ENVIRONET

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SPACE ENVIRONMENT INFORMATION

EnviroNET is a service/facility that provides users with on-line, dial-up technical information concerning environmental conditions likely to be encountered by instruments and experimental arrangements carried aboard spacecraft.

EnviroNET incorporates at present a combination of expository text and numerical tables amounting to about two million characters (bytes), plus FORTRAN programs that model the space environment.

ADVANTAGES OF ENVIRONET

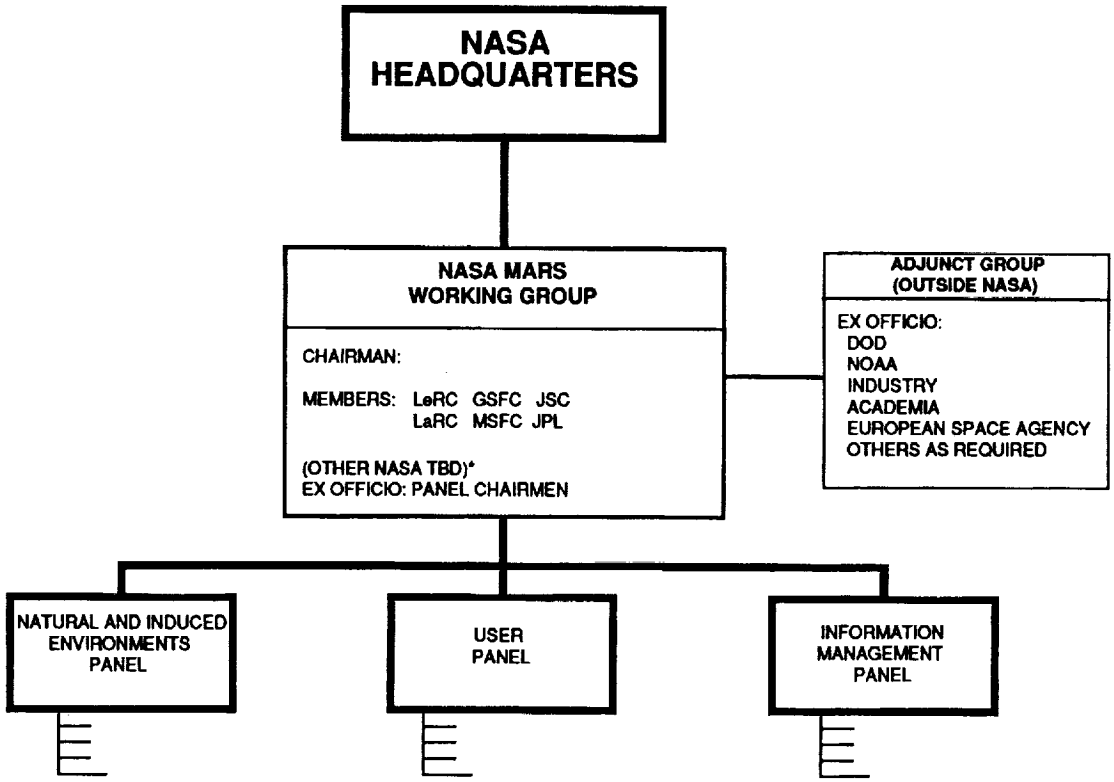
- CENTRALIZED COMPUTER-BASED INFORMATION ON NATURAL AND INDUCED ENVIRONMENTS
- BASED ON MEASURED DATA (SHUTTLE) AND EMPIRICAL MODEL VALIDATED BY DISCIPLINE PANELS
- FOR SCIENTISTS' AND ENGINEERS' USE IN THE DESIGN AND DATA ANALYSIS OF FLIGHT HARDWARE
- CURRENCY MAINTAINED BY NASA THROUGH COOPERATIVE EFFORTS OF INDUSTRY, OTHER GOVERNMENT AGENCIES, THE EUROPEAN SPACE AGENCY, ACADEMIA, AND THE NASA COMMUNITY

AREAS OF CONCERN FOR USERS ARE INCLUDED
IN THE MAIN TOPICS

MAIN TOPICS

- **INTRODUCTION**
- **THERMAL AND HUMIDITY**
- **VIBRATION AND ACOUSTICS**
- **ELECTROMAGNETIC INTERFERENCE**
- **LOADS AND LOW FREQUENCY DYNAMICS**
- **MICROBIAL AND TOXIC CONTAMINANTS**
- **MOLECULAR CONTAMINATION**
- **NATURAL ENVIRONMENT**
- **ORBITER MOTION**
- **PARTICULATE ENVIRONMENT**
- **SURFACE INTERACTIONS**
- **SPACECRAFT ANOMALIES**
- **INTERACTIVE GRAPHICS FACILITY**

