北アメリカの厳冬を引き起こす新たな要因
～夏季北太平洋亜熱帯からのテレコネクションの影響～

中野渡　拓也[1,2], 猪上　淳[1,3,4], 佐藤　和敏[4], 菊地　隆[3]
[1] *国立極地研究所　国際北極環境研究センター*
[2] *北海道大学　低温科学研究所*
[3] *海洋研究開発機構　北極環境変動総合研究センター*
[4] *総合研究大学院大学*

Summertime atmosphere-ocean preconditionings for the Bering Sea ice retreat and the following severe winters in North America

Takuya Nakanowatari[1,2], Jun Inoue[1,3,4], Kazutoshi Sato[4], Takashi Kikuchi[3]
[1] *Arctic Environment Reserch Center, NIPR*
[2] *Institute of Low Temperature Science, Hokkaido University*
[3] *Institute of Arctic Climate and Environment Research, JAMSTEC*
[4] *The Graduate University for Advanced Studies*

Recently, it was reported that atmospheric responses to sea ice retreat in the Bering Sea have been linked to recent extreme winters in North America [*Lee et al*. 2015; *Kug et al*. 2015]. In this study, we investigated the leading factor for the interannual variability of Bering Sea ice area (SIA) in early winter (November–December), using canonical correlation analysis (CCA) based on seasonally resolved atmosphere and ocean data for 1980–2014. The preprocessing and procedure for CCA is mostly identical to *Nakanowatari et al*. [2014]. We found that the 3-month leading (August–September) geopotential height at 500 hPa (Z500) in the Northern Hemisphere explains 29% of SIA variability. The spatial pattern of Z500 for positive (negative) sea ice anomalies is associated with negative (positive) anomalies over the Gulf of Alaska related to the Pacific Transition (PT) pattern. The heat budget analysis indicates that summertime atmospheric conditions influence SIA through the ocean temperature anomalies of the Alaskan Coastal Current forced by atmospheric turbulent heat fluxes. The PT pattern highly correlates with convective precipitation in the western subtropical Pacific, implying that weakened subtropical forcing is the likely cause for the recent extreme winters in North America. The manuscript of this study was accepted by Environmental Research Letters [*Nakanowatari et al*. 2015].

References

Lee M-Y, Hong C-C and Hsu H-H 2015 Compounding effects of warm sea surface temperature and reduced sea ice on the extreme circulation over the extratropical North Pacific and North America during the 2013–2014 boreal winter *Geophys. Res. Lett*. **42** 1612–1618

Kug J-S, Jeong J-H, Jang Y-S, Kim B-M, Folland C K, Min S-K and Son S-W 2015 Two distinct influences of Arctic warming on cold winters over North America and East Asia *Nat. Geosci*. doi:10.1038/ngeo2517

Nakanowatari T, Sato K and Inoue J 2014 Predictability of the Barents Sea ice in early winter: Remote effects of oceanic and atmospheric thermal conditions from the North Atlantic *J. Climate* **27** 8884–8901

Nakanowatari T, Inoue J, Sato K and Kikuchi T 2015 Summertime atmosphere-ocean preconditionings for the Bering Sea ice retreat and the following severe winters in North America *Environ. Res. Lett*. accepted