

A review of the environmental connection to 2015 typhoon intensity

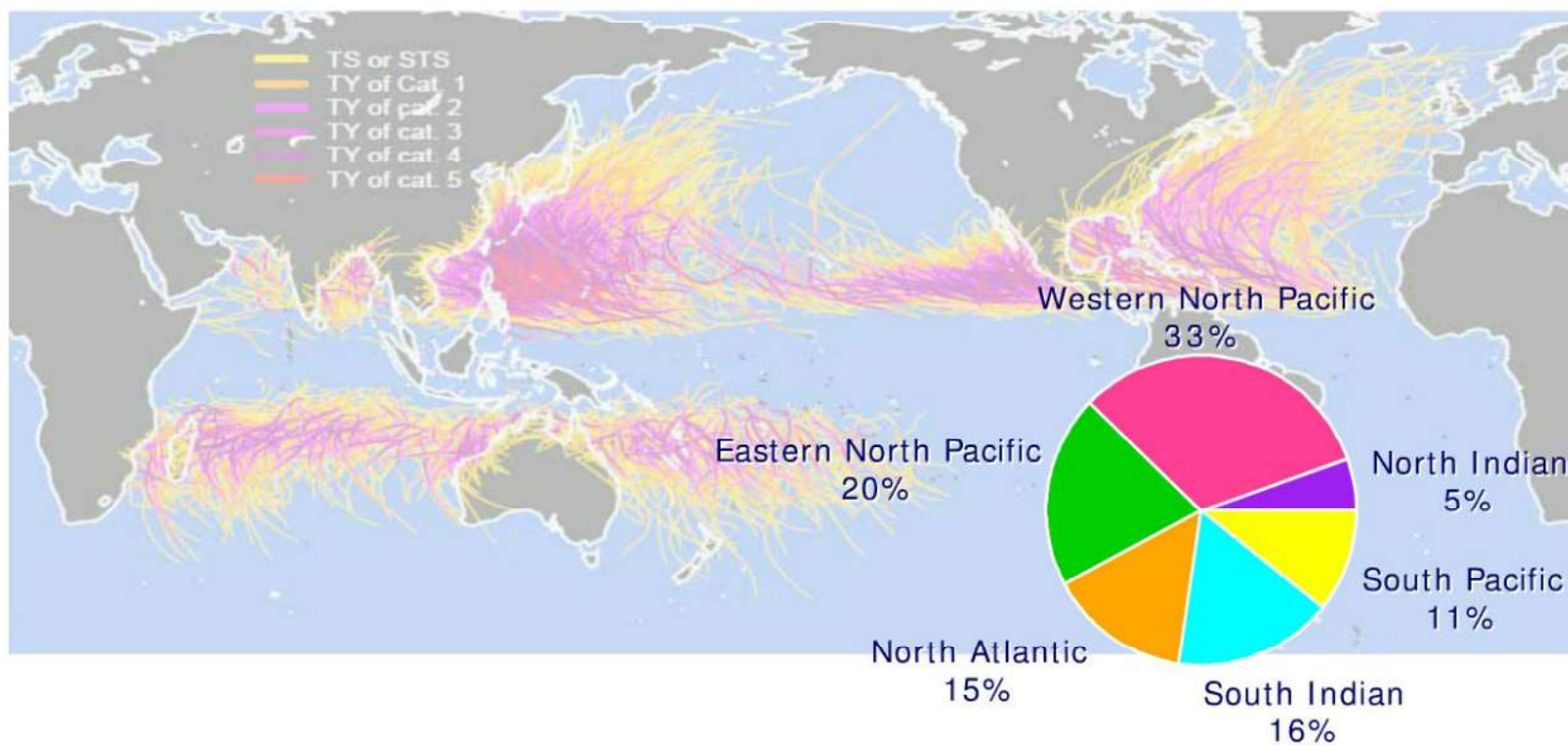
Nam-Young Kang



Korea Meteorological Administration

National Typhoon Center

Best-track source : JTWC , CPHC & NHC (43 year : 1970 ~ 2012)



✳ The western North Pacific accounts for one third of all TCs worldwide.

Kang and Elsner 2012a (Clim. Dyn.)

Alternativ viewpoints (indicators)

Kang and Elsner 2012b (J. Clim.)

Data for reliable consensus

Kang and Elsner 2015 (Nature Clim. Change)

Global warming and the role of EINT

Kang and Elsner 2016 (J. Clim.)

The role of EINT in the western North Pacific

Yang, Kang, Elsner and Chun 2018 (J.Clim.)

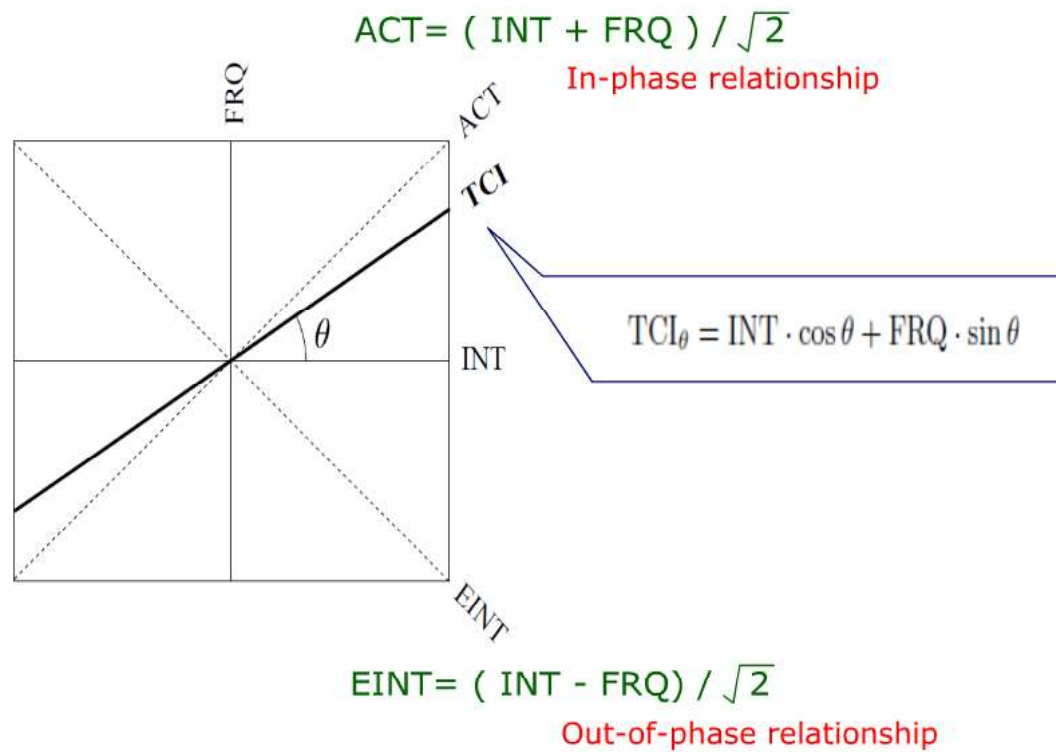
Seasonal INT (FRQ)

