

Introduction

- Water vapor transport over East Asia (EA) - WNP is extremely complex and energetic which exhibits remarkable annual variability;
- ENSO shows great influences on the climate over EA-WNP;
- What is the impact of ENSO on the variation of summer moisture circulation over EA-WNP?

Data

- Reanalysis dataset: JRA-25
- SST: ERSST V3b

Methodology

- Real-vector empirical orthogonal function technique

Results

(1) Modes of moisture circulation

• +EOF1

Anticyclonic circulation over tropical-subtropical WNP, westward transport over tropical IO and WNP

• +EOF2

Tripole pattern, anticyclonic circulation over subtropical WNP, with two opposite ones to its south and north

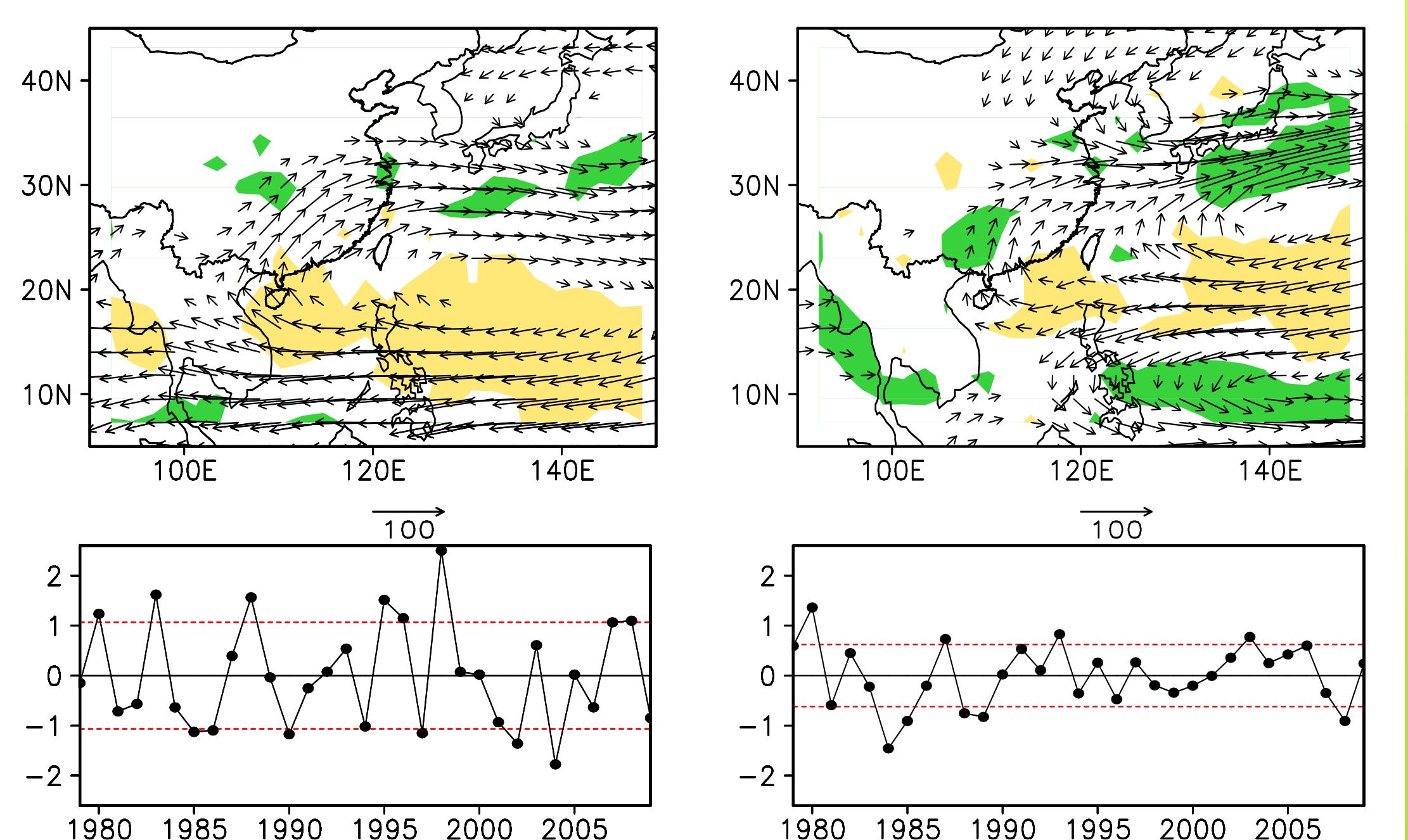


Fig.1 Two well-separated modes of moisture circulation over EA-WNP.

