

# DPOI との相関場からみた南大洋上における大気変動特性

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## Atmospheric Variability over the Southern Ocean based on correlation field with DPOI

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In the Antarctic Ocean, changes in the atmospheric, oceanic and sea ice fields have much influences on biological productivity. Especially, variability of Antarctic krill, *Euphausia superba* Dana, which is a key species of the Antarctic ecosystem, is affected by oceanic and atmospheric conditions surrounding the Antarctic Ocean. Previous studies (Naganobu et al., 1999; Kondo, 2009) have found that the Drake Passage Oscillation Index (DPOI), defined by the sea-level difference across the Drake Passage, changes coherently with the variabilities in krill recruitment and upper-oceanic condition in the Antarctic Peninsula (Fig. 1). We need to verify whether the DPOI is a good measure for the westerly wind near the Drake Passage, and then to clarify spatial feature for the DPOI-related wind changes. The present study focuses on spatial features of surface wind field over the southern ocean based on correlation field with the DPOI, using surface wind data by NCEP/NCAR reanalysis data set. Results reveal that there are areas south of the Pacific Ocean with high correlation with DPOI in the zonal wind field. Especially in the period range around 3 years which the DPOI has a significant spectral peak (Fig. 2), high correlation areas are found south of the Pacific and Indian Ocean, suggesting that the signal with about 3-year period has its basin-scale feature surrounding the Antarctic Continent (Fig. 3).

南極域は近年気候・海洋・海氷場には近年顕著な変動がみられ、南極生物資源にも多大な影響を与えていることが明らかになってきた。特に南極半島近海を生息地とするナンキョクオキアミの生態変動は、その周辺海況や気象変動に影響を強くうけていると考えられる。過去の研究において、ドレーク海峡上(図 1)における偏西風の強さの指標とされる DPOI は、南極半島周辺における生物資源量や上層海洋の年々変動に関係していることが指摘されている (Naganobu et al, 1999; 近藤, 2009)。本研究では、これらドレーク海峡付近の変動が南大洋上の如何なる空間特性をもつ大気場変動に関係するのかに注目し、海上風データ (NCEP/NCAR1 再解析データ) と DPOI との相関特性をベースとした解析を行った。その結果、海上風東西成分は、太平洋南方海域において DPOI との間に高い相関をもつことが確認された。また DPOI は約 3 年のスペクトルピークがみられ (図 2)、相関分布図ではドレーク海峡付近だけでなく、インド洋および太平洋南方海域において高相関域がみられた (図 3)。

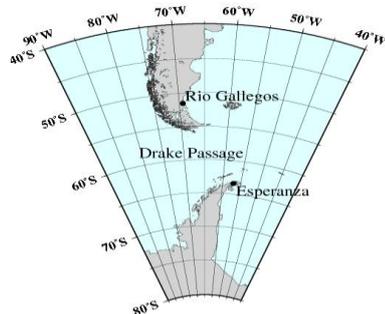


Fig.1 Map around the Drake Passage between the southern tip of the South America (Rio Gallegos) and the northern tip of the Antarctic Peninsula (Esperanza)

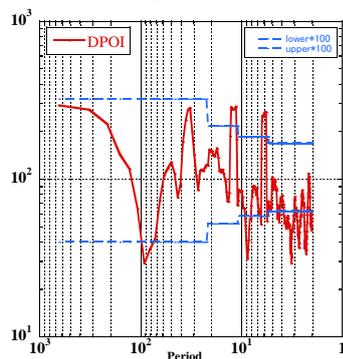


Fig.2 Spectrum for time series of the Drake Passage Oscillation Index (DPOI)

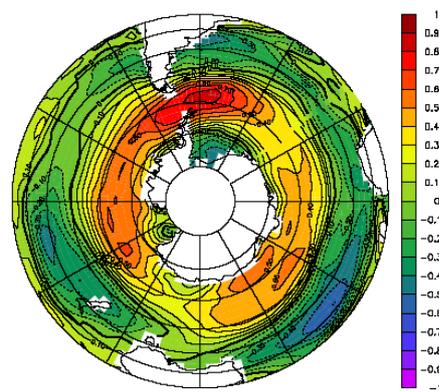


Fig.3 Correlation map for the zonal wind by NCEP/NCAR reanalysis data with the DPOI for a period range around 3 years

### References

Naganobu, M., K. Kutsuwada, Y. Sasai, S. Taguchi, and V. Siegel (1999): Relationships between Antarctic kill (*Euphausia superba*) variability and westerly fluctuations and ozone depletion in the Antarctic Peninsula area, *J. Geophys. Res.*, **104**(C9), 20651-20665.