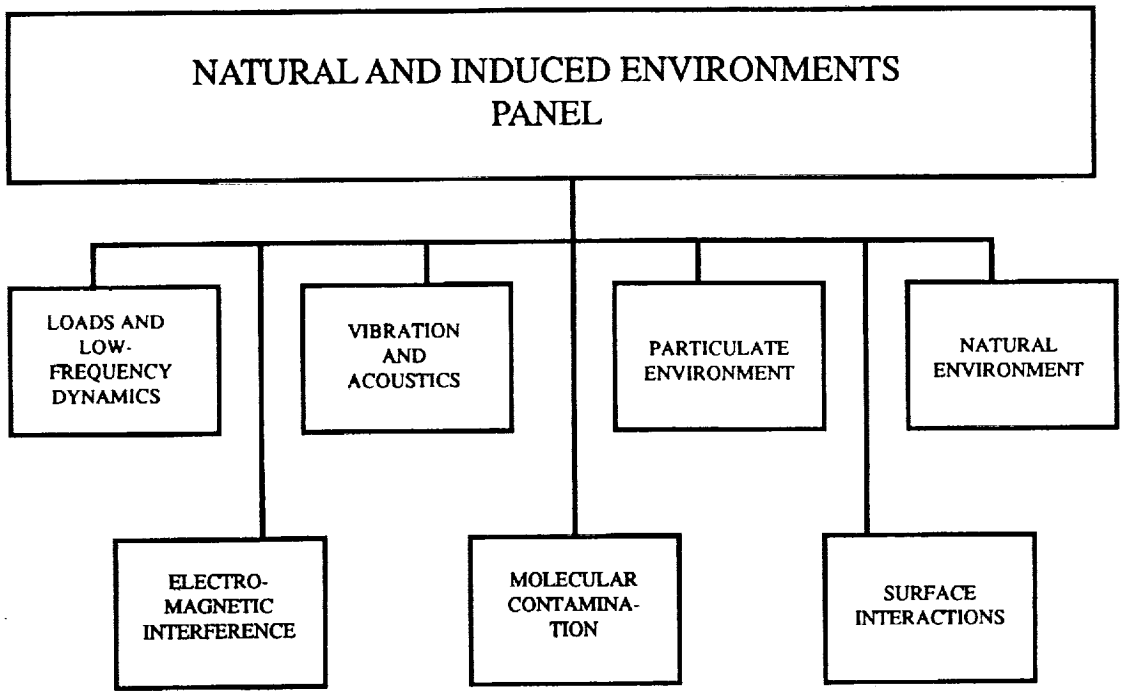
NASA MARS WORKING GROUP



FUNCTIONS OF THE NATURAL AND INDUCED ENVIRONMENTS PANEL

- GATHER DATA
- MAKE PRELIMINARY ASSESSMENTS OF RELIABILITY AND TRACEABILITY OF DATA
- PROVIDE GUIDELINES FOR MEETING PAYLOAD INTEGRATION REQUIREMENTS
- ACCESS STATE-OF-THE-ART-DATA FOR FEASIBILITY