Seasonal track pattern

+ Operational procedure considered

Goal of the series of works

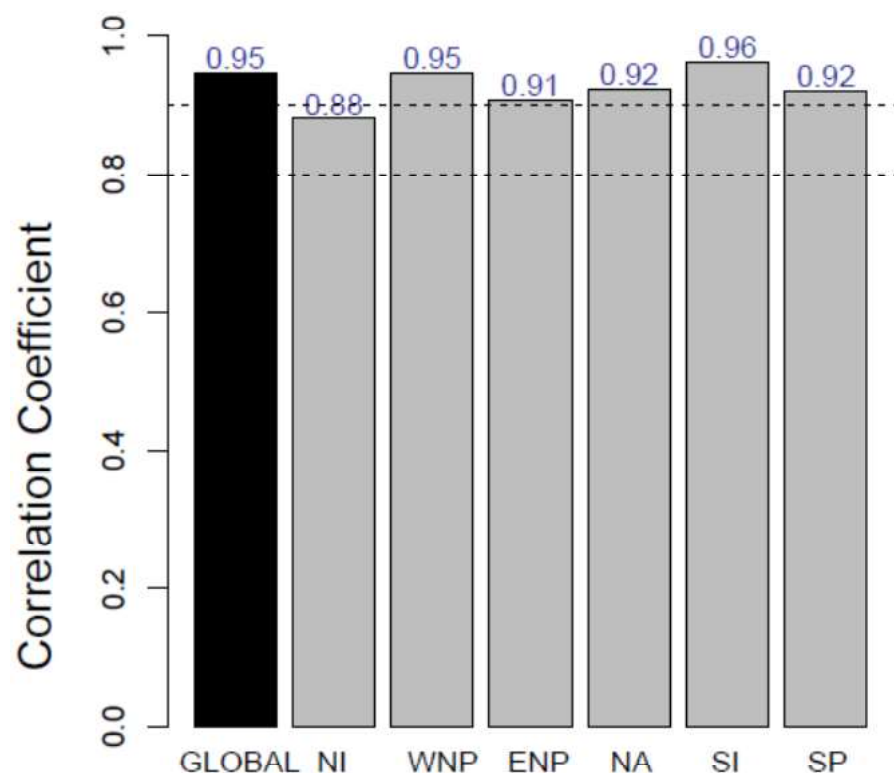
Seasonal typhoon prediction system



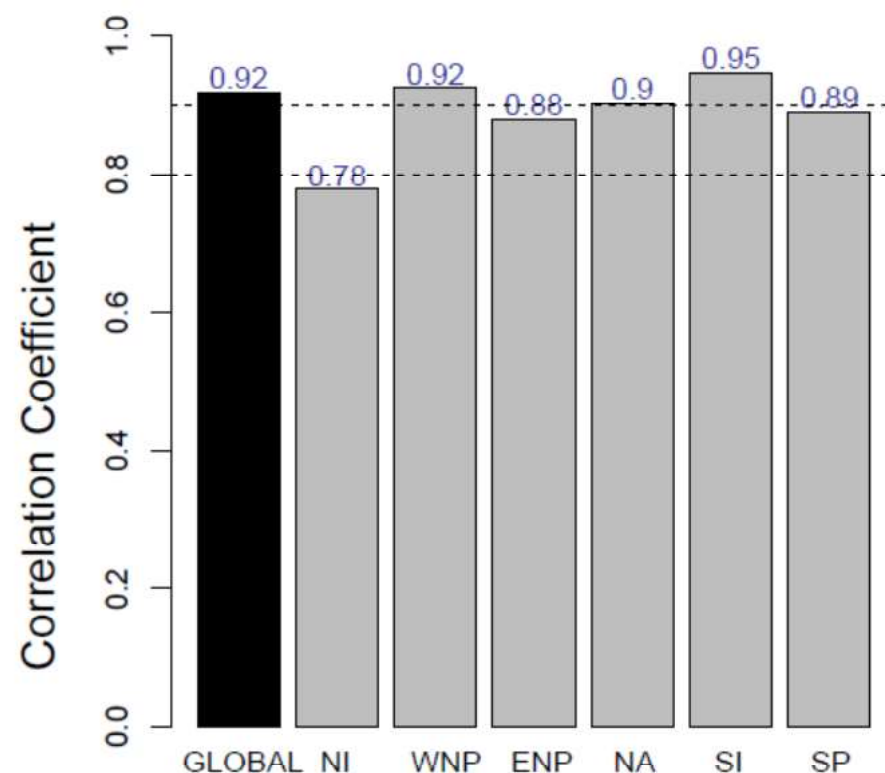
- § TCI represents a weighted linear combination of INT and FRQ.
- § ACT and EINT are the special cases when θ is $+45^\circ$ and -45° , respectively.

