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Modes based on high resolution regional atmospheric excitation functions for polar motion

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Based on a set of high spatial resolution regional sectors of the atmospheric signal that excites polar motion, we calculate global modes of variability to try to link the excitation of polar motion to any climate modes. Here we use atmospheric surface pressure fields from the NCAR-NCEP Reanalysis over the lengthy 60-year period 1948-2007. Although our earlier intramonthly study of variability in these sectors highlighted regions that were particularly important to polar motion excitation, like the atmosphere over central Eurasia, it was based on a shorter period and a coarser network. Here we expand the study as well to examine monthly and interannual time scales. We utilize the complex empirical orthogonal function method to select the vector modes that explain independently the most variance of polar motion excitation. Regionally, only the atmosphere over land is important, as the Inverted Barometer model, which greatly reduces all variability over the ocean, is appropriate at the time scales considered here. The variability appears strong over portions of Eurasia and North America in particular for most modes, but has some southern hemisphere variability as well for the first mode too. We compare years with strong and weak monthly variability to see the differences between such periods. The time series of these modes, especially when seasonally stratified, may reveal some influence of climate patterns like the El Nino/Southern Oscillation, North Atlantic, Arctic, Antarctic, and Pacific-North American Oscillations, based on their indices.