

Role of solar activity in the troposphere-stratosphere coupling in the northern and southern hemisphere winters

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Observation shows that the variability associated with surface Annular Mode (AM) (NAO in the NH, and SAM in the SH) in the active season (mid-winter in the NH and late winter/spring in the SH) commonly tends to indicate structural modulation with the solar cycle: The signal extends to the upper stratosphere and persists until next summer in high solar (HS) years, but it is restricted in the troposphere and disappear very quickly in low solar (LS) years. Such structural modulation of the AM is originated from modulation of the strength of the troposphere-stratosphere coupling with the solar activity. Experiments with a chemistry-climate model suggest that such modulation is created from interaction between dynamics and UV-ozone.