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The Sea Level Pressure Response to 11-Year Solar Forcing: Observational Analyses and Comparisons With a Recent Model Simulation

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An improved multiple linear regression (MLR) statistical model is applied to estimate the sea level pressure (SLP) response to the 11-year solar cycle during northern winter using 160 years of Hadley Centre gridded and interpolated SLP data. In the Northern Hemisphere, statistically significant responses are obtained in four regions: A strong positive response in the North Pacific, a moderate positive response in eastern North America, a weak negative response in the central Pacific, and a moderate negative response in central Asia. Analyses of individual time series at these locations and repetitions of the MLR analysis for separate time periods show that the response was strongest and most clearly detected during the $\sim$ 1930-2000 period when 11-year solar variations were especially strong and the spatial coverage of the original SLP observations was largest. A recent model simulation (Bal et al., GRL, 2011) produces SLP responses in NH winter that resemble the observed North Pacific and eastern North America responses. The model accounts for UV-induced stratospheric heating changes using prescribed 11-year ozone variations as well as total irradiance forcing. More detailed comparisons of the observed SLP response with the model response calculated using a similar MLR statistical model will be presented at the conference.