Wednesday, July 11, 2007
POSTER SESSION: THE MARTIAN CLIMATE AND CURRENT PROCESSES
11:30 a.m. Dabney Garden

Altieri F. Bellucci G. Carrozzo G. Zasova L. Bibring J. P. Formisano V.
OMEGA-PFS Observations of a Local Dust Storm on Mars **[#3248]**
We report on the observation of a dust storm in the Atlantis Chaos region on Mars, observed by the OMEGA/MEx and PFS.

Archer P. D. Jr. Pavlov A. A. Smith P. H.
Atmospheric Methane and Martian Climate **[#3193]**
Though atmospheric methane currently has no effect on martian climate due to the low surface pressure and temperature, methane could have played a critical role in sustaining a dense CO_2 atmosphere that would support a warm early Mars.

Benson J. L. Glenar D. A. James P. B. Wolff M. J.
Properties of Mars Aphelion Volcano Clouds from Combined Mars Global Surveyor MOC and TES Measurements **[#3352]**
Maps of 425 nm cloud optical depth are produced and analyzed for aphelion clouds near Olympus, Ascraeus, and Elysium Mons from MGS MOC and TES data.

Bergstralh J. T. Natarajan M. Zawodny J. M. Tolson R.
Density Profile Variations in the Martian Middle and Lower Atmosphere, in the Vicinity of Eberswalde, Holden, and Terby Craters **[#3162]**
Density profiles in the martian middle and lower atmosphere, in the vicinities of three proposed MSL landing sites, were derived from MGS-TES temperature profiles. Interannual, temporal, and spatial variations among them were examined to evaluate risk for landing.

Cahoy K. L. Hinson D. P. Tyler G. L.
Characterization of a Semidiurnal Eastward-propagating Tide at High Northern Latitudes with Mars Global Surveyor Electron Density Profiles **[#3088]**
Apparent phase velocities estimated from MGS electron density profiles are used to uniquely identify and characterize SE1, the semidiurnal eastward-propagating tide with zonal wave number one, at high northern latitudes during the summer of Mars Year 26.

Clancy R. T. Wolff M. J. Whitney B. A. Smith M. D. Cantor B. A. Malin M. Murchie S. MARCI/CRISM Science Teams
Mars Ozone Measurements from the Mars Reconnaissance Orbiter (MRO) MARCI and CRISM Experiments **[#3082]**
The MRO experiments, MARCI and CRISM, observe complementary aspects of Mars ozone and cloud distributions. MARCI supports daily global maps of Mars ozone and cloud columns through UV imaging, CRISM images the 1.27 μm O_2 singlet delta band emission.

Colaprete A. Barnes J. R. Haberle R. M. Montmessin F.
CO_2 Clouds, CAPE and Convection on Mars: Observations and General Circulation Modeling **[#3305]**
A new Mars Global Circulation Model (MGCM) CO_2 cloud model is developed to better understand the distribution of observed CAPE and its potential effect on martian polar dynamics and heat exchange, as well as effects on the climate as a whole.

Costard F. Mangold N. Baratoux D. Forget F.
Current Gullies Activity: Dry Avalanches at Seasonal Defrosting as Seen on HiRise Images **[#3133]**
One HiRise image of gullies taken during defrosting shows the presence of slope streaks formed within the frost blanket, thus signing a currently active process. Consequences for gullies activity will be shown.

Economou T. E. Pierrehumbert R. Banfield D. Landis G. A.
Mars Atmosphere Argon Density Measurement with the Alpha Particle X-Ray Spectrometer on MER Missions **[#3035]**
Dedicated measurements of the argon in the martian atmophere have been conducted recently with the APXS on MER missions. It is hopped that Ar/CO_2 mixing ratio as a fuction of martian seasons could help understand better the atmosphere circulation on Mars.

Elteto A. Toon O. B.
Martian Atmospheric Dust Properties Retrieved Using a Sensitivity Matrix Method **[#3199]**
We present a dust property retrieval algorithm from Mars Global Surveyor Thermal Emission Spectrometer data using a sensitivity matrix method. We compare our results to those from other retrievals.

Eluszkiewicz J. Moncet J.-L. Connor T. Cady-Pereira K.
TES Polar Retrievals **[#3339]**
Simultaneous atmospheric and surface retrievals from the TES spectra of the polar regions will be described.

Forget F. Millour E. González-Galindo F. Spiga A. Lewis S. R. Montabone L. Read P. L.
López-Valverde M. A. Gilli G. Desjean M.-C. Huot J.-P. MCD/GCM Development Team
The New (Version 4.2) Mars Climate Database **[#3098]**
The Mars Climate Database (MCD) is a database of atmospheric statistics compiled from General Circulation Model numerical simulations of the martian atmosphere. It is freely distributed and useful in the framework of engineering applications as well as in the context of scientific studies.