Quasi-four-year Coupling between ENSO and Water Vapor Transport over East Asia-WNP

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(2) Quasi-four-year Coupling

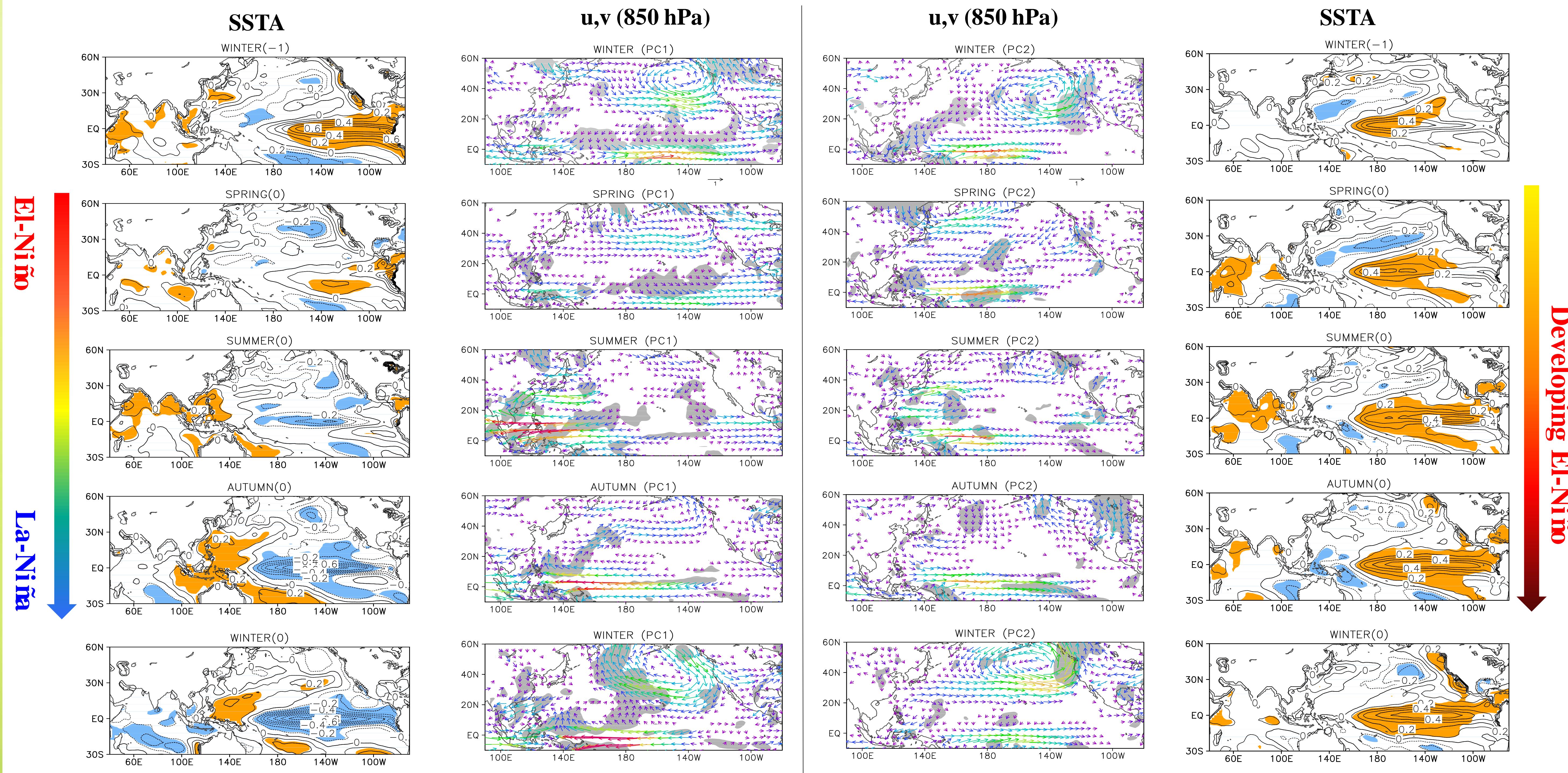


Fig. 2 Regression of SST and 850-hPa based on PC1 (left) and PC2 (right) of EOF analysis.

- +EOF1 tends to come up in the summer proceeded by an El Niño event and followed by a La Niña event.
- +EOF2 tends to come up in the summer that +SSTA over tropical eastern-central Pacific develops continually from the previous year to the following winter
- The establishment of anticyclone/cyclone over Philippine Sea region and its eastward extension during different phase of the ENSO episode play an important role in the moisture circulation variation over EA-WNP.