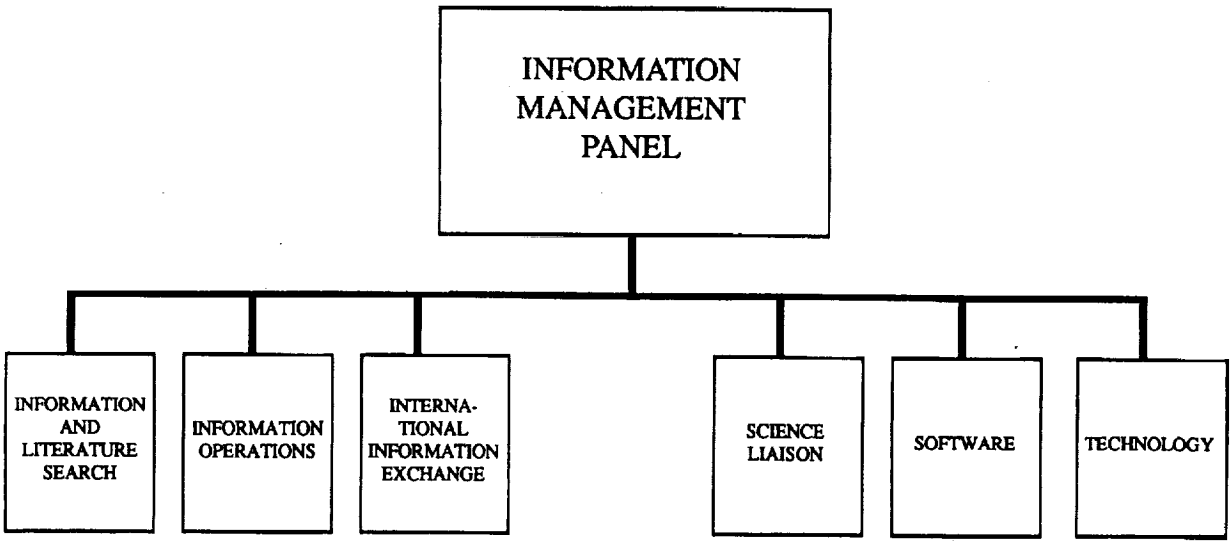
THE NATURAL AND INDUCED ENVIRONMENTS PANEL



INFORMATION MANAGEMENT

The Information Management Panel provides the database structure and manages the database. Duties: Create a system for compiling, storing, and cataloging the information in the database; edit information; and coordinate network activities.

INFORMATION MANAGEMENT PANEL



The scope of the interactive models is shown below. This activity has been advanced by adding interactive models of the natural environment. The models include neutral atmosphere density and temperature, ionosphere, electron temperature and density, the magnetic field vector, and energetic particle or radiation flux. These models are based on data from satellites which orbit the earth in the thermospheric and exospheric regions of the atmosphere.

INTERACTIVE MODELS

MARSGRAM*	(Mars Global Reference Atmospheric Model)
MSIS*	(Mass Spectrometer Incoherent Scatter
MET*	(Marshall Engineering Thermosphere)
IRI*	(International Reference Ionosphere)
IGRF*	(International Geomagnetic Reference Field Model)
CREME	(Cosmic Ray Effects on Microelectronics)
TOTAL DOSE*	(Orbital Radiation Dose Analysis Package)

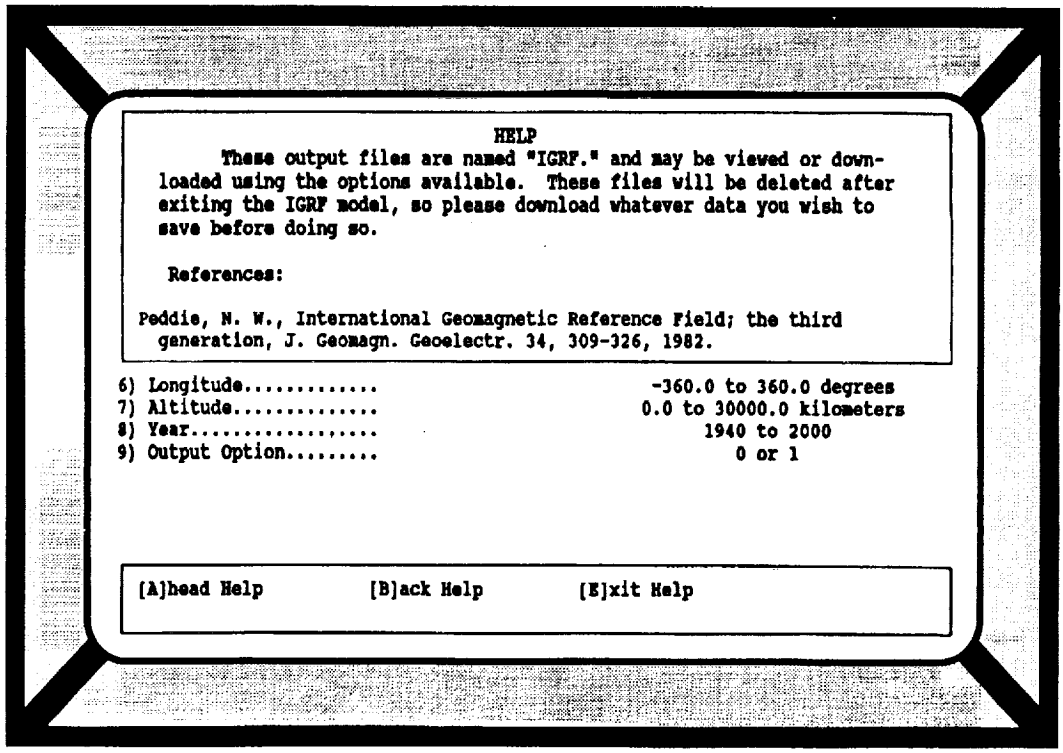
ENERGETIC PARTICLES*
RADIATION BELTS
SOLAR FLUX
ORBITAL DEBRIS*
METEOROID*
ORBITAL DECAY
THERMAL ANALYSIS

