ESA contract
Martian Environmental Model

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Technical note describing material to be made available on WWW site

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Abstract

This document presents the World Wide Web site which has been developed in the frame of the ESA contract (Ref. 11369/95/NL/JG(SC)) on Martian environmental models.

Contents

1 Introduction

The World Wide Web site has been developed in the frame of the ESA contract (Ref. 11369/95/NL/JG(SC)). This site provides a direct and user-friendly access to the full database developed in the first part of this contract. This is very important with regard to the diffusion of the database results. The site is a good way for advertising the database. It should contain a suitable statement to the effect that data obtained from it may not be used for profit-making purposes and that there must be a full acknowledgement of the source of the data.

The present document describes what material will be available on WWW site.

2 Description of the site

The site is being developed at LMD (http://www.lmd.jussieu.fr/mars.html) and is mirrored on a site at AOPP (http://www.atm.ox.ac.uk...). It could be also mirrored at ESTEC if required.

It offers an access to all the documentation written during the contract (technical notes) and a user manual for the GCM.

Sites will be supported as long as possible at LMD and Oxford, and until at least December 1999 in terms of the present contract. During this period, news about planet Mars and links to other Martian web sites (recent papers, news of the Pathfinder mission, MGS ...) will be maintained by LMD and AOPP teams.

Any updates and improvements of the Martian General Circulation Model will be incorporated in a new version of the climate database at the end of the extension period. This new version will be available on the WWW.

3 Access to the database

The major work done for the site concerns the developement of a web interactive system (Common Gateway Interface script) which allows any user, through graphic tools, to access easily the database. The CGI script is written in C language and graphics output are provided by ferret. Ferret is a visualization and analysis application designed to meet the needs of oceanographers and climate researchers analyzing large and complex gridded data sets. This software is developed by NOAA / PMEL / Thermal Modeling and Analysis Project. It is necessary to convert the DRS files of the database in NetCDF format (Network Common Data Format) in order to make them readable by ferret. This new format is more and more used by the meteorology community.

The CGI script builds a HTML page depending on the choice made in the previous page. Through these pages, the user is able to select data sets and variables, to specify the season, the time of day, and the location he wants in the full Martian database.

Then the script runs the ferret software to provide the required data. The result is returned directly by HTML in GIF format (profile or plane geometry), or may be downloaded by FTP in a variety of data formats (NetCDF, ASCII,...), in a profile, plane or volume geometry.

The different datasets which can be selected are the various dust scenarios provided for the Martian Climate Database, and the mountain maps of the topographic height on Mars (which will be soon replaced by the MGS topography). The various dust scenarios are:

- dust storm scenario with optical depth 2
- dust storm scenario with optical depth 5
- low dust scenario
- Viking year scenario

These various scenarios are explained in an appendix to the Detailed Design Document of the Martian Climate database v1.0 written in the frame of the present contract.

Each simulation has a duration of one year, splitted into 12 seasons. Each season correspond to one Martian 'month', defined as follow:

- season 1, $Ls = 0°$ - $30°$
- season 2, $Ls = 30°$ - $60°$
- season 3, $Ls = 60°$ - $90°$
- season 4, $Ls = 90°$ - $120°$
- season 5, $Ls = 120°$ - $150°$
- season 6, $Ls = 150°$ - $180°$
- season 7, $Ls = 180°$ - $210°$
- season 8, $Ls = 210°$ - $240°$
- season 9, $Ls = 240°$ - $270°$
- season 10, $Ls = 270°$ - $300°$
- season 11, $Ls = 300°$ - $330°$
- season 12, $Ls = 330°$ - $360°$

where the northern hemisphere spring equinox is at $Ls = 0°$, with northern summer solstice at $Ls = 90°$, autumn equinox at $Ls = 180°$ and winter solstice at $Ls = 270°$.

Variables wich can be selected for each simulation are:

<u>2-D variables</u>

- co2ice - CO2 ice cover (kg/m2)
- emis - surface emissivity
- tsurf - surface temperature (K)
- ps - surface pressure (Pa)

<u>3-D variables</u>

- temp - atmospheric temperature (K)
- u - zonal (east - west) wind (m/s)
- v - meridional (north - south) wind (m/s)
- rho - atmospheric density (kg/m3)

- q2 - boundary layer eddy kinetic energy (m2/s2)

For each season, means of variables are stored 12 times of day (approximately 2 hours), and standard deviations once a day.

The user is able to choose a geometry in 1, 2, 3 or 4 dimensions to view the data . For a profile or a plane view, it is possible to visualize directly the data; the CGI script creates an image with ferret and displays it in GIF format into a HTML page. Otherwise, the user can get the data in a variety of data formats (NetCDF, ASCII,...), in any of the following geometry:

profile view
- Longitude profile
- Latitude profile
- Depth profile
- Time series

plane view
- Longitude-latitude
- Longitude-depth
- Latitude-depth
- Longitude-time
- Latitude-time
- Depth-time

volume view
- Longitude-latitude-depth
- Longitude-latitude-time
- Longitude-depth-time
- Latitude-depth-time
- Lon-lat-depth-time

It is possible to select a viewing region. A HTML page allows to enter the limits of a desired region in text fields for every dimension. For a Longitude-Latitude plane, a graphical zoom is also possible. The region is selected by clicking on a altitude orographic map of Mars.

4 copyright on the WEB

A sentence will be added about copyright on the WEB site. It will allow all scientists to use the database as soon as they correctly quote the origin of the data in publications and keep us informed, but will forbid the use of the database for commercial purposes.