Fritts D. Gordley L. Dissly R. Johnson B.
Atmospheric Dynamics of Mars: What Can be Learned with High-Resolution Limb and Sub-Limb IR Emission Measurements? **[#3330]**
This presentation will cover the need to measure the spatial and temporal structure of the martian atmosphere at higher resolution than done previously, to capture the gravity wave structures that dominate vertical mass and momentum transport.

Gulick V. C. Davatzes A. Kolb K. HiRISE Team
Some Insights on Gully Morphology and Formation on Mars from HiRISE **[#3371]**
This abstract summarizes some of the recent findings on the martian gullies from HiRISE.

Guo X. Richardson M. I. Newman C. E.
Non-Condensable Gas in a Mars General Circulation Model **[#3375]**
We use a simple CO_2 condensation scheme in the PlanetWRF to study the tracer dynamics in the Mars atmosphere. Non-condensable gas changes as a result of CO_2 condensation. It provides us a way to study the tracer gas transportation and improve the GCM parameterization.

Hale A. S. Tamppari L. K. Christensen P. R. Smith M. D. Bass D. S. Martin T. Z. Pearl J. C.
Water Ice Clouds in the Martian Atmosphere: A Comparison of the TES and Viking Eras **[#3188]**
We map water-ice clouds as seen by MGS TES and Viking IRTM and investigate the weather and climate seen by each instrument.

Hansen C. J. Okubo C. McEwen A. Byrne S. DeJong E. Herkenhoff K. Mellon M.
Russell P. Thomas N.
HiRISE Views of the Sublimation of Mars' Southern Seasonal CO_2 Cap **[#3364]**
Results of the HiRISE campaign to observe the sublimation of the southern seasonal CO_2 cap have shown a number of exotic phenomena with few Earth analogs.

Hartmann W. K.
Martian Chronology: Toward Resolution of the 2005 "Controversy" and Evidence for Obliquity-driven Resurfacing Processes **[#3318]**
Malin et al. recently reported discovery of 20 martian impact sites where new craters formed. Their rate is still within about an order of magnitude of the rate I have used to construct the isochrons if only half their detections are correct.

Heavens N. G. Richardson M. I. Toigo A. D.
Two Aerodynamic Roughness Maps Derived from MOLA Data and Their Effects on Boundary Layer Properties in a Mars GCM **[#3218]**
We develop two aerodynamic roughness maps of Mars based on different assumptions and using different types of MOLA data. We investigate the differences between boundary layer processes in a Mars GCM forced by each map, also considering implications for dust devil activity.

Heavens N. G. Richardson M. I. Newman C. E.
Using Mars Orbital Camera Dust Devil Observations to Develop Schemes for Representing Dust Devils in Mars General Circulation Models **[#3208]**
Current methods of representing dust devil activity in Mars GCMs are reviewed. An alternate method is proposed. This method is then used in conjunction with Mars GCM simulations and MOC WA dust devil observations to develop new schemes for representing dust devil activity.

Hébrard E. Coll P. Montmessin F. Marticorena B. Bergametti G.
Modelling the Aeolian Erosion Thresholds on Mars **[#3144]**
A physical model, designed at LISA to represent correctly the spatial and temporal variability of dust emission in arid terrestrial environment [Marticorena and Bergametti (1995), Marticorena et al. (1997)] has been now adapted to martian conditions.

Hinson D. P.
Radio Occultation Measurements with Mars Global Surveyor: Dynamics of the Neutral Atmosphere **[#3064]**
MGS radio occultations have produced an extensive record of variations in geopotential height on time scales from diurnal to interannual, offering a unique perspective on planetary-scale dynamics such as baroclinic eddies and Kelvin waves.

Hoekzema N. M. Garcia Comas M. Gwinner K. Grieger B. Markiewicz W. J. Keller H. U.
The Scale-Height of Dust Around Pavonis Mons from HRSC Stereo Images **[#3154]**
We used HRSC stereo observations for estimating the scale-height of aerosols in the martian atmosphere and found 10.8 +0.9/–0.8 km on the flanks of Pavonis Mons. This is equal to, or very close to, the expected local gas-scale-height.

Hoekzema N. M. Thomas N. Keller H. U. Markiewicz W. J. Inada A. Delamere W. A. Herkenhoff K. E. Milazzo M. McEwen A. HiRISE Team
Optical Depth Retrievals from Shadows in HiRISE Images **[#3226]**
We use a HiRISE image of the Opportunity rover site to estimate optical depths from shadows and compared our estimates with the rover's ground truth. Our results suggest that retrievals of the optical depth from shadows can yield an accuracy of better than 10%.