*Suitable for orbit integration

ENVIRONMENT MODELS

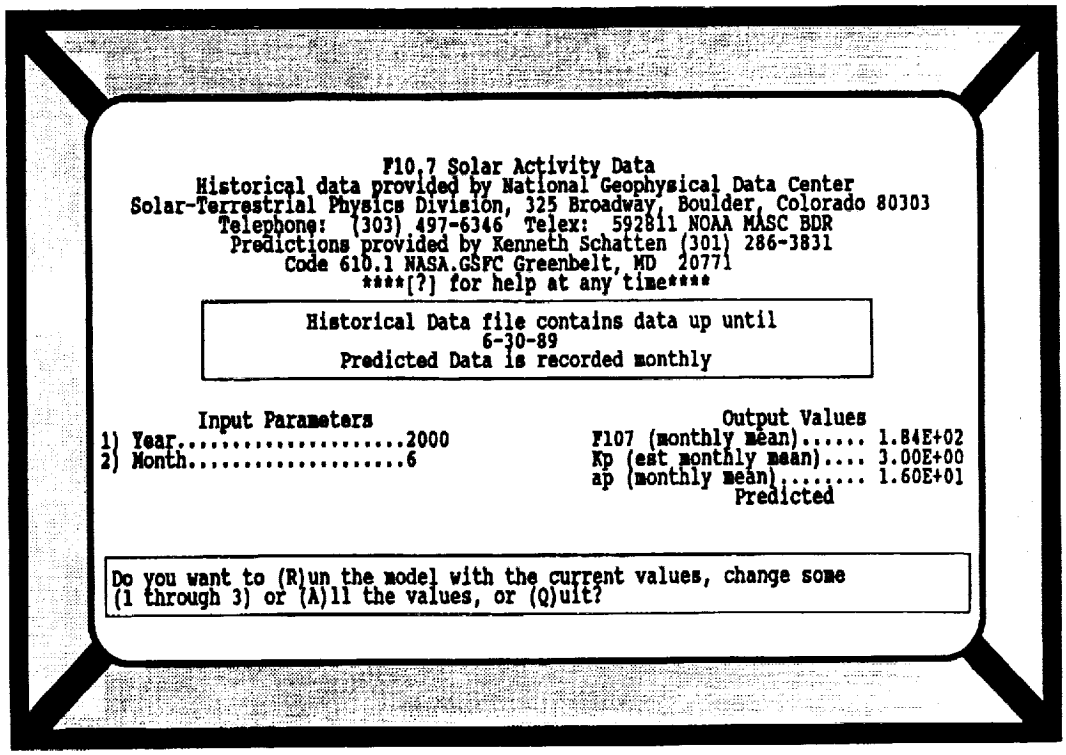
- PROVIDE A READILY ACCESSIBLE METHOD TO DO QUICK, ACCURATE CALCULATIONS.
- ENCOMPASS MANY IMPORTANT ENVIRONMENTS FOR ENGINEERS.
- A USER-FRIENDLY, INFORMATIVE INTERFACE IS STANDARD ON ALL ENVIRONET MODELS.
- ALL MODELS HAVE A POP-UP HELP WINDOW WHICH GIVE MORE INFORMATION ON MODEL INPUTS, OUTPUTS AND CAVEATS.
- PERMIT UPLOADING AND DOWNLOADING OF LARGE DATA FILES.

