A statistical approach for dust and water ice spectral features analysis by PFS-MEX data.

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Previous work on IR data from the Thermal Emission Spectrometer, onboard the NASA Mars Global Surveyor mission (MSG-TES), shown that statistical analysis could give a complete description of atmospheric non-gaseous components (mineral dust and water ice cloud). In particular it is possible to describe a spectral observation as a linear combination of several spectral shapes that are extracted from the statistical analysis of the data. An important result is the possibility to eliminate the atmospheric contribution to the observed spectrum for direct analysis of surfaces features. In this work we use a similar approach, applying the Factor Analysis (FA) and the Linear Deconvolution Algorithm (LDA) to the Planetary Fourier Spectrometer, onboard the Mars Express ESA mission (PFS-MEX). These techniques have been shown very reliable and fast in order to analyze a huge set of data. There is a large temporal separation between the two experiments and probably the spectral composition and distribution of atmospheric components was changed due specially the 2001 global dust storm . Currently PFS dataset is of about 270.000 spectra, enough for application of statistical methods. Analyzed subset involves observation from Ls 320 to Ls 200 coverings nearly a whole Martian year . Factor Analysis allows successfully separation of ground features from atmosphere thanks to this large seasonal coverage (i.e. thanks to the great variability of the atmospheric components like suspended mineral dust and water ice clouds). The results shows that derived atmospheric components are in agreement with previous TES results and allow to show annual variation of the this components.