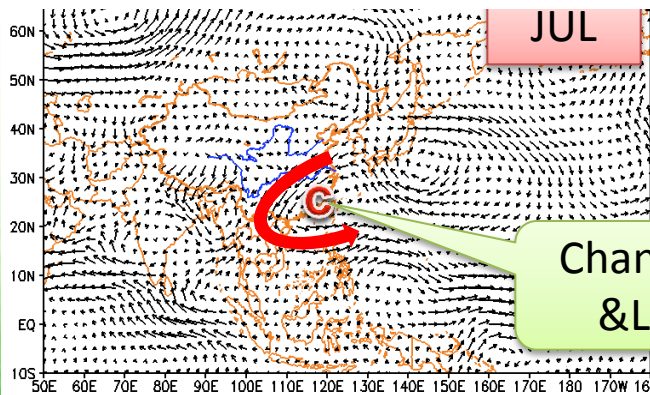
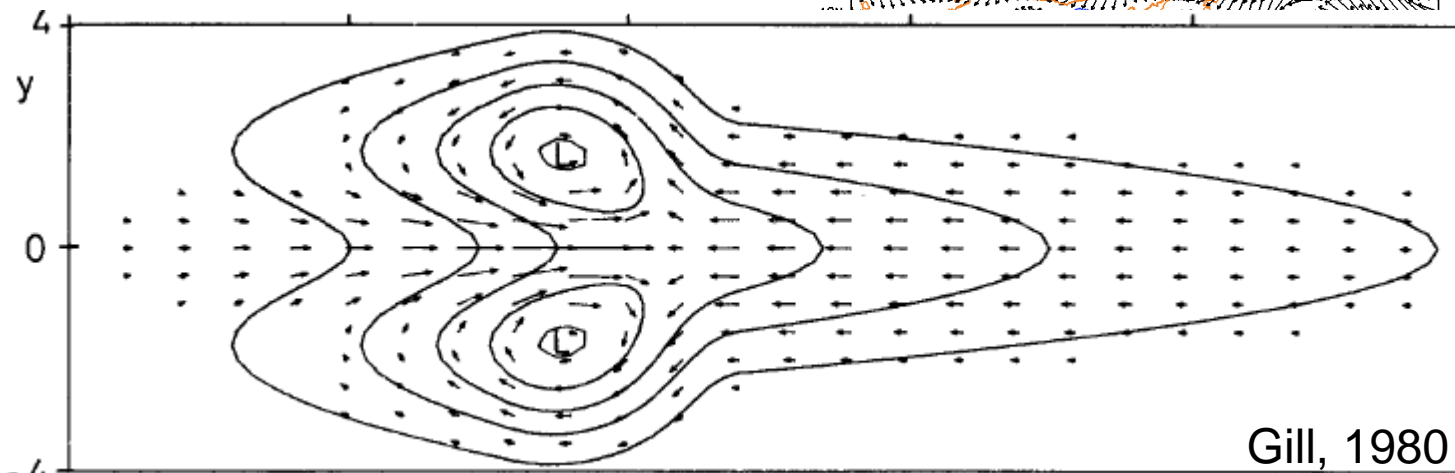
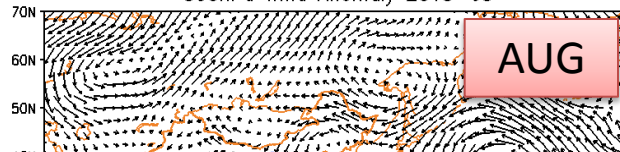


850hPa Wind Anomaly 2015-05



850 hPa wind anomaly

850hPa Wind Anomaly 2015-08



Chan-hom
& Linfa

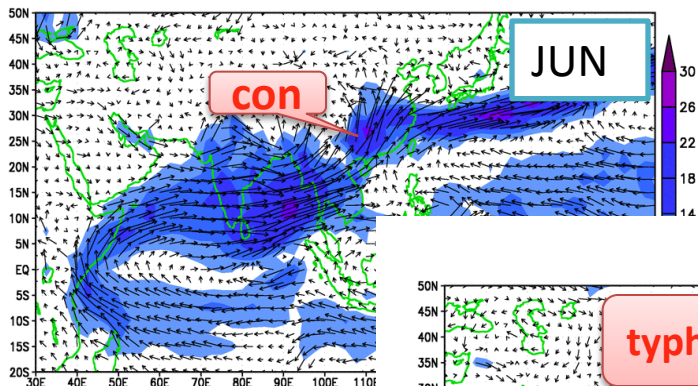
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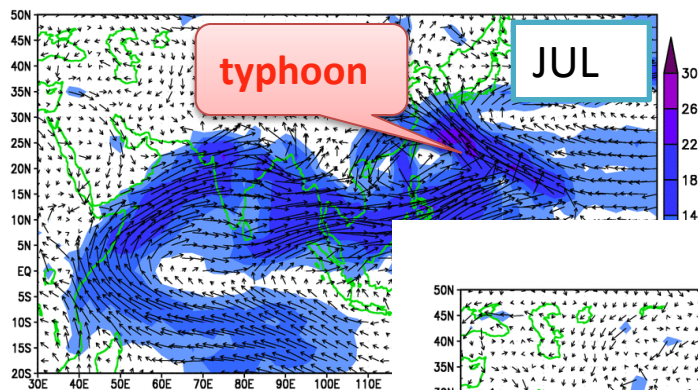