MODEL HELP WINDOW



SOLAR ACTIVITY DATA AND PREDICTIONS

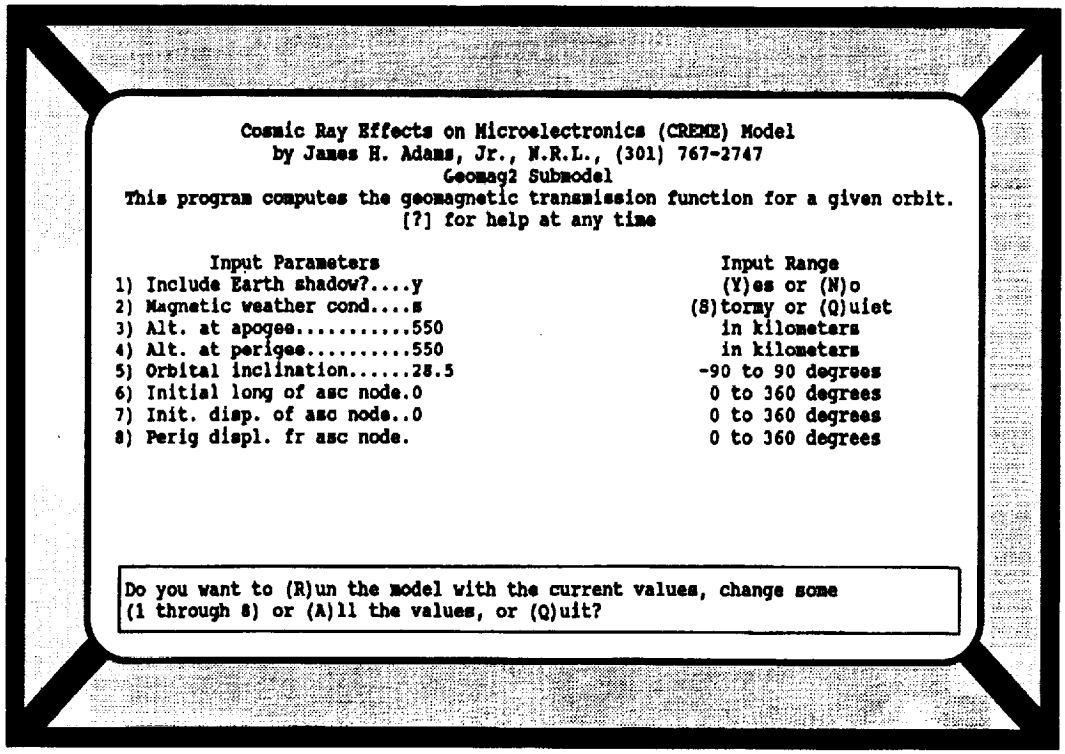
- PRODUCES DAILY AVERAGES OF Ap AND Kp ACTIVITY WHICH ARE NEEDED FOR MOST ATMOSPHERE AND MAGNETOSPHERE MODELS.
- DATA FILES SPAN FROM 1940 TO 2011 AND ARE PERIODICALLY UPDATED.
- HISTORICAL DATA SUPPLIED BY ARRANGEMENT WITH NOAA.
- PREDICTIONS SUPPLIED BY ARRANGEMENT WITH NASA/GODDARD SCIENTIST DR. KENNETH SCHATTEN.



COSMIC RAY EFFECTS ON MICROELECTRONICS MODEL

- CALCULATES THE LINEAR ENERGY TRANSFER (LET) SPECTRA FOR A CHOSEN RANGE OF ELEMENTS, FOR ANY ORBIT.
- CALCULATES THE SINGLE-EVENT UPSET (SEU) RATE DUE TO THE LET SPECTRA AND PROTON REACTIONS OUTSIDE THE SPACECRAFT, GIVEN PARAMETERS OF THE PART OF INTEREST.
- INCLUDES THE EFFECTS OF SOLAR FLARES, GEOMAGNETIC CUTOFF, AND TRAPPED PROTONS.

