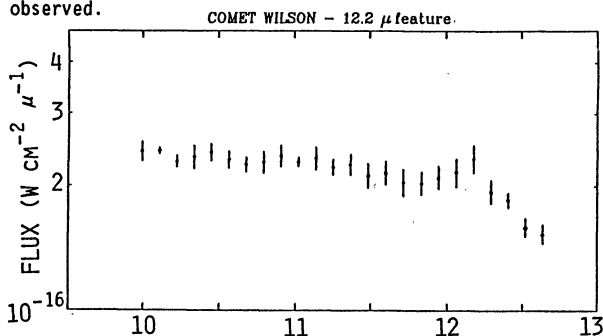


phase function. Phase angles varying from 14 to 58° are employed in the least-squares fitting procedure, which yields best estimates for the phase function terms g_1 , g_2 , and f . The light scattering solution is then applied to produce an image which is the ratio of the Voyager data to the computed Uranus disk having the least-squares derived properties. This powerful filter at all spatial scales enhances subtle features in the Uranian atmosphere. We present the modeling results and the ratio images, and discuss the implications of structure in the ratio images and their relationships to trends found earlier in Minnaert-ratio work.

5 - 13 μ m Airborne Observations of Comet Wilson 1986L: Preliminary Results

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Comet Wilson was observed from the Kuiper Airborne Observatory approximately April 23.6 and 25.6 1987 UT (≈ 3 and 5 days after perihelion) using the NASA-Ames Faint Object Grating Spectrometer. Spectrophotometric data were obtained with a 21" aperture ($\approx 10,000$ km at the comet) between 5 and 13 μ m with a spectral resolution of 50-100. Spectra of the inner coma and nucleus reveal a fairly smooth continuum with some evidence of silicate emission. The 5 - 8 μ m color temperature of the comet was 300 ± 15 K, approximately 15% higher than the equilibrium blackbody temperature. All three spectra of the nucleus show a new emission feature at $\approx 12.25 \mu$ m $\approx$ two channels (.22 μ m) wide. Visual and photographic observations made during the time of these observations showed a broad faint, possibly two-component, tail. No outburst activity was observed.



Possible Role of Breaking Gravity Waves in the Winter Circulation of the Middle Atmosphere of Mars

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Recent Earth-based observations of Mars utilizing heterodyne spectroscopy have indicated that temperatures at high winter latitudes in the 50-85 km region may be considerably above radiative equilibrium and higher than those at lower latitudes (Deming et al., Icarus, 1987). Such a thermal structure would be similar to that in the terrestrial upper mesosphere. Its existence there appears to be due in large part to the effects of breaking internal gravity waves. Gravity waves, forced by flow over topography, should be abundant in the winter hemisphere of Mars (they are prominent in spacecraft imagery) and may be playing a key role in producing the observed warm high latitude temperatures between 50-85 km.

A simple beta-plane numerical model, incorporating a gravity wave drag and diffusion parameterization, has been employed to examine the possible effects of breaking internal gravity waves on the winter middle atmosphere circulation of Mars. The model incorporates only a single (stationary) gravity wave mode, and neglects the effects of damping on the vertical wave propagation (below the breaking level).

Results obtained with this model indicate that breaking gravity waves could produce substantially elevated temperatures, as much as 40-50 K above radiative equilibrium, at high winter latitudes between 50-85 km. A nominal case is characterized by peak warming in the 60-70 km range (the breaking level for this case is 78 km), with maximum zonal winds located near 45 km. For this case there is little warming below 30 km. If stronger gravity wave forcing and more "active" breaking is invoked, then substantial warming can be induced below 30 km. It thus appears possible that gravity waves could be of importance for the polar warming event observed by Viking during the 1977 winter solstice dust storm.

Relatively long (horizontal wavelengths of order 100 km) gravity waves are required to produce these effects; shorter waves are vertically trapped well below their breaking levels. The influence of damping, both radiative and turbulent (the latter perhaps largely due to other breaking waves - e.g., tides), on the vertical propagation (below the breaking level) of the gravity waves has not yet been investigated with the model. It would be expected to raise breaking levels, and to distribute the gravity wave drag and diffusion through a deeper region.

Properties of the beta Pictoris circumstellar disk

P. Artymowicz, C. Burrows, F. Paresce (STScI)

We present photometric evidence that the beta Pictoris disk has a roughly constant opening angle between 80 AU and 230 AU from the star, rather than constant thickness adopted in previous models of the disk. Based on this observation and taking into account the IRAS far-IR spectrum of the object, we construct a range of optically thin disk models corresponding to various optical properties of grains and different tilt angles of the disk. Preferred models have a large ratio of scattered to thermally reradiated stellar flux, suggesting an icy composition of grains. We discuss the physical processes determining the distribution of grain sizes and the evolutionary status of the system.

Photometry of Hyperion

Jim Klavetter (M.I.T.)

Hyperion (SVII) has been predicted to be in a chaotic rotation state by Wisdom, Peale, and Mignard (1983). Although there have been attempts to test this prediction from both ground-based and Voyager observations, no definitive conclusion has been reached because these observations have 1) too short a time base, 2) undersampling and/or 3) inadequate background subtraction. I have observed Hyperion at CTIO (1m), Lowell Observatory (0.9m), and McGraw Hill Observatory (1.3m and 2.4m) for a total of 56 nights over a 96 day period in the V and R filters using a CCD camera. The background light has been successfully subtracted using the two-dimensional information provided by the CCDs. I am able to obtain a precision of ± 0.03 magnitudes for most of my data and will be able to resolve the question of Hyperion's rotation state with my lightcurve. My objectives are to model this lightcurve and fit for the rotation state and moments of inertia to better than $\pm 1\%$ precision. This analysis will be discussed.