

transfer model indicates that the Lyman alpha source temperature is very high. This suggests that energetic protons or hydrogen atoms are responsible for a fraction of the emissions. Calculation of the solar scattered component of the emissions based on the neutral atmosphere of Smith et al. [1983] reveals that only 1-2 kR out of a total of 3.5 kR of the observed Lyman alpha intensity is due to solar scatter for the V2 disc observations; the remainder of the Lyman alpha emissions are collisionally excited. While the Lyman alpha and H₂ bands are constant in longitude they decrease by a factor of two from dawn to dusk. This correlation of the Lyman alpha and H₂ band intensities is further evidence that most of the Lyman alpha is collisionally excited.

3.6

IUE Observations of Auroral Emissions from Saturn

G. E. Ballester, P. D. Feldman, H. W. Moos, T. E. Skinner (JHU)

Saturnian ultraviolet spectra from 1150 to 1800 Å obtained with the International Ultraviolet Explorer (IUE) between December 1981 and August 1984 show occasional bursts of H₂ auroral emissions of the Lyman- and Werner-bands over an apparent continuous base. The spectra (~11Å resolution) were acquired with the large aperture of the IUE short wavelength spectrograph with a spatial resolution of ~5". The diameter of the Saturnian disk, ~15", can then be resolved to determine that the bursts come from the north polar region.

The signal to noise ratio of the IUE spectra of Saturn is very low. Hence, only the brightest part of the spectrum was used to determine the H₂ emission, the Lyman-band region from 1557 to 1619 Å. This spectral region was estimated both from a laboratory spectrum and from several Jovian IUE auroral spectra to contain 12% of the total H₂ auroral flux. For each exposure a least squares fit of two parameters was performed using an estimated planetary scattered light background and a bright IUE Jovian H₂ auroral spectrum. Then using the area of the auroral region between 81° and 78.5°, as determined by B. R. Sandel and A. L. Broadfoot (Nature, 292, 679, 1981), average brightnesses were obtained.

For six days of observations we detected three bursts in the aurora, the brightest one on 21 December 1981 of ~30 kR, and an apparent continuous emission of ~5-10 kR. The burst of December 1981 seems to have been emitted from a longitude region that includes the λSL of 115° from which, according to M. L. Kaiser and M. D. Desch (JGR, 87, 4555, 1982), Saturnian Kilometric Radiation has its origins. The other bursts do not seem to come from this region, but a more precise determination of longitudes is needed at the present stage of the analysis.

This work was supported by NASA grant NSG 5393.

Planetary Lab, is completing assembly of a prototype Martian rover. The unique feature of the vehicle is its propulsion system: independent, sequential inflation of 16 radial sectors on each of two tires. Our current rover follows in the tracks of our first crude tire, which in 1984 negotiated 25 degree slopes and 15 cm obstacles. The project objective is to determine the viability of this previously untested method of rover propulsion.

Construction milestones include: 1) assembly of one tire, composed of the central high-pressure air chamber, the 16 valves controlling air flow to each sector, and the inflatable sectors themselves, 2) installation of the three-computer network (one on each tire plus one on the payload) responsible for vehicle command and control, 3) completion of the rover payload section, containing computer, TV camera, and power distribution systems. We have pressurized the completed tire to 1.1 psi, more than enough to support the estimated vehicle weight given the footprint of an inflated sector.

With a fully-inflated tire diameter of 5 m and a width of 4.6 m along its single axle, the 500 kg Mars Ball will be able to surmount meter-sized obstacles. The large dimensions enable the vehicle to ignore most Martian rocks and obstacles. Other advantages are: a) collapsible tires minimize launch vehicle size and cost, b) exceptional freedom of movement reduces the requirement for real-time control from Earth. After final assembly this winter, we will field test the Mars Ball in the desert near Tucson. We anticipate demonstrating an inexpensive concept for a Martian rover mission, one costing far less than the usually considered Viking-scale effort. This work is funded by NASA Grant NAGW-546.

4.2

Magnetospheric Plasma Interaction with Io's Atmosphere

E.M. Sieveka, M. McGrath-Kinnally, R.E. Johnson (U. Virginia)

Although the exact scenario for ejection is uncertain, Io is thought to account for ~98% of the plasma supplied to the Jovian magnetosphere. It now appears that the presence of an atmosphere is required in order to explain the estimated supply rates necessary to maintain the observed plasma torus and to reproduce the observed night-side ionosphere. However, mechanisms for direct escape from a reasonable, sublimated atmosphere, including sputtering at the exobase and ionization and pickup, together are only minimally successful in meeting the lower limit of the required escape fluxes. In addition to the escape mechanisms mentioned above, subsequent losses from a sputter-generated, atmospheric corona (superimposed on the thermal corona) due to collisional ejection, ionization and charge transfer will produce the necessary flux of escaping particles. We investigate this by generating sputter corona from atmospheres of various compositions, exobase heights and temperatures and calculate the resulting escape fluxes. We also discuss the consistency of such a model with the observed nightside ionosphere and the possible origin and evolution of such an atmosphere.

Work supported by NASA Planetary Atmosphere Division under Grant NAGW-461.

Session 4

Posters

5:00-6:30 p.m., Salons D,E,F

4.1

Construction of the 'Mars Ball' Prototype Exploration Vehicle

D. Hilton, E. Eplee, D. Grinspoon, A. Hildebrand, T. Jones, R. Marcialis, M. Marley, S. Pope, B. Rizk, N. Schneider, A. Tyler, D.M. Hunten (U. Arizona)

The Mars Ball Project, eleven graduate students and a faculty advisor from the U. of Arizona's Lunar and

4.3 Gravity Field of the Saturnian System From Pioneer and Voyager Tracking Data. J. K. Campbell, J. D. Anderson, Jet Propulsion Laboratory, California Institute of Technology - Analysis of the Doppler tracking data and star-satellite imaging from the Voyager 1 and Voyager 2 spacecraft, combined with a reanalysis of the Pioneer 11 Doppler tracking has yielded values for the masses of the satellites Tethys, Rhea, Titan, and Iapetus, and the mass and harmonic coefficients of Saturn. Doppler data were not sensitive to the masses of Mimas, Enceladus, Dione, Hyperion, and Phoebe. The mass estimate for Tethys relies on analysis of noncoherent Doppler data collected during the Voyager 2 flyby