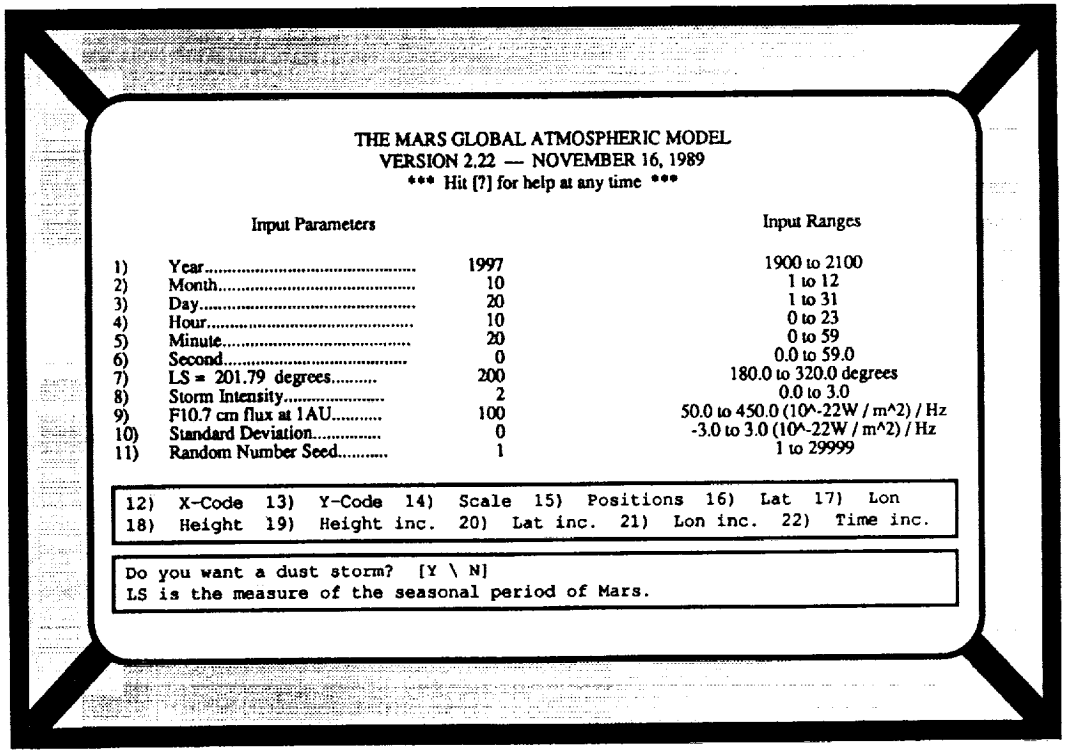
CREME MODEL



MARSGRAM

- AN ENGINEERING MODEL ATMOSPHERE FOR MARS.
- LOWER ATMOSPHERE DATA BASED ON ACTUAL MEASUREMENTS MADE BY MARINER AND VIKING SPACECRAFT.
- SIMULATES EFFECTS OF SEASONAL AND DIURNAL VARIATION, DUST STORMS, AND CO_2 SUBLIMINATION/CONDENSATION ON SURFACE PRESSURE.
- RANDOM PERTURBATION PROFILES FOR DENSITY VARIATIONS ALONG SPECIFIED TRAJECTORIES.

MARSGRAM MODEL



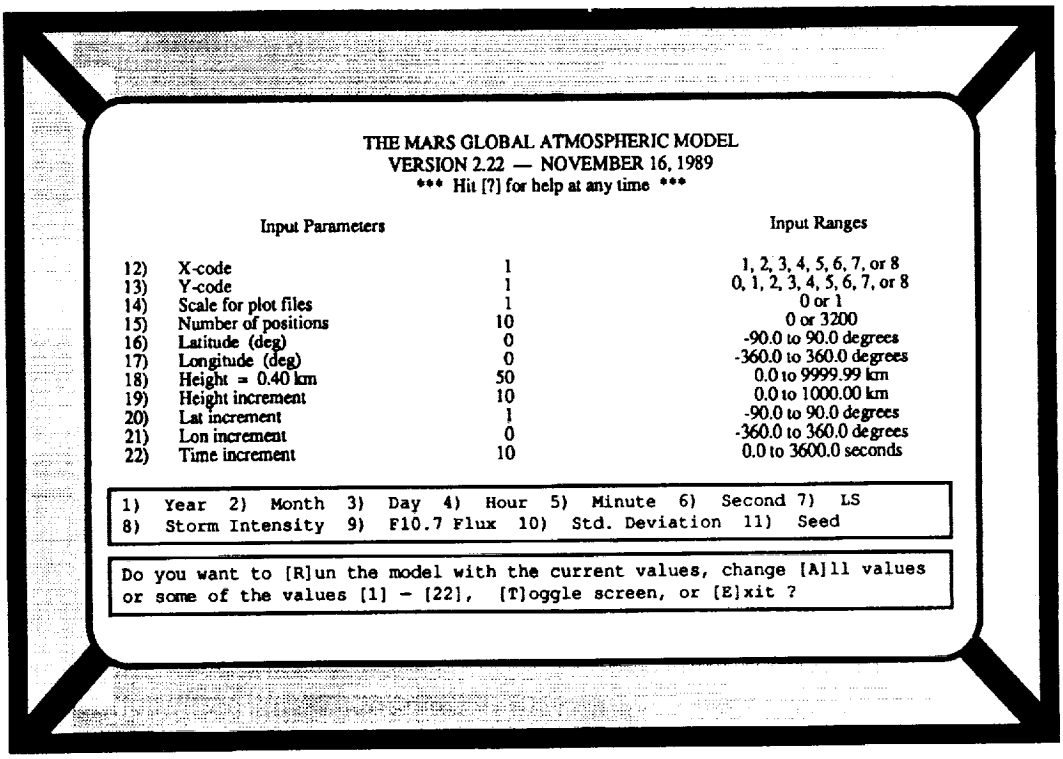
THE MARS GLOBAL ATMOSPHERIC MODEL
VERSION 2.22 — NOVEMBER 16, 1989
*** Hit [?] for help at any time ***

