



A user-orientated column modelling framework for efficient analyses of the Martian atmosphere

Mark Paton (1), Ari-Matti Harri (1), Oliver Vierkens (1), and Hannu Savijärvi (2)

(1) Finnish Meteorological Institute, Helsinki, Finland (mark.paton@fmi.fi), (2) University of Helsinki, Helsinki, Finland

As spacecraft return ever more data from Mars an increasingly integrated approach will be required to efficiently explore and analyse these data sets. Vast amounts of data already exist from soundings of the Martian atmosphere by spacecraft instruments, e.g. Mars Climate Sounder, providing snapshots during the evolution of the Martian climate. Temperature can be particularly useful, as a diagnostic tool for understanding Martian weather, as it is sensitive to a wide range of processes.

To streamline research into the atmosphere of Mars a user-orientated modelling capability is developed that enables automatic initialisation and running of a column model. This model can be initialised using headers from the soundings data and compared to a selection of temperature profiles filtered using a graphical user interface. The soundings data can itself be independently queried, via a command line, to explore and extract the temperature data or any other associated information.

As a demonstration we utilise the modelling framework to provide additional verification for the University of Helsinki/Finnish Meteorological Institute Mars column model at the higher altitudes. We also utilise the framework to understand the model's applicability, and identify opportunities for modifications/research, within the context of atmospheric processes that occur over large horizontal distances. We allow the software wrapper to automatically initialise the model with values either from the soundings data itself or other sources. These properties include surface temperature, surface pressure, dust opacity, thermal inertia and albedo. Locations on Mars that are well characterised and cover a range of latitudes are explored, e.g. landing sites such as Curiosity, Viking lander 1 and Viking lander 2.