Correlation of activity (A) with ACE and PDI

a Correlation of A with ACE

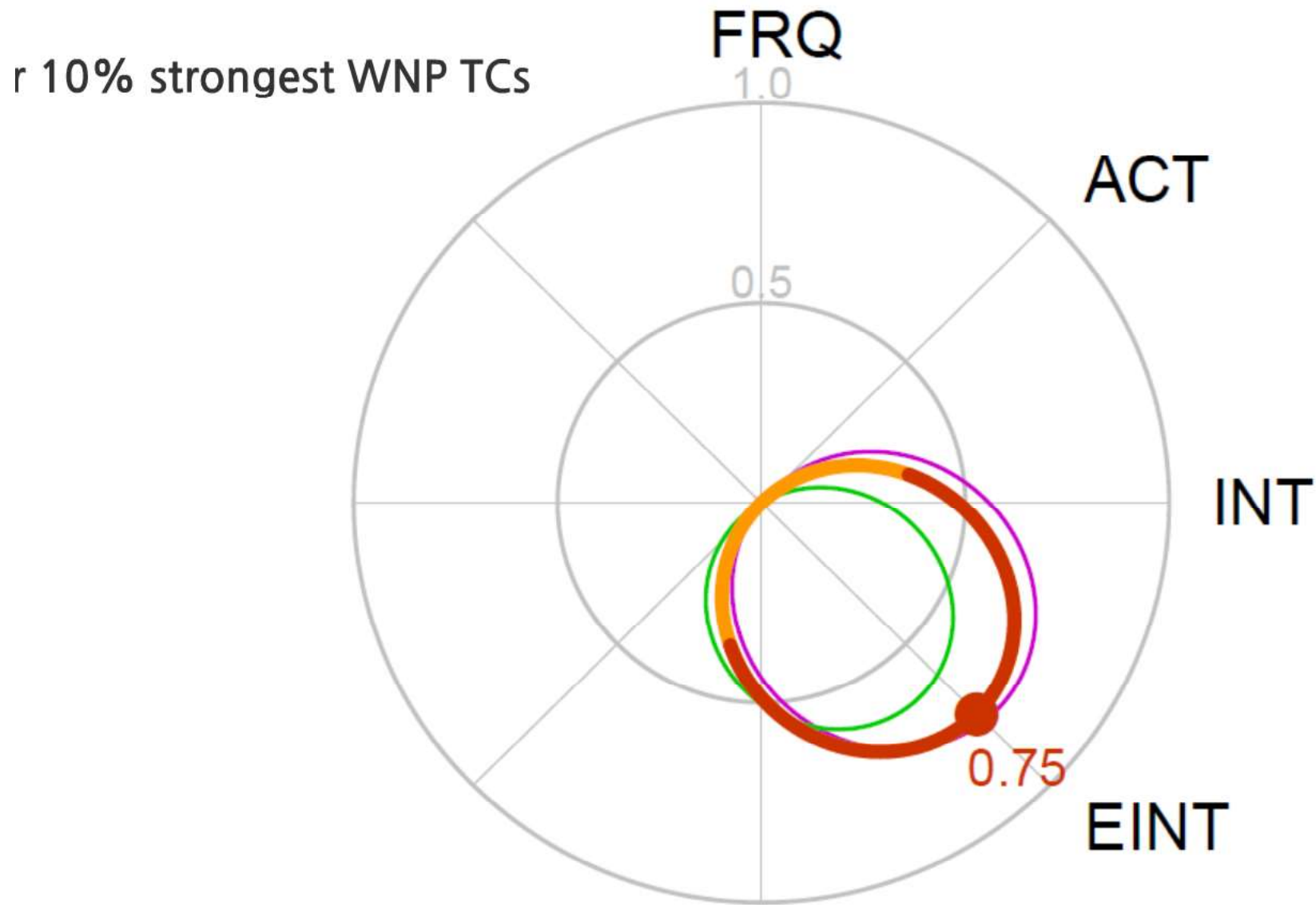


b Correlation of A with PDI



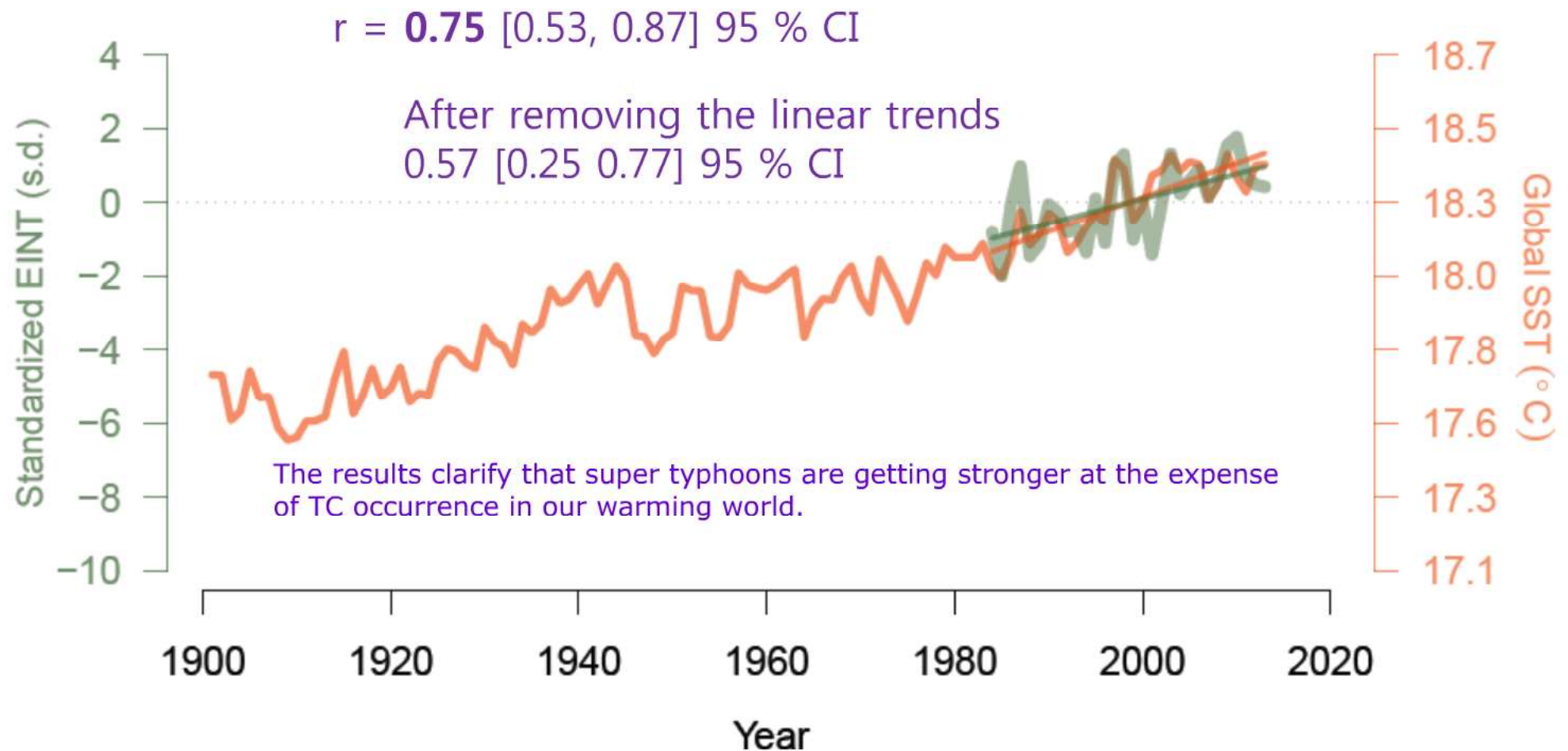
Data : JTWC & NHC / 1984-2012 (29 years)

