

Basin Mode Oscillations in the Japan/East Sea

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■ tide station
● bottom pressure

Basin mode oscillations from numerical model [Rikiishi,1986]

A standing wave pattern, which rotates counter-clockwise around an amphidromic point with a period of 6.13 hour, and a coastal wavelength equivalent to the circumference of the basin.

Rikiishi, K. (1986), *Kaiyo Monthly*, 18, 447-445 (in Japanese).

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Sum of cross wavelet power for wind in different directions

Optimal wind direction to generate basin oscillations (30° north of east).

- Orientation of greatest phase change in Rikiishi's model
- Alignment with Korea Strait
- Approximately alignment with major axis of Japan/East Sea

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Summary

We provide the first observational evidence of basin oscillations in the Japan/East Sea using coastal tide station and bottom pressure data.

Power spectra from tide station and bottom pressure site

Both exhibit enhanced energy near predicted period (~7 hours).

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Typhoon Saorhai

***Cross - wavelet power**

East-west wind stress and first CEOF times series. Only values above 95% confidence level are shown:

- High power at synoptic time scales of 2-14 days
- Seasonal and interannual variations.

***Joint variability (of two time series, x(t)=windstress and y(t)=basin mode amplitude) estimated as the complex modulus $W_x W_y^*$ of their two Morlet wavelets in the frequency-time domain.**

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Complex EOF (CEOF) analysis of band-pass (6.42-7.75h) filtered data from (a) tide stations and (b) bottom pressure sites

1. First-mode eigenvectors

- Both (a) and (b) exhibit consistent counter-clockwise phase propagation.
- The relative amplitudes of tide stations (upper panel) agree well with numerical model results except for the tide stations near the Korea Strait (treated as closed in the numerical model).

2. First-mode time series

- Seasonal and interannual variations and high variance at atmospheric synoptic time scales 2-14 days suggest wind variability as a potential energy source
- High in phase coherence of (a) and (b) at periods above 50 hours suggest observation of the same oscillations

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