



Comparing the influence of sunspot activity and geomagnetic activity on winter surface climate

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We compare here the effect of geomagnetic activity (using the aa index) and sunspot activity on surface climate using sea level pressure dataset from Hadley centre during northern winter. Previous studies using the multiple linear regression method have been limited to using sunspots as a solar activity predictor. Sunspots and total solar irradiance indicate a robust positive influence around the Aleutian Low. This is valid up to a lag of one year. However, geomagnetic activity yields a positive NAM pattern at high to polar latitudes and a positive signal around Azores High pressure region. Interestingly, while there is a positive signal around Azores High for a 2-year lag in sunspots, the strongest signal in this region is found for aa index at 1-year lag. There is also a weak but significant negative signature present around central Pacific for both sunspots and aa index. The combined influence of geomagnetic activity and Quasi Biannual Oscillation (QBO 30 hPa) produces a particularly strong response at mid to polar latitudes, much stronger than the combined influence of sunspots and QBO, which was mostly studied in previous studies so far. This signal is robust and insensitive to the selected time period during the last century. Our results provide a useful way for improving the prediction of winter weather at middle to high latitudes of the northern hemisphere.