Correlation screen of El Niño and global ocean warmth with TC climate variabilities



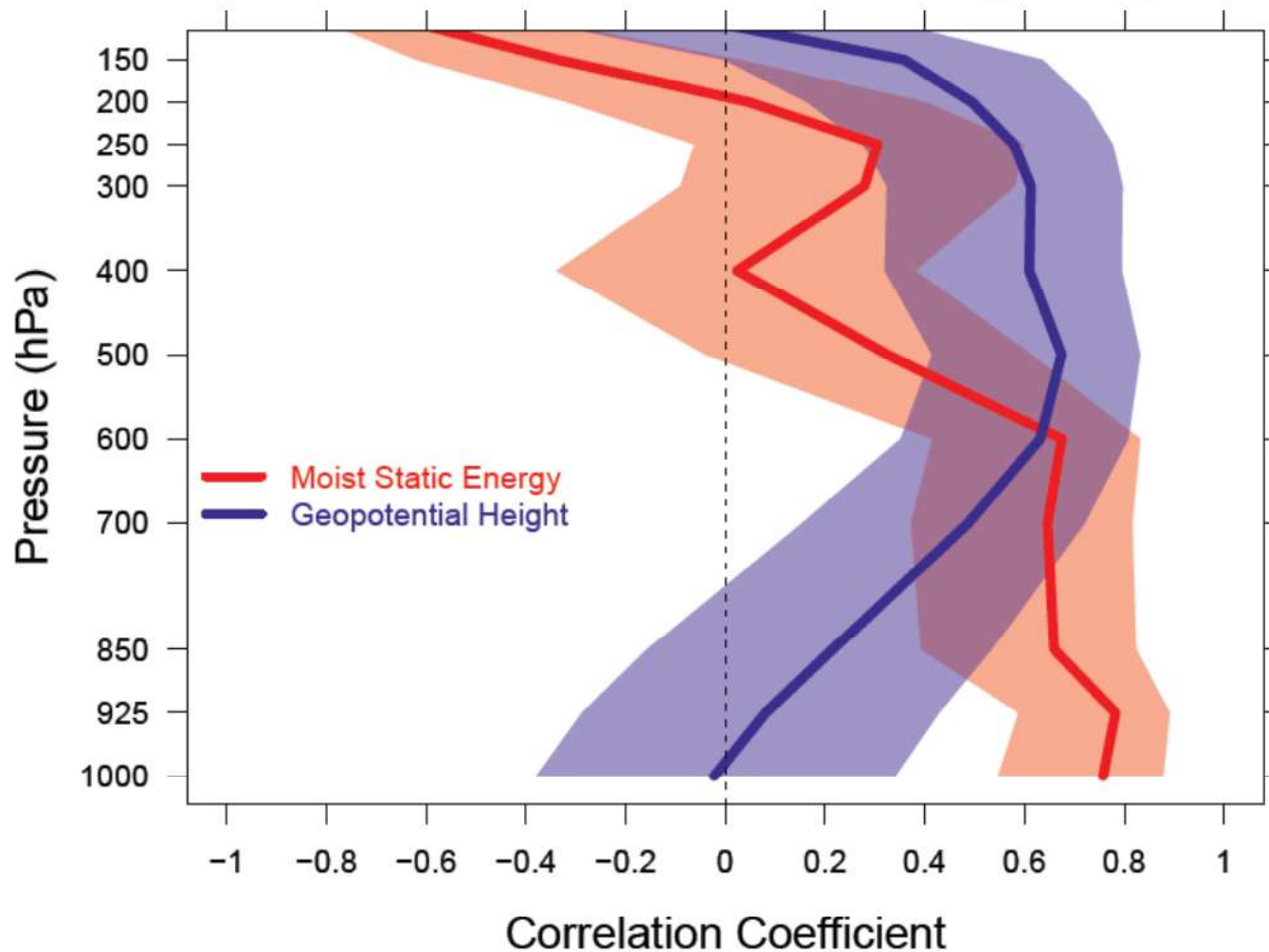
Data : JTWC / JJASON 1984-2013 (30 years)

Time series of global ocean warmth and EINT



Data : NOAA ERSST V3b / JJASON 1901-2013 (113 years)
JTWC / JJASON 1984-2013 (30 years)

Correlation profile of global ocean warmth with MSE and GPH in the WNP tropics (0-30N, 100E-180)

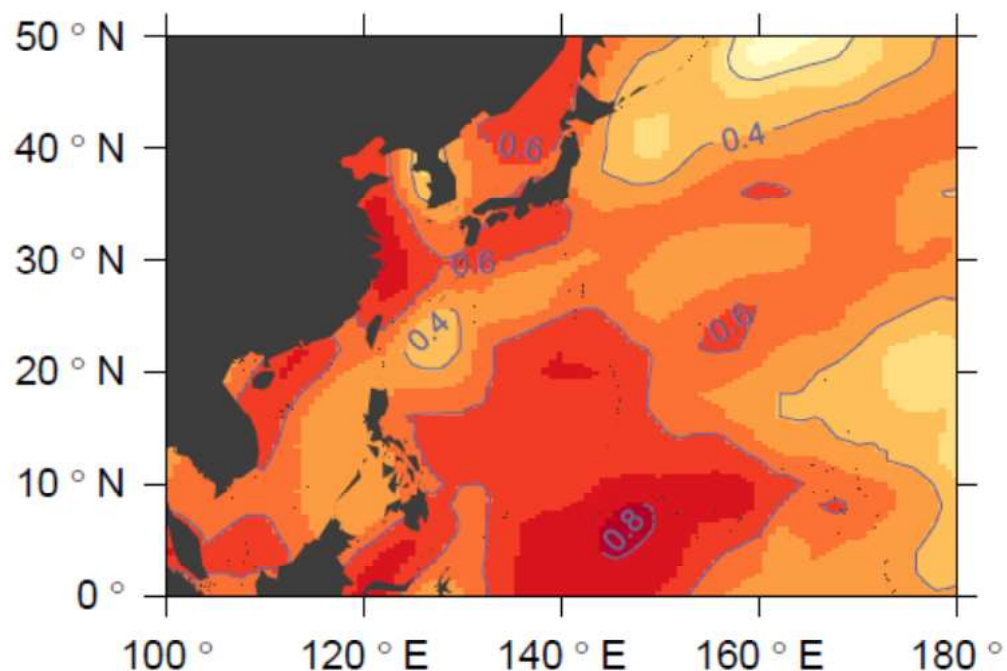


Partial correlation (El Nino influence removed)

