

Solar cycle modulation of Southern Annular Mode -Energy-momentum analysis-

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Climate is known to be affected by various factors, including oceanic changes and volcanic eruptions. 11-year solar cycle change is one of such important factors. Observational analysis shows that the winter-mean North Atlantic Oscillation (NAO) and late-winter/spring Southern Annular Mode (SAM) show structural modulation associated with 11-year solar cycle [Kodera, 2002; Kuroda and Kodera, 2005]. In fact, these signals tend to extend from surface to upper stratosphere and persistent longer period only in the High Solar (HS) years. In the present study, we used ERA-Interim reanalysis data and performed wave-energy and momentum analysis on the solar-cycle modulation of the SAM to examine key factors to create such solar-SAM relationship. It is found that enhanced wave-mean flow interaction tends to take place in the middle stratosphere in association with enhanced energy input from diabatic heating on September only in HS years. The result suggests atmospheric and solar conditions on September are keys to create solar-SAM relationship.

Key words: solar cycle, Southern Annular Mode, wave-energy, momentum analysis (maximum 5)

References

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