(3) Composite quasi-four-year coupling

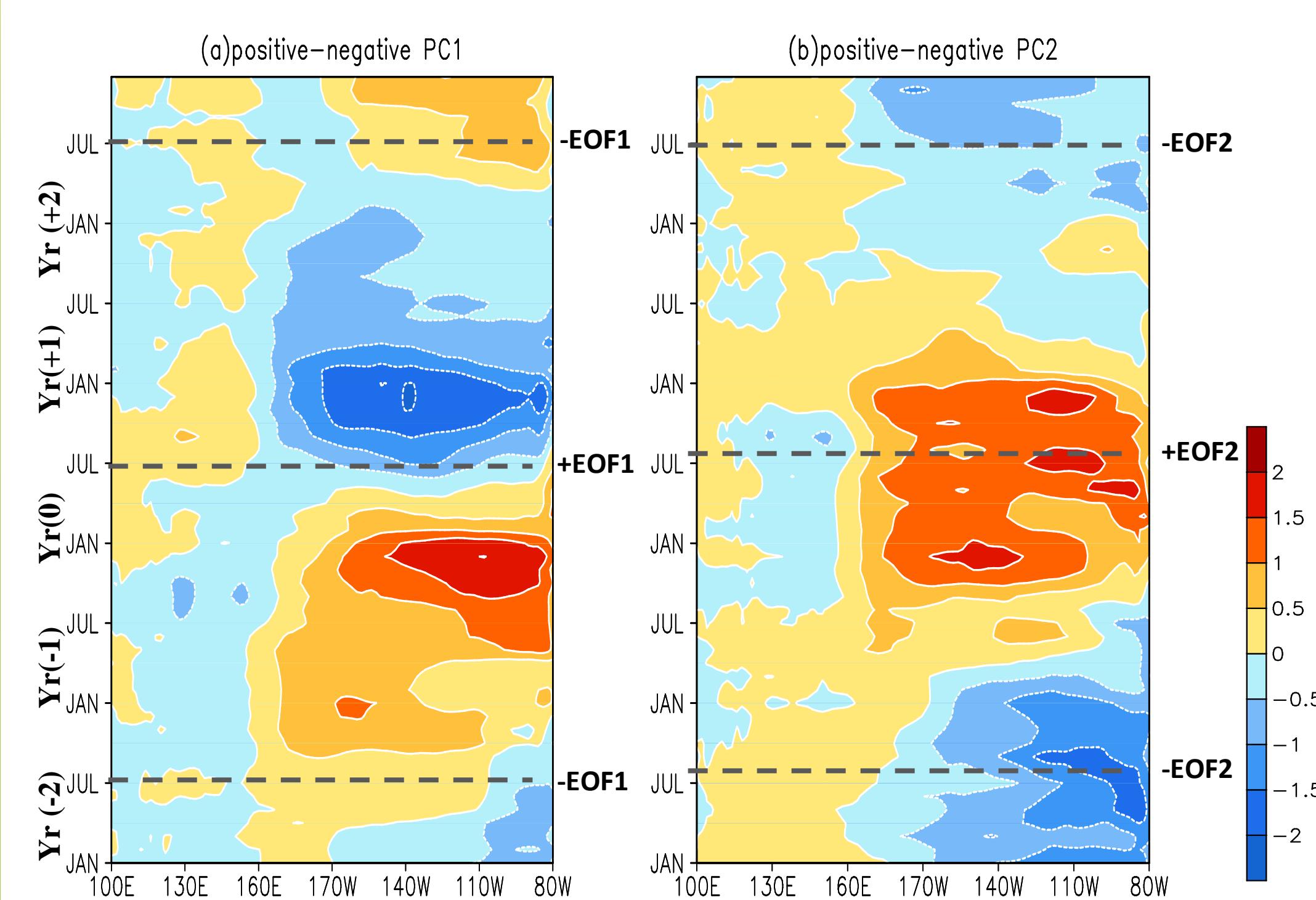


Fig. 3. Composite positive-minus-negative tropical SSTA from two years before to two years after.

- Quasi-four-year coupling between ENSO and the moisture transport is also found in the composite study, which is consistent with the result from the regression study

Conclusion

- Moisture circulation over East Asia-WNP is dominated by two well-separated modes.
- They couple well with the low-frequency ENSO during its quasi-four-year cycle.
- Anticyclone (cyclone) over the Philippine Sea and the easterly (westerly) wind anomaly to its south play an important role in maintaining this quasi-four-year coupling.

Further Information

Li X. Z., W. Zhou. 2012. Quasi-four-year coupling between El Niño-Southern Oscillation and water vapor transport over East Asia-WNP. Accepted by Journal of Climate.