	Input Parameters		Input Ranges
1)	Year	1997	1900 to 2100
2)	Month	10	1 to 12
3)	Day	20	1 to 31
4)	Hour	10	0 to 23
5)	Minute	20	0 to 59
6)	Second	0	0.0 to 59.0
7)	LS = 201.79 degrees	200	180.0 to 320.0 degrees
8)	Storm Intensity	2	0.0 to 3.0
9)	F10.7 cm flux at 1AU	100	50.0 to 450.0 (10^-22W / m^2) / Hz
10)	Standard Deviation	0	-3.0 to 3.0 (10^-22W / m^2) / Hz
11)	Random Number Seed	1	1 to 29999

12) X-Code 13) Y-Code 14) Scale 15) Positions 16) Lat 17) Lon
18) Height 19) Height inc. 20) Lat inc. 21) Lon inc. 22) Time inc.

Do you want a dust storm? [Y \ N]
LS is the measure of the seasonal period of Mars.

MARSGRAM MODEL



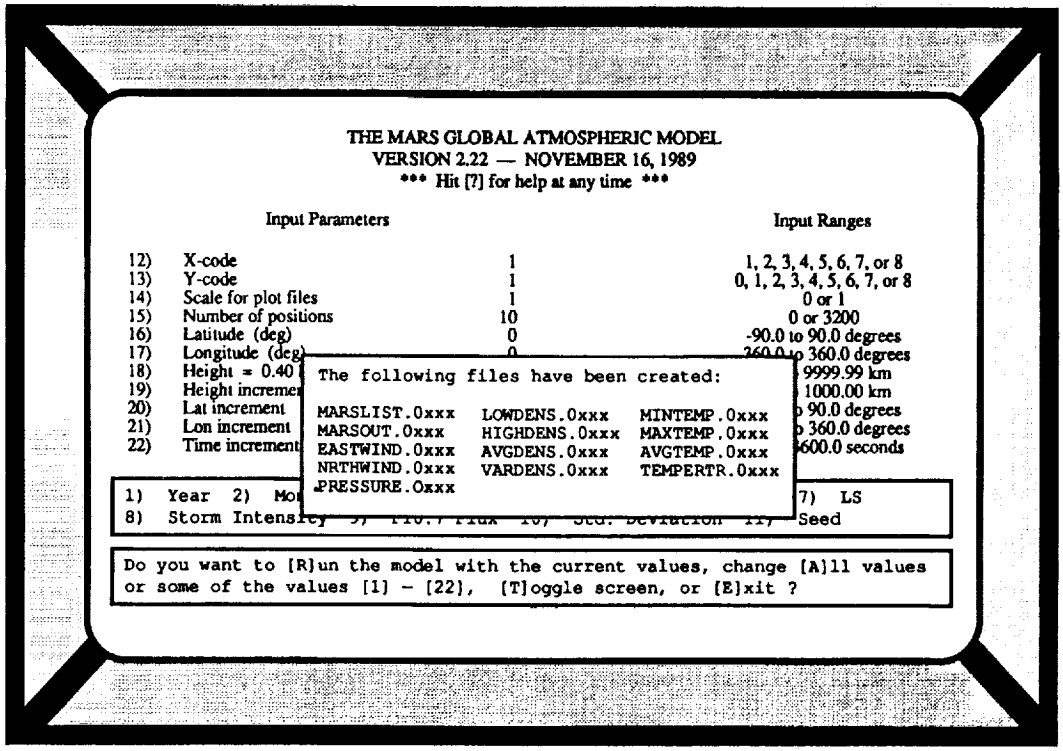
THE MARS GLOBAL ATMOSPHERIC MODEL
VERSION 2.22 — NOVEMBER 16, 1989
*** Hit [?] for help at any time ***

