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Transient waves in the Martian atmosphere from assimilation of MGS/TES data

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The dynamics of transient mid-latitude baroclinic weather systems in the Martian atmosphere have been reconstructed from the assimilation of retrieved meesurements of temperature and dust from the Thermal Emission Spectrometer (TES) instrument on the Mars Global Surveyor spacecraft (MGS) into the Oxford Mars General Circulation Model (MGCM). The period of observations covers the interval 1999 - 2004, and the assimilated 'reanalysis' dataset provides global maps of meteorological variables 12 times per day throughout this time. The results of the assimilation have been validated against radio-occultation measurements and the reconstruction verified against previous synoptic mapping studies of baroclinic transients from TES data. The record of baroclinic transient activity shows a rich climatology, modulated by the seasonal cycle, large-scale topography and major dust storms. Some case studies will be presented of interesting periods of baroclinic activity, illustrating complex spatio-temporal structures and chaotic vacillations of wave amplitude and structure.