

Name: Baek-Min Kim

bmkim@kopri.re.kr

Korea Polar Research Institute

28 songdo miraero yeonsugu Incheon

Country: South Korea

Title: Role of Arctic Sea-ice Loss for Stratospheric Polar Vortex Variability

Additional authors: Seok-Woo Son (2), Seung-Ki Min (3), Jee-Hoon Jeong (4), Seong-Joong Kim (1), Taehyoun Shim (1)

Additional Affiliations: 1. Korea Polar Research Institute Korea, 2. Seoul National University Korea, 3. Pohang University of Science and Technology Korea, 4. Chonnam National University Korea

Abstract:

We provide evidences that less Arctic sea-ice in early winter (November-December), especially over Barents/Kara Sea sector, can bring a weakening of tropospheric polar vortex in early winter and a subsequent development of weak stratospheric polar vortex event in late winter (January-February). Using reanalysis outputs and General Circulation Model (GCM) experiments, we show that Arctic sea-ice loss in early winter brings tropospheric circulation regime that favors upward propagation of planetary scale waves, which eventually weakens the stratospheric polar vortex. Since the weak stratospheric polar vortex is known to induce surface negative Arctic Oscillation (AO) bringing cold mid-latitude surface temperature, the sea-ice-stratosphere link found in this study may provide a proper explanation for the recent prolonged cold winters.

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