

Plain Language Summary: Recent year-to-year and long-term climate variabilities during 1980–2020 were investigated using the Japanese 55-year reanalysis dataset (JRA-55) to assess the robustness of and uncertainties in future sea-level pressure (SLP) patterns for summertime East Asia due to global warming, which were obtained in a previous study on the multi-model future projections in the sixth phase of the Coupled Model Intercomparison Project (CMIP6).

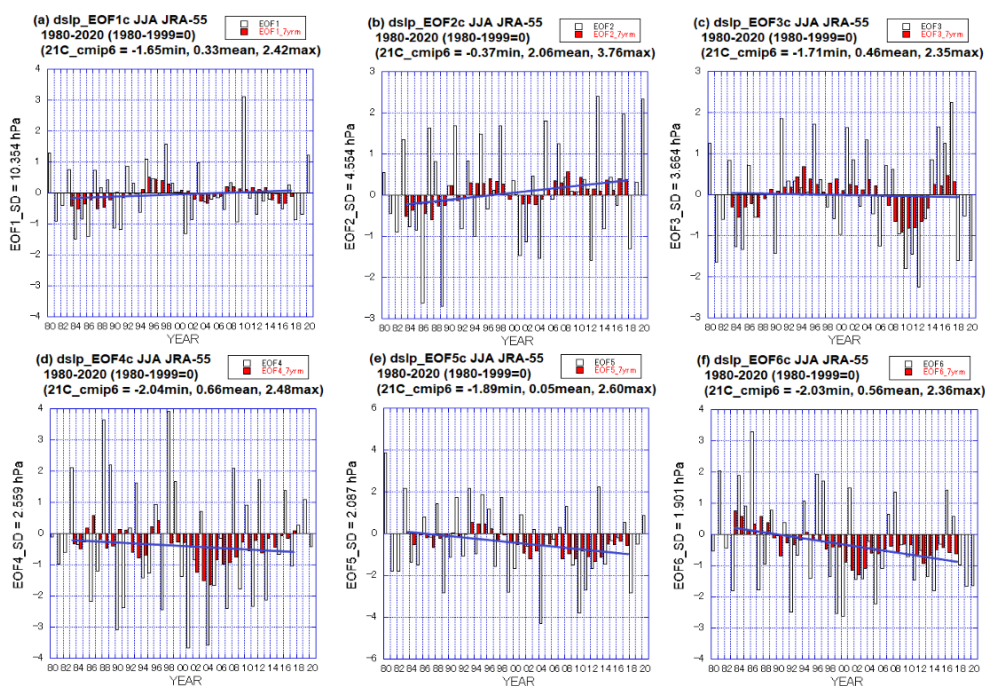


Figure 1. (a) Recent year-to-year variations during 1980–2020 for the first major pattern of future sea-level pressure changes in East Asia (empty bars) and their 7-year running means (red-filled bars). A blue line is the linear trend for the 7-year means. (b)–(f) Same as (a), but for the second to sixth major patterns, respectively. Normalized units on the vertical axis are noted along the axis.

- The future second SLP pattern (Fig.1b), representing low- and high-SLP anomalies in northern and southern East Asia respectively, emerges with a significant trend in the recent long-term variability consistent with the CMIP6 future projection. This pattern is a robust future SLP pattern predicted by almost all CMIP6 models. The significant trend in the recent long-term variability is created similarly to the CMIP6 future projection by recent warming over northern continents and seas.
- A few of the future uncertain patterns (Fig.1e and f), whose future polarities depend on the CMIP6 projection model, display significant trends recently, but against the future projection means. The trends are attributed to the weak and reverse surface warming distribution over the tropical oceans in the recent climate change compared with the future change.