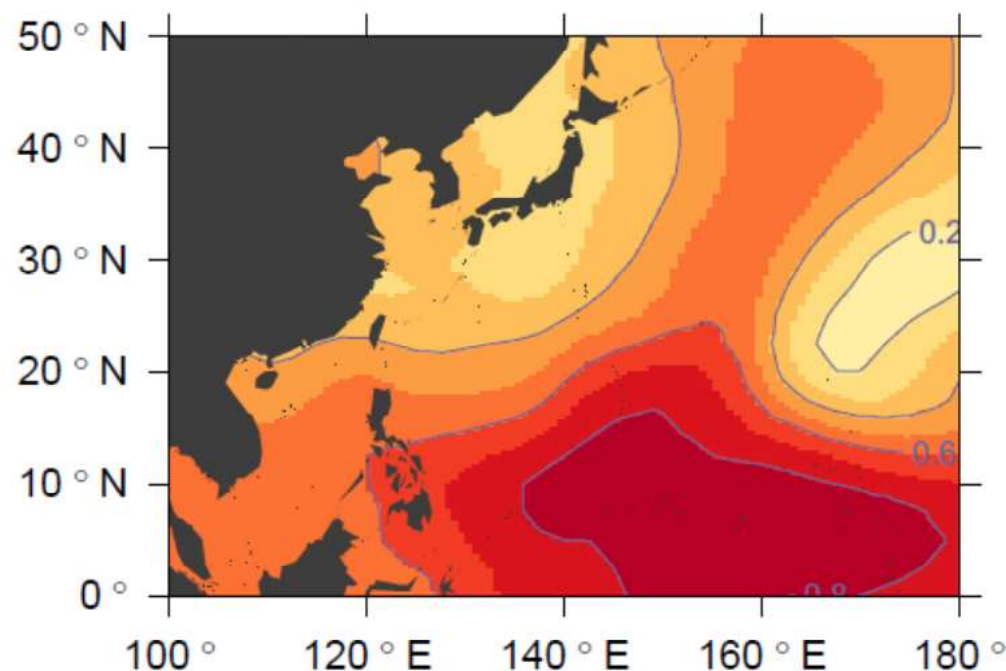
Data : NCEP reanalysis / JJASON 1984-2013 (30 years)

Correlation of global ocean warmth

with regional SST



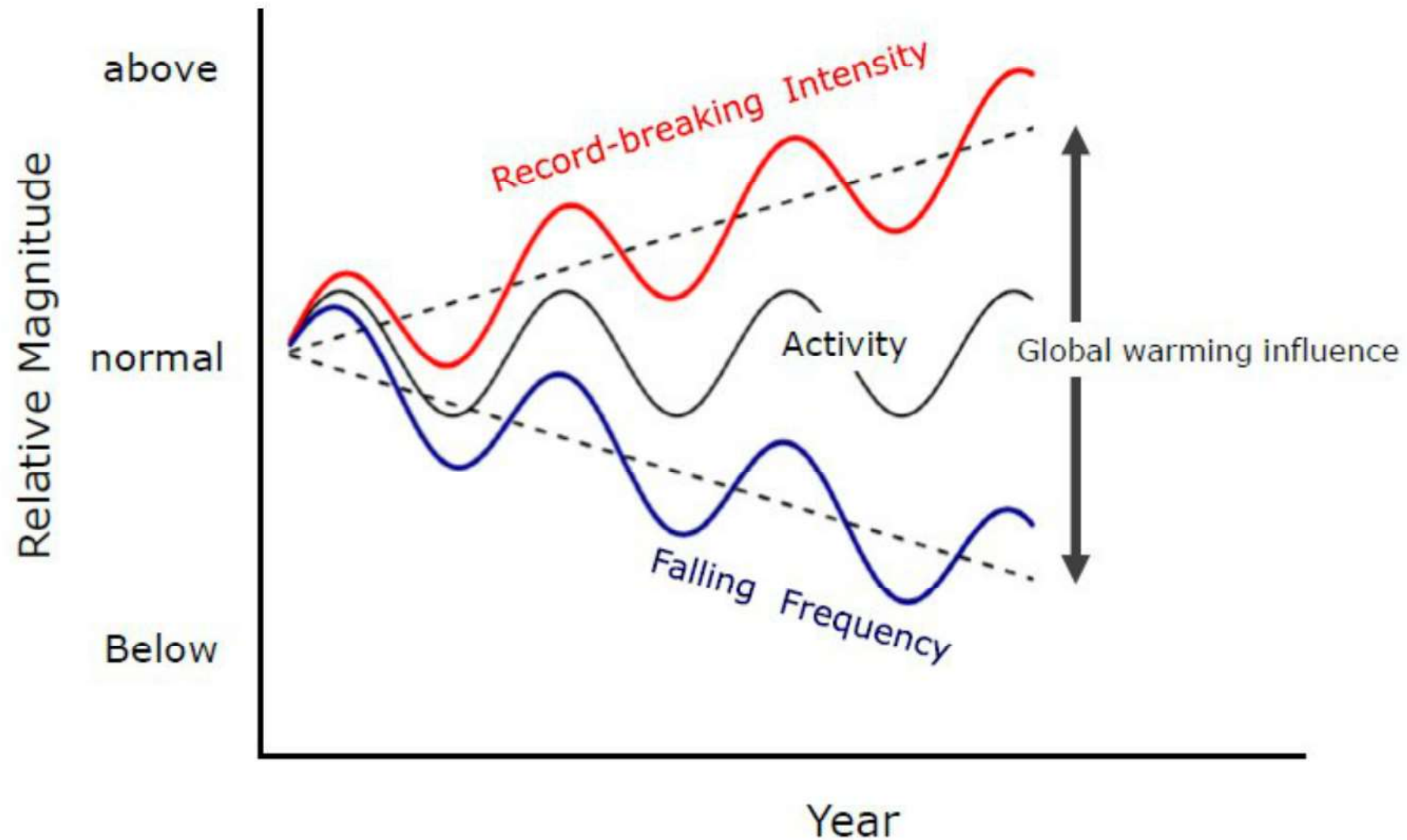
with regional 500 hPa GPH



Partial correlation (El Nino influence removed)