	Input Parameters		Input Ranges
12)	X-code	1	1, 2, 3, 4, 5, 6, 7, or 8
13)	Y-code	1	0, 1, 2, 3, 4, 5, 6, 7, or 8
14)	Scale for plot files	1	0 or 1
15)	Number of positions	10	0 or 3200
16)	Latitude (deg)	0	-90.0 to 90.0 degrees
17)	Longitude (deg)	0	-360.0 to 360.0 degrees
18)	Height = 0.40 km	50	0.0 to 9999.99 km
19)	Height increment	10	0.0 to 1000.00 km
20)	Lat increment	1	-90.0 to 90.0 degrees
21)	Lon increment	0	-360.0 to 360.0 degrees
22)	Time increment	10	0.0 to 3600.0 seconds

1) Year 2) Month 3) Day 4) Hour 5) Minute 6) Second 7) LS
8) Storm Intensity 9) F10.7 Flux 10) Std. Deviation 11) Seed

Do you want to [R]un the model with the current values, change [A]ll values
or some of the values [1] - [22], [T]oggle screen, or [E]xit ?

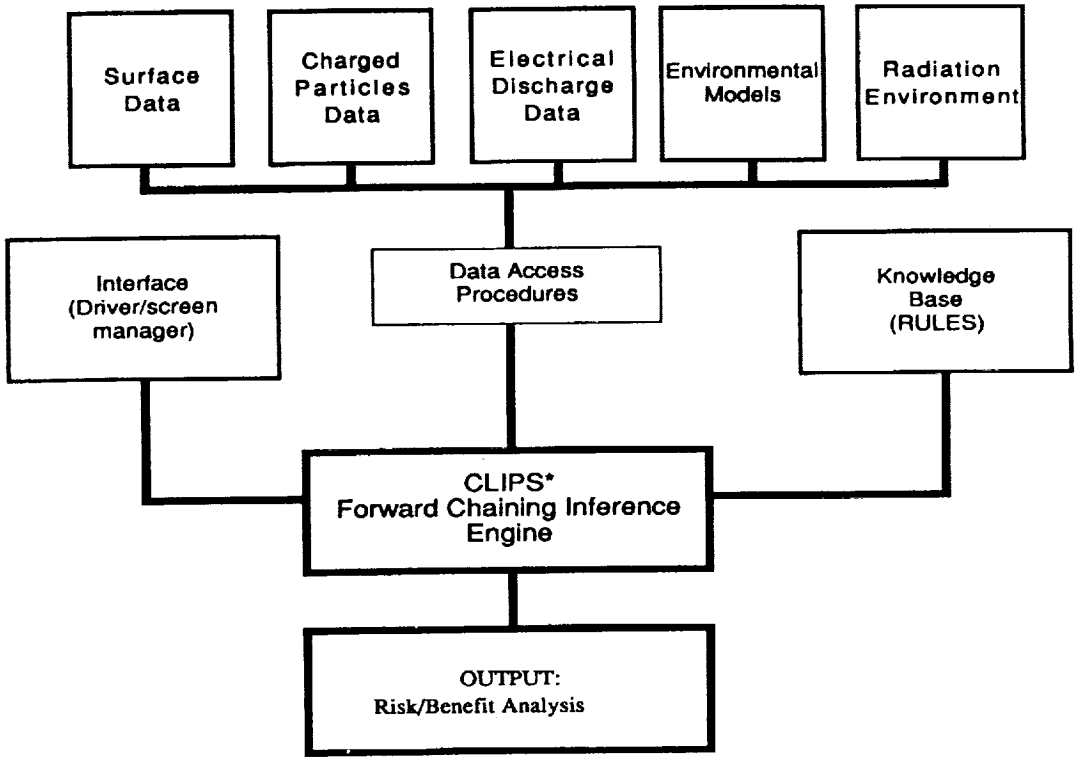
MARSGRAM MODEL



EXPERT SYSTEMS

- Provide an effective method of saving corporate knowledge.
- Allow computers to sift through large amounts of data and pinpoint significant parts.
- Use heuristics for predictions instead of algorithms.
  - Approximate reasoning and inference.
  - Able to attack problems not rigidly defined.

PROPOSED EXPERT SYSTEM FOR ELECTRICAL AND CHEMICAL INTERACTIONS ON MARS



*C-Language Integrated Production System (NASA/JSC)

The proposed model access and organization is shown below