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Sampling downscaling in summertime precipitation over Hokkaido

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1. Introduction
Recently, the mixture method of dynamical and statistical downscaling have been developed (cf. Kuno and Inatsu 2014, Pinto et al. 2014). Kuno and Inatsu (2014) developed the sampling downscaling (SmDS) method in which a regional atmospheric model is integrated for sampled years. However, in order to know how these mixture methods are able to effectively reduce the computational costs for dynamical downscaling, we need to apply them to other cases. The purpose of this study is to apply SmDS to summertime precipitation over Hokkaido as another case study.
2. Method
Singular value decomposition (SVD) analysis is performed from 1981 to 2010 in June-July-August (JJA) months using the moisture flux convergence (JRA25/JCDAS) around Japan and precipitation (APHRO_JP/V1207) over Hokkaido. Next, we selected the top and bottom two years of the moisture flux convergence of the general circulation model projection onto the first SVD mode. This study conducts the dynamical downscaling for 30 years (full DDS) under the current climate experiment in advance to investigate the reproducibility of SmDS.
3. Result
The spatial correlation coefficient between SmDS and full DDS shows 0.96 in daily-mean precipitation and 0.85 in 99 percentile value of daily precipitation. This indicates that SmDS can be applied to the place where the synoptic field strongly controls the local precipitation. In addition, we also statistically considered the error in SmDS and it turned out that the mean in SmDS depended on the correlation coefficient between local and synoptic variables, the number of samples, and the standard deviation of seasonal mean precipitation. It was also demonstrated the SmDS selected the group of years where extreme events likely occurred and another group where they rarely occurred.
References
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