Data : NCEP reanalysis / JJASON 1984-2013 (30 years)

Diagram of global warming influence on WNP TCs



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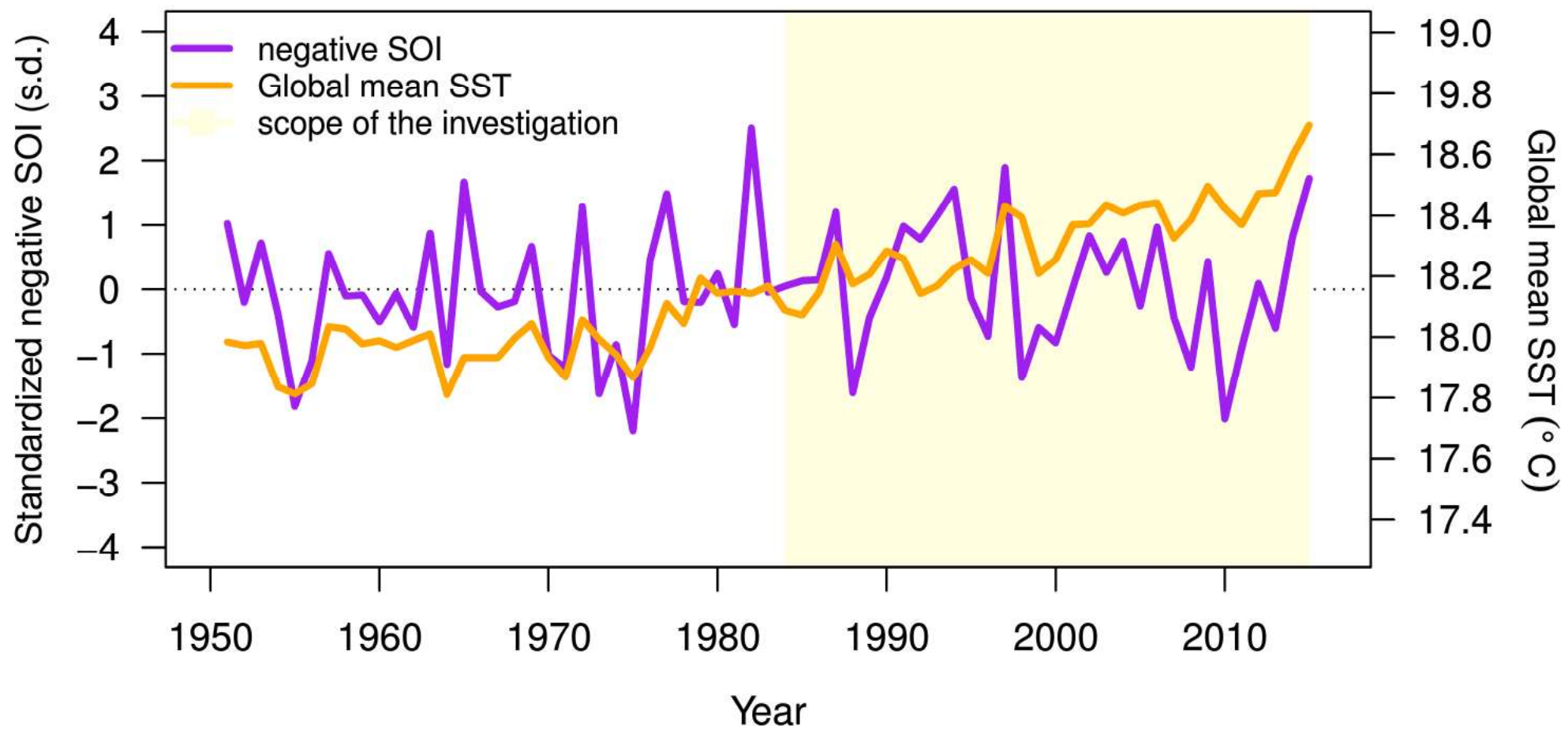
Seasonal INT (FRQ)