Justh H. L. Justus C. G.
Mars Global Reference Atmospheric Model (Mars-GRAM 2005) Applications for Mars Science Laboratory Mission Site Selection Processes **[#3291]**
Mars-GRAM's new auxiliary profile option is described. Results are given using auxiliary profiles made from two Mars mesoscale models at three MSL candidate sites. Results are also compared with three Mars years of observed TES atmospheric data.

Kahre M. A. Hollingsworth J. L. Haberle R. M. Murphy J. R.
A Numerical Study of the Evolution of Airborne Dust Particle Sizes During a Simulated Martian Global Dust Storm **[#3254]**
The NASA Ames MGCM is utilized with interactive dust lifting and radiatively active dust transport and sedimentation to investigate the transport processes that give rise to spatial and temporal variability of airborne dust particle sizes.

Karatekin O. Wautier J. Van Hoolst T.
Length-of-Day Variations of Mars **[#3195]**
The Length of Day (LOD) variations are associated with the seasonal redistribution of masses on planetary scale. In the present study we calculate LOD variations using the outputs of a Global Circulation Model and compare with previous estimates.

Kinch K. M. Sohl-Dickstein J. Bell J. F. III
Dust Deposition Rates at the MER Landing Sites **[#3209]**
Dust reflectance properties as well as rates of dust deposition at the landing sites of the two Mars Exploration Rovers are derived from the large set of images of the Panoramic Camera calibration targets.

Landis G. A. Geissler P. G. Greeley R. Lemmon M. T. Maki J. Neakrase L. D. V. Thompson S. D. Waller D. Whelley P. L. MER Athena Science Team
Dust Devils in Gusev Crater: A Second Year of Observations by the Spirit Rover **[#3149]**
Dust devils seen by Spirit at Gusev vary in morphology from narrow columns to more amorphous dust. The second year we saw the first dust devils 16 sols before equinox. To date we've seen 19 dust devils the second season. Optical depth is calculated.

Lawson W. G. Richardson M. I. McCleese D. J. Schofield J. T. Aharonson O. Calcutt S. B. Irwin P. G. J. Kass D. M. Leovy C. B. Lewis S. R. Paige D. A. Read P. L. Taylor F. W. Zurek R. W.
Adapting State of the Art Data Assimilation Approaches for Use with the Mars Climate Sounder and the PlanetWRF Martian GCM **[#3321]**
We shall present our progress to date of our efforts to adapt state of the art data assimilation approaches within the terrestrial meteorological community for use with the new MCS dataset and a martian GCM.

Lefèvre F. Bertaux J.-L. Perrier S. Lebonnois S. Korablev O. Fedorova A. Montmessin F. Forget F.
The Martian Ozone Layer as Seen by SPICAM/Mars-Express **[#3137]**
We report on the distribution and variability of martian ozone as observed by SPICAM. Observations give pole-to-pole coverage, seasonal evolution, vertical distribution, and provide new constraints on photochemical models of Mars atmosphere.

Lewis S. R. Montabone L. Read P. L. Rogberg P. Wilson R. J. Smith M. D.
Planetary Waves in an Assimilation of Three Mars Years of Thermal Emission Spectrometer Data from Mars Global Surveyor **[#3167]**
We investigate the dynamics of large-scale traveling and stationary planetary waves diagnosed from a re-analysis of data from the Thermal Emission Spectrometer aboard the Mars Global Surveyor spacecraft over a period of three Mars years.

Määttänen A. Fouchet T. Drossart P. Melchiorri R. Encrenaz T. Combes M. Bibring J. P. Langevin Y. Gondet B. Poulet F. Titov D. V. Forni O. Formisano V. Giuranna M. OMEGA Team
Study of a Dust Storm Properties from the Mars Express OMEGA and PFS Data **[#3061]**
We will report initial results from a study of a localized dust storm observed by Mars Express.

Määttänen A. Vehkamäki H. Lauri A. Napari I. Kulmala M.
Two-component Heterogeneous Nucleation in the Martian Atmosphere **[#3045]**
We will present the results of our theoretical two-component nucleation studies: modelling the formation of cloud particles of a mixture of water and carbon dioxide ices.

Madeleine J.-B. Forget F. Head J. W. Levrard B. Montmessin F.
Exploring the Northern Mid-Latitude Glaciation with a General Circulation Model **[#3096]**
Using an atmospheric general circulation model, we propose a climatic scenario for northern mid-latitude glaciation and explore the meteorological conditions under which this major glacial modification of the dichotomy boundary may occur.

