

Authors used Singular Spectral Analysis to examine variations of the Arctic and Antarctic sea-ice extents (SI), and of the atmospheric surface pressure (AP) in both hemispheres (NH and SH). There exists a range of periods (an annual, 1/2, 1/3, 1/4 and 1/5). Some relationships between sea ice and pressure are built. The manuscript was written well. Some improvements need to be made before the manuscript is accepted. The results presented in this study are statistical, the mechanisms behind the results lack. This is the main shortcoming.

For SSA method, what is the difference between SSA and other methods (Circulant SSA, EMD)?

Lines 38-42 Authors should give some reasons for the dissymmetry of Arctic and Antarctic sea ice extent.

Lines 47-54 The large-scale atmospheric oscillation in the Arctic is not only AO. The factors influencing the Antarctic climate include forcings in the Indian, Atlantic, and Pacific Oceans. Authors only introduced Pacific factors.

While authors represent the results of the SSA analysis for a given period (for example annual cycle), please display the spatial pattern of pressure and sea ice at maximum and minimum values, and explain the relationship between air pressure and sea ice pattern.

Authors exhibited the 1/2 year period. There is a common phenomenon in the Southern Ocean. There are a lot of literatures.

“The semi-annual oscillation (SAO) in the middle and high latitudes is an important and well known component of the Southern Hemisphere climate. An overview of the early literature on the SAO is given by van Loon (1967), and a reexamination of the phenomenon and its causes is presented by Meehl (1991). “

The semi-annual oscillation and Antarctic climate Part 1-4 depict SAO and its effect on the Antarctic climate.

VAN LOON, V. 1967. The half-yearly oscillation in the middle and high southern latitudes and the coreless winter. *Journal of Atmospheric Sciences*, 24, 472-486.

MEEHL, G. A. 1991. A reexamination of the mechanism of the semiannual cycle in the Southern Hemisphere. *Journal of Climate*, 4, 911-926.

For 1/3, 1/4, and 1/5 period, what mechanisms behind these periods are there?

Lines 389-390 “The phase lag between sea-ice extent and pressure decreases from -35 to -60 days (~ degrees; Figure 6b).” Pressure precedes sea ice extent 35-60 days for semi-annual period? Why? There is an increasing trend. Why?

The similar case also occurs for 1/3, 1/4 and 1/5 annual periods in Figure 7b, 8b and 9b.

There is no color bar for Figure 10c.