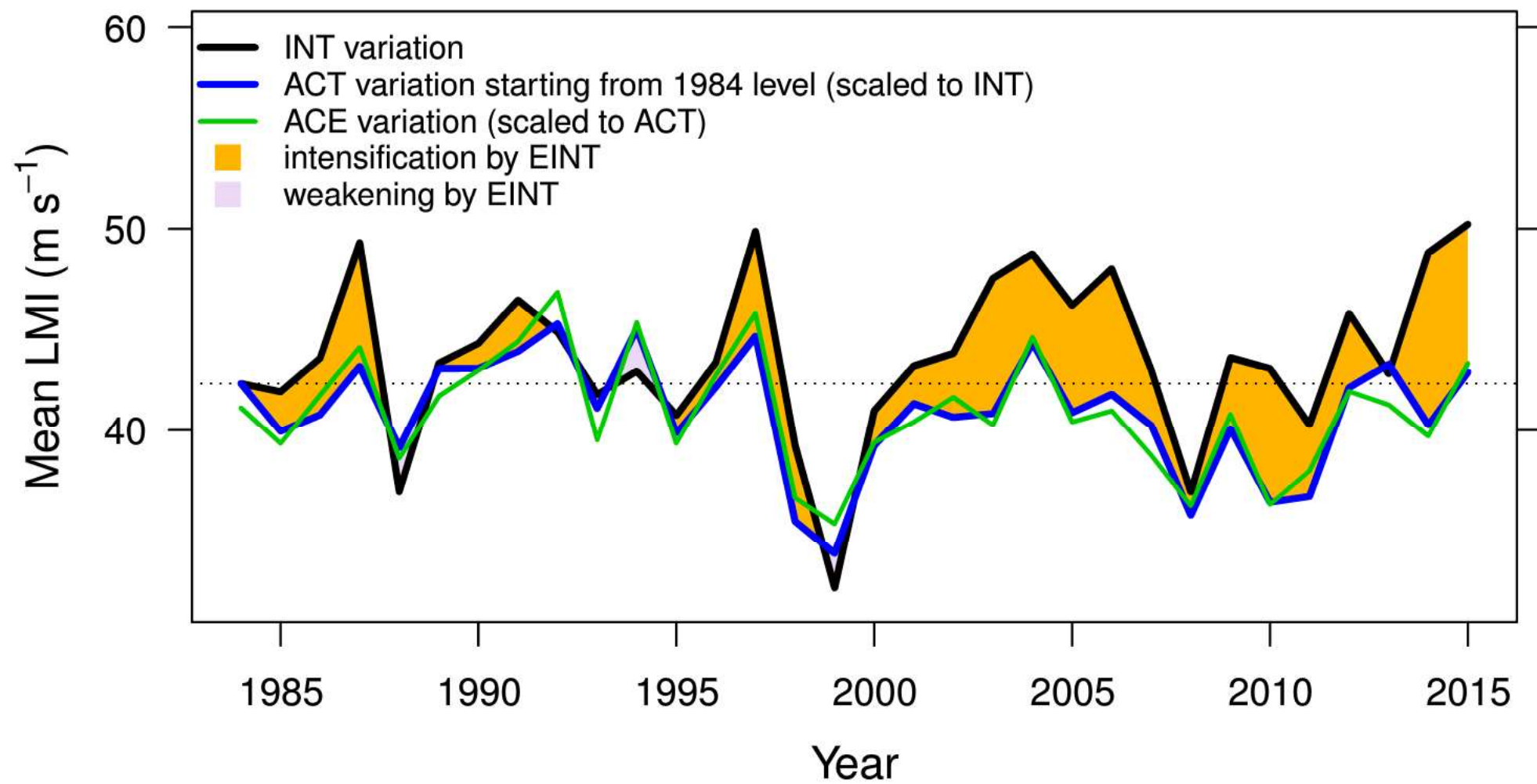
Seasonal track pattern

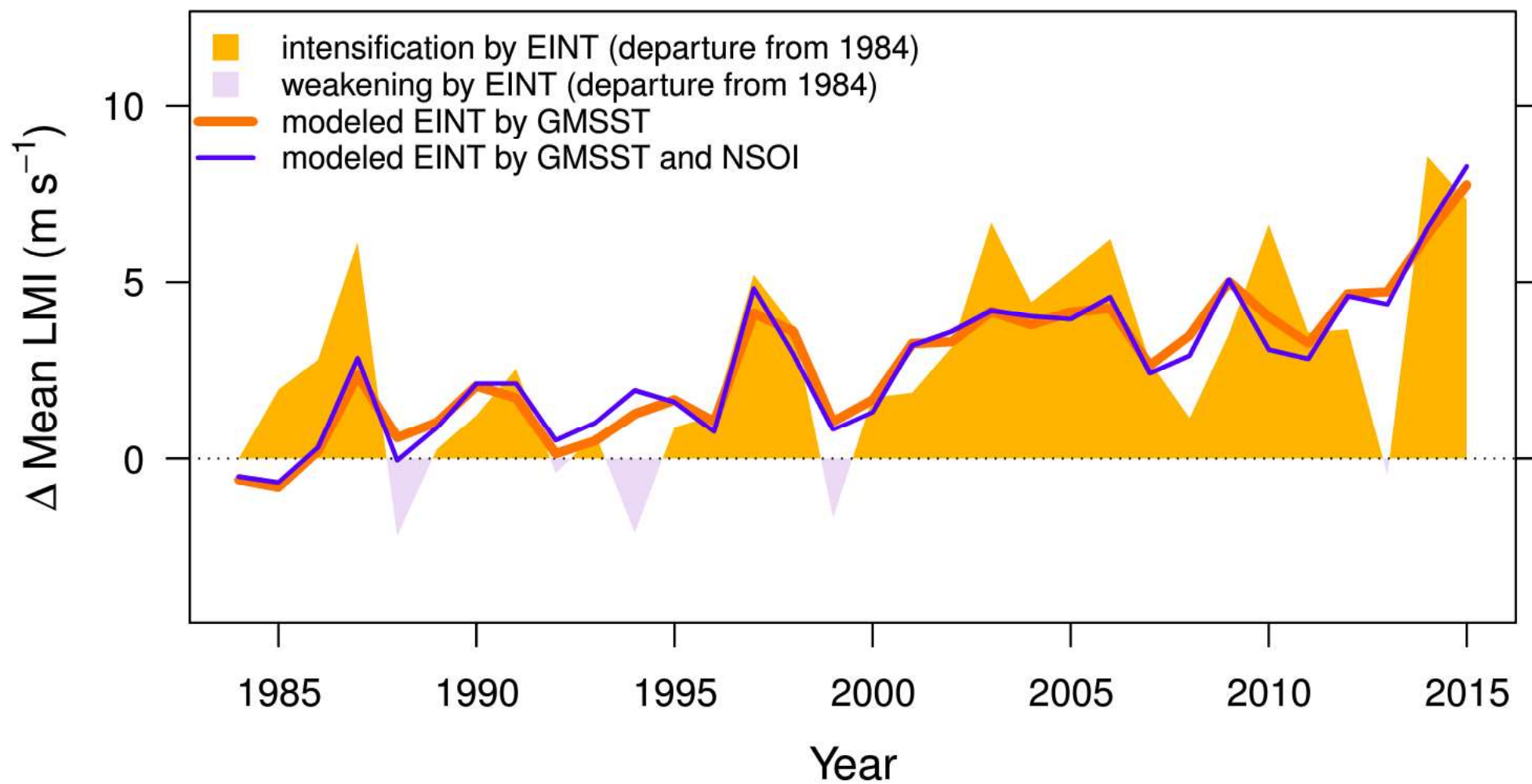
+ Operational procedure considered

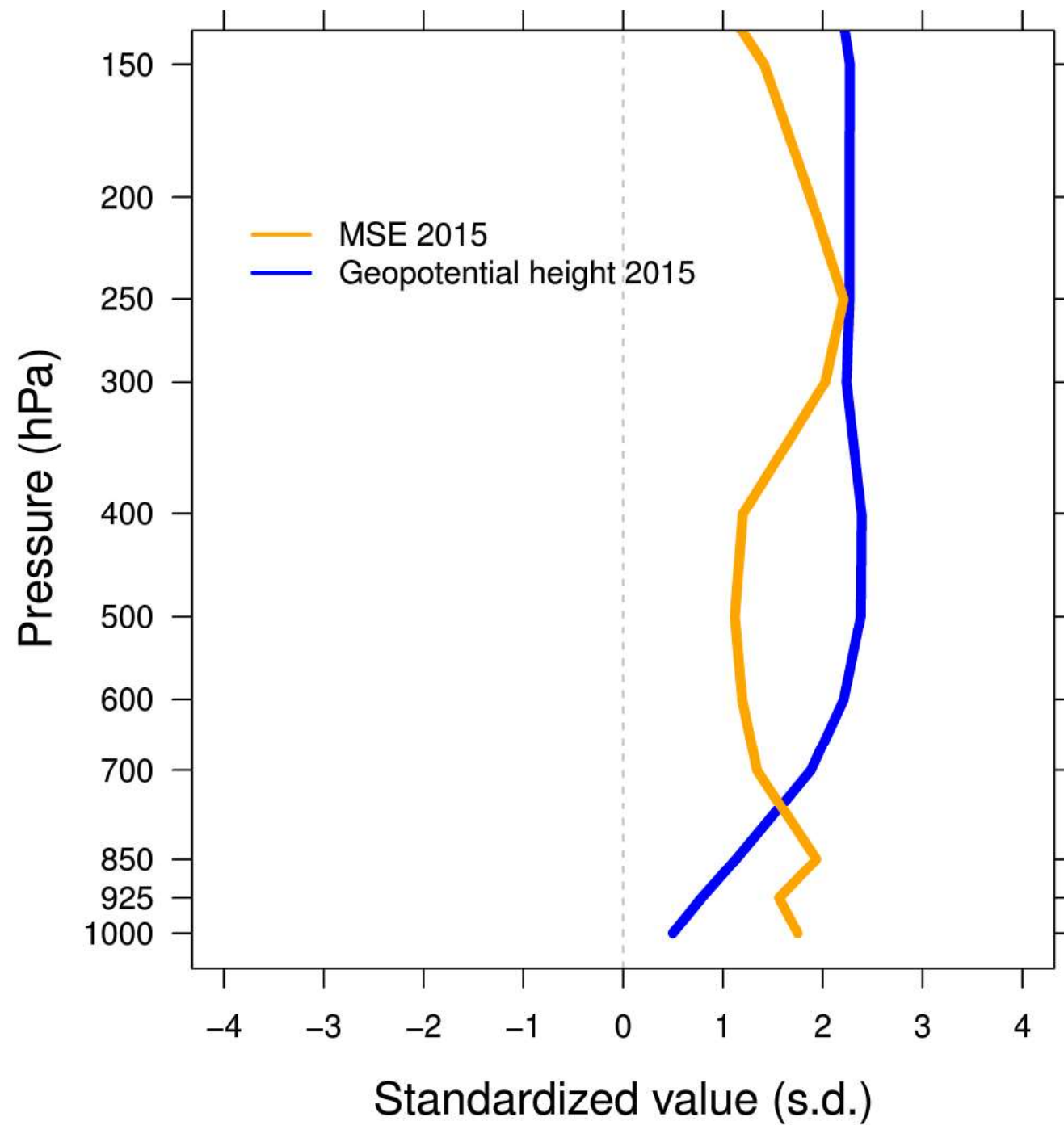
Goal of the series of works

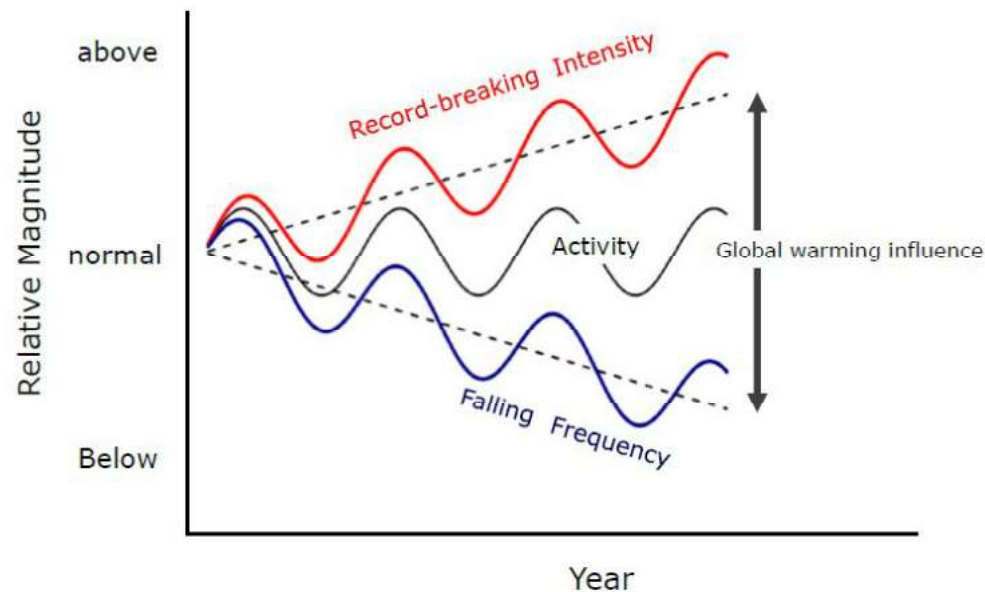
Seasonal typhoon prediction system











Intensity variation is the linear combination of activity and the efficiency of intensity, while **frequency variation** is that of activity and the negative efficiency of intensity.

Global warmth does not affect TC activity but the efficiency of intensity, in the western North Pacific.

In a linear perspective, this climate structure brings about a **record-breaking intensities and falling frequencies** under global warming.

Thank you



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References

N.-Y. Kang and J. B. Elsner. An empirical framework for tropical cyclone climatology. [Climate Dynamics](#). 39, 669-680 (2012).

N.-Y. Kang and J. B. Elsner. Consensus on climate trends in western North Pacific tropical cyclones. [Journal of Climate](#). 25, 7564-7573 (2012).

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