Maltagliati L. Titov D. V. Encrenaz T. Forget F. Garcia-Comas M. Tschimmel M. Keller H. U.
Behavior of Atmospheric Water Vapor Observed with the OMEGA Imaging Spectrometer Onboard Mars Express **[#3025]**
We present the results of water vapor retrievals obtained using OMEGA-MEx observations. They include both the global scale behavior and, thanks to OMEGA high spatial resolution, detailed analysis of specific interesting regions of the planet.

Martin T. Z. Tamppari L. K.
Diurnal Variation of Martian Dust Opacity **[#3079]**
Diurnal change in dust opacity mapped from Viking IR Thermal Mapper data shows midday peaks for dusty periods, and little change for clear conditions. Behavior in Amazonis, site of frequent dust devils, is not distinct from other regions.

McDunn T. L. Bougher S. W. Smith M. D. Bertaux J. L. Montmessin F. Forget F. Steers B. M.
Investigating the Structure of the 80–140 km Region on Mars **[#3087]**
We characterize the mean and wave structure of the middle atmosphere using density observations from MEX/SPICAM. We also perform MGCM-MTGCM model verification and use the SPICAM dataset to constrain this coupled model while exploring the physics governing the structure of this region.

Montabone L. Martinez-Alvarado O. Lewis S. R. Read P. L. Smith M. D.
Meteorology of the 2001 Global Dust Storm on Mars in an Assimilation of Thermal Emission Spectrometer Data from Mars Global Surveyor **[#3343]**
We report here on an assimilation of thermal profiles and dust optical depths from Mars Global Surveyor/Thermal Emission Spectrometer, aimed at characterizing the meteorology at the time of the 2001 global dust storm.

Mouginot J. Kofman W. Safaeinili A. Herique A.
Ionospheric Correction for MARSIS on Mars Express and Total Electron Content (TEC) Estimation **[#3138]**
MARSIS surface echoes need a ionospheric correction because the two-way travel through the ionosphere defocuses the signal. This process provides also a powerful tool to study the ionosphere and more particularly the Total Electron Content (TEC).

Nazarava K. Sephton M. A. Bland P. A.
Meteoritic Contribution to the Methane Component of the Martian Atmosphere **[#3008]**
Methane has been detected in the martian atmosphere at an average concentration of 10±5 ppbv. We estimated the methane production in Mars' atmosphere due to meteoroid ablation at 2.2 ppbv by using a "pancake" model to simulate the flight of the meteoroid through Mars' atmosphere.

Nelli S. M. Feldman W. C. Murphy J. R.
Temporally and Spatially Varying Near-Surface Water Vapor Pressure on Mars **[#3140]**
The exchange of water vapor across the soil-atmosphere boundary produces temporal and spatial variability in the near-surface water vapor pressure and the near-surface water vapor density on Mars.

Novak R. E. Mumma M. J. Villanueva G. Bonev B. DiSanti M.
Mapping of HDO and H_2O in the Martian Atmosphere **[#3283]**
Latitudinal maps of the [HDO]/[H_2O] ratio have been made for seasonal dates that span the entire martian year. Data have been taken using CSHELL at NASA IRTF. Results indicate a higher ratio in the southern hemisphere than in the northern hemisphere.

Phebus B. Colaprete A. Iraci L. Bartowski Reed R.
Laboratory Determination of Water Ice Cloud Properties Under Mars Conditions **[#3317]**
A laboratory study has been undertaken to measure critical cloud microphysical parameters, including the supersaturation needed for nucleation and growth rate. Results from the laboratory work and the impact of these findings on cloud modeling will be presented.

Rafkin S. C. R.
Radiative-Dynamic Feedback Between the Atmosphere and the Surface of Mars **[#3313]**
The feedback between atmospheric circulations, dust lifting, and radiatively active atmospheric dust is investigated through numerical simulations. Dust lifted from the surface is shown to increase the kinetic energy of circulations. Analogs to hurricane intensification are discussed.

Sabato J. S.
Dynamical Effects of Increased Dust in the Martian Atmosphere **[#3062]**
Increased dust in the martian atmosphere causes an increase in baroclinic wave activity. This can produce a positive feedback between dust lifting and eddies, explaining the seasonal asymmetry of global dust storms.

Smith M. D. Wolff M. J. Clancy R. T. CRISM Science Team
CRISM Observations of Water Vapor and Other Atmospheric Gases **[#3266]**
CRISM observations are used to map the seasonal and spatial distribution of atmospheric gases H_2O, CO, and CO_2. CRISM limb-geometry observations give vertical profile information for atmospheric gases.

