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12 years of atmospheric monitoring by the Planetary Fourier Spectrometer onboard Mars Express

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We use thermal-infrared spectra returned by the Mars Express Planetary Fourier Spectrometer (PFS-MEx) to retrieve atmospheric and surface temperature, and dust and water ice aerosol optical depth. More than 2,500,000 spectra have been used to build this new dataset, covering the full range of season, latitude, longitude, and local time. The data presented here span more than six Martian years (from MY26, $L_s = 331^\circ$, 10 January 2004 to MY 33, $L_s = 78^\circ$, 6 December 2015). We successfully retrieved atmospheric temperatures and aerosols opacity in the polar regions, including the polar nights. By exploiting PFS/MEx capability to perform observations at different local times (LT), this dataset allows investigation of the daily cycles of suspended dust and ice. We present an overview of the seasonal and latitudinal dependence of atmospheric quantities during the relevant period, as well as an assessment of the interannual variability in the current Martian climate, including spatial, daily (LT), seasonal, and interannual variations of the aphelion equatorial cloud belt. With unprecedented spatial and temporal coverage and details revealed, this dataset offers new challenges to the GCMs and, at the same time, a new reference for the MYs complementary to those observed by MGS-TES.