Piecewise trend analysis is applied to midlatitude mesosphere/lower thermosphere winds over Europe and Canada. In summer, there is a similar behavior of the prevailing winds of each time series. The zonal wind trends may be influenced by the 11-year solar cycle. The zonal prevailing winds in winter show partly opposite behavior at different longitudes, which may be explained by a stationary planetary wave (SPW) influence. Differences between Collm and Obninsk, both Europe, are correlated with SPW variability at the interannual time scale, and with tropospheric circulation at the decadal time scale. There are also hints that summer zonal prevailing winds are connected with Southern Hemisphere planetary waves. The long-term variation of semidiurnal tidal (SDT) amplitudes corresponds with that of the zonal prevailing wind in a sense that several joint breakpoints of trends are visible. Obninsk and Collm SDT amplitudes show, however, an out-of-phase variability on the decadal time scale.