

Long-term modulations of Decadal Climate Variability over the North Pacific and their future projection in CMIP5 Models

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Observations since the 1950s suggest that (quasi-) decadal climate variability over the wintertime North Pacific may have undergone notable modulations. An EOF analysis applied to 3-year running-mean anomalies of the North Pacific SST reveals that the subarctic oceanic frontal zone was the primary center of action of the extratropical decadal SST variability until the 1980s, and then the primary center of action has shifted to the subtropical oceanic frontal zone (Miyasaka et al. 2014). The same EOF analysis applied to SST anomalies in historical runs of the CMIP5 models indicates that only 7 out of the 45 models we analyzed reproduce the separation in decadal SST variability between the subarctic and subtropical oceanic zones as extracted in different EOFs and their associated decadal anomalies of the surface Aleutian low and subtropical high, respectively. However, none of them can reproduce the observed multi-decadal modulations in the strengths of the two modes of SST variability, which suggests that the observed modulations may be regarded as intrinsic modulations in the coupled atmosphere-ocean system of the Pacific rather than those induced under the global warming. In fact, strength of modulations for RCP4.5 scenario in good models is almost same as counterpart in historical run, as a multi-model mean, based on comparison of a centennial range of bi-decadal standard deviation of amplitude time series which is defined as a projection onto EOF pattern in historical run. This result suggests that multi-decadal modulations of Pacific decadal variability are not affected by the global warming.

Key words: Pacific decadal variability, oceanic fronts, Kuroshio, Aleutian Low, Subtropical anticyclone

References

Miyasaka, T., H. Nakamura, B. Taguchi, and M. Nonaka, 2014: *Geophys. Res. Lett.*, **41**, 2948-2955.