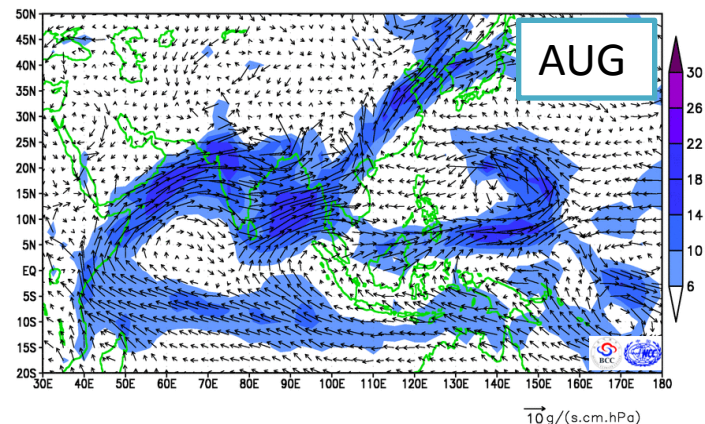
Water vapor transportation



候平均 850hPa水汽输送图
 pentadly mean 850hPa vapor transport
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 Climate Diagnostics and Prediction



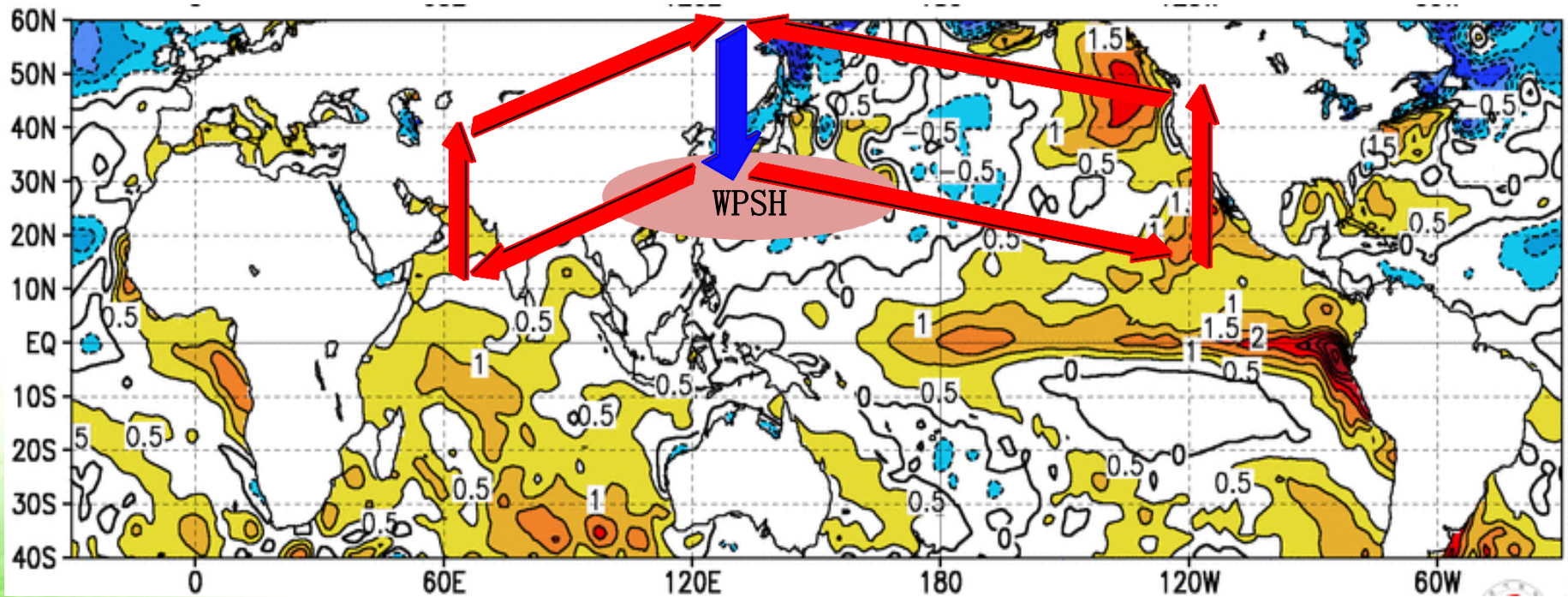
候平均 850hPa水汽输送图
 pentadly mean 850hPa vapor transportation
 (Unit: g/(s.cm.hPa))

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Schematic diagram of the impact of ENSO on China's climate





Conclusions

- ◆ In 2015, EASM began with SCSSM at the date the same as normal. Then it progressed northward not as far as normal, and exhibited a weaker intensity in the late summer time.
- ◆ The seasonal variation of WPSH, which was closely related to the onset and withdrawal of EASM, was characterized by an enhanced intensity, more southward and westward location except for July.
- ◆ Rainfall over East China also had a like-“southern flooding and northern drought” distribution, was partly due to a weaker EASM in late summer and a southward stronger WPSH.
- ◆ An ongoing El Nino is reinforcing the convection over tropical EP and damping over WP, which can further weaken the walker circulation and induce an anti-cyclone over SCS. The anti-cyclone intensifies an anomalous westerly over Yangtze River, which is in favor of convergence of water vapor flux, and eventually lead to excessive rainfall in SC and deficient rainfall in NC.



Thanks for your attention!