Smith M. D. Wolff M. J. Spanovich N. Ghosh A. Banfield D. Landis G. A. MER Athena Science Team
Atmospheric Observations Using MER Mini-TES **[#3217]**
The seasonal and diurnal variations of atmospheric temperature below 2 km altitude and of column-integrated dust optical depth as observed by the MER Spirit and Opportunity Mini-TES instruments are presented.

Soto A. Mischna M. A. Richardson M. I.
Atmospheric Dynamics of Early Mars **[#3327]**
Newly developed global and mesoscale atmospheric models allow us to investigate not just radiative models of early Mars, as previously done, but also the atmospheric dynamics of early Mars. We use one such model, Caltech's MarsWRF, to investigate the atmospheric dynamics of early Mars.

Spiga A. Forget F. Dolla B. Vinatier S. Melchiorri R. Drossart P. Gendrin A. Gondet B. Langevin Y. Bibring J. P.
Mapping Surface Pressure on Mars with the Mars Express OMEGA Spectrometer **[#3109]**
Reflectances from the Mars Express OMEGA spectrometer in the CO_2 absorption band at 2 μm are used to retrieve surface pressure with a precision sufficient to draw maps of this field and analyze meteorological events in the martian atmosphere.

Sprague A. L. Kerry K. E. Boynton W. V. Hunten D. M. Janes D. M. Nelli S. M. Murphy J. R. Reedy R. C. Metzger A. E.
Topography Driven Variation In Argon Abundance As Measured by the GRS on Mars Odyssey **[#3060]**
The GRS on Mars Odyssey measures the 1294 keV gamma ray line of Mars atmospheric argon. We present data from discrete longitudes centered over Hellas Basin, Tharsis Montes, and a sector of no particular topographic form other than the dichotomy between the southern highlands and northern lowlands. Some differences in the argon abundance as a function of season are seen between these longitude sectors.

Toigo A. Richardson M. I. Newman C. E.
MarsWRF: A General Purpose, Local to Global Numerical Model for the Martian Climate and Atmosphere **[#3324]**
A new atmospheric model has been developed with generalized map-projection, multi-scale, and nesting capabilities, blurring the distinction between global and mesoscale models, and enabling investigation of coupling between processes on all scales.

Treiman A. H.
Growth of Gully Alcoves (Mars): Implications for Interpreting Gully Morphology and Origins **[#3222]**
As they form, alcoves of martian gullies can grow uphill and sideways as debris slumps into them and is carried away. This mechanism implies that neither the top nor the base of a gully's alcove need be the source of its flow.

Tyler D. Barnes J. R. Skyllingstad E. D.
A Mars LES Model Forced by Time and Height Dependent Mesoscale Model Geostrophic Winds to Simulate the EDL Environment for Phoenix **[#3249]**
Geostrophic winds from a mesoscale model of the Phoenix Region A/D landing site are used to force an LES simulation. This approach causes the LES model simulation to be site-specific and not idealized/generic. Preliminary results are favorable and more results will be presented in a poster.

Vincendon M. Langevin Y. Poulet F. Bibring J.-P. Gondet B.
Analysis of the Contribution of Aerosols in OMEGA and CRISM Observations of the Polar Regions of Mars **[#3159]**
We present a study of the contribution of dust aerosols in the OMEGA and CRISM observations of the polar regions of Mars. This work uses a Monte-Carlo based model of radiative transfer and a wide range of illumination and observation conditions.

Wilson R. J. Lewis S. R. Montabone L.
Thermal Tides in an Assimilation of Three Years of Thermal Emission Spectrometer Data from Mars Global Surveyor **[#3307]**
The diurnally varying circulation elements are a prominent aspect of martian weather and climate. This presentation focuses on the thermal tides present in the assimilated data record derived from MGS TES temperature and dust retrievals.

Wolff M. J. Clancy R. T. Smith M. D. CRISM Science Team MARCI Science Team
Some Studies of Martian Aerosol Properties Using MRO/CRISM and MRO/MARCI **[#3121]**
A synopsis of the aerosol studies by the CRISM and MARCI atmospheric groups, with the primary emphasis on the relatively unexplored NIR and UV wavelength regimes. Microphysical constraints on the aerosols are the ultimate goal of such analyses.

Zahnle K. Haberle R. M.
Atmospheric Sulfur Chemistry on Ancient Mars **[#3256]**
We use a 1-D steady state atmospheric photochemistry to determine what happens to volcanic sulfur gases on early Mars.