The reflectivity of the Red Spot differs very little from that of the dark belts. The colour of the Spot is apparently of the same nature that the colour of other features of the Jupiter's cloud layer and is connected with the thermochemical changes in the cloud particles. For the solution of the question on the nature of the Red Spot it is necessary to determine its temperature. The radiometric observations taken on this purpose are so far powerless determining a temperature only of some effective layer of the overcloud atmosphere. Therefore it is very important to obtain a spectrum of the Red Spot with the high resolution and to study its temperature pecularities by the examination of the intensity distribution in the rotation-vibration absorption bands.

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7. *The infra-red spectrum of Jupiter obtained by Stratoscope II*

R. E. Danielson

The second flight of Stratoscope II was flown during the night of November 26–27, 1963. During the flight, the infra-red spectrum of Jupiter was traced from $0{\cdot}8\mu$ to $3{\cdot}0\mu$ at an altitude of 84 000 feet. The entrance slit of the spectrometer was centered on Jupiter's disk and subtented an angular area of about 8·4 by 28 seconds of arc. Fig. 3 shows the observed spectrum of Jupiter obtained by detector A, one of two detectors operated simultaneously along the dispersed spectrum. The spectrometer sensitivity was determined by comparing the observed

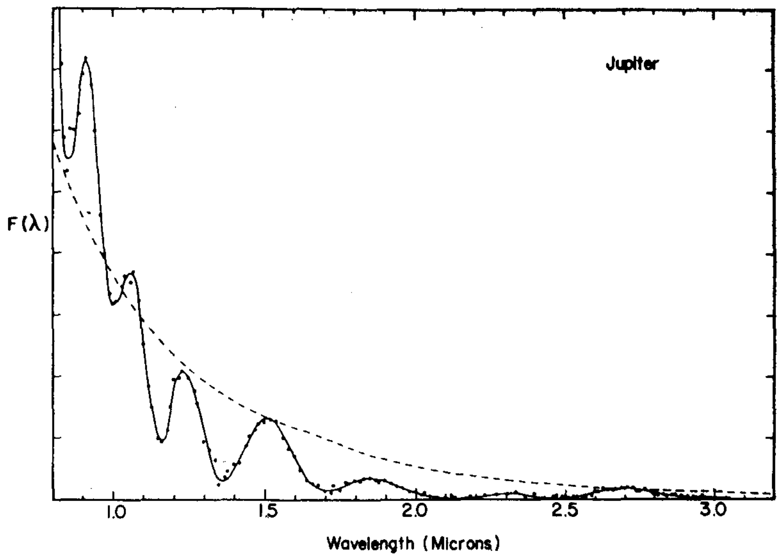

Fig. 3. The intensity of the reflected solar radiation from Jupiter (per unit wavelength interval). The dashed curve is the solar spectrum.

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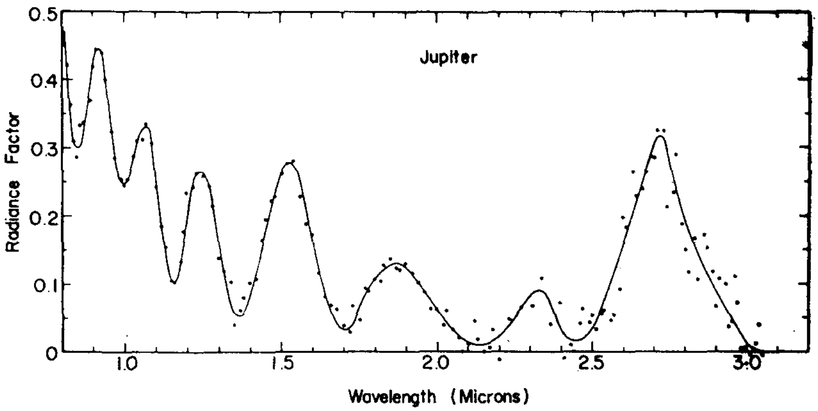

Fig. 4. The radiance factor of Jupiter in the infra-red.

spectrum of Sirius with the predicted spectrum (Woolf, Schwarzschild and Rose, 1965). The only terrestrial feature detected in the spectrum of Sirius was a slight depression at 2·7μ due to atmospheric CO_2. The wavelength calibration was established by scanning a didymium source during the flight.

Fig. 4 shows the radiance factor of Jupiter (the observed brightness of a white diffuse screen at Jupiter's distance which is normal to the Sun's rays). The absolute accuracy is uncertain by at least 20 per cent. The bands at 0·85μ, 0·99μ, 1·16μ, 1·37μ and 1·7μ all appear to be due to CH_4. The fundamental band of NH_3 at 3300 cm^{-1} causes the large absorption at 3·0μ.

The feature of most interest in the spectrum is the deep, broad absorption centered at about 2·25μ. It has two likely causes:

(1) The pressure induced band of H_2 at 2·4μ and

(2) The combination bands of CH_4 at 2·20μ, 2·32μ 2·37μ and 2·42μ.

Laboratory measurements of the H_2 band (Chisholm and Welsh, 1954) show that the H_2 band extends from about 1·8μ to 2·7μ in approximate agreement with the observed feature. Furthermore, of the order of 10 km-atm² of H_2 will produce the observed amount of absorption. Since the scale height in Jupiter's atmosphere is about 20 km, the required partial pressure of H_2 at the effective reflecting level is of the order of 0·7 atmosphere. Such a partial pressure is consistent with recent estimates of the hydrogen abundance on Jupiter.

One can therefore conclude that the pressure induced dipole band of H_2 at 2·4μ is at least partially responsible for the large feature. The contribution of the methane bands to this feature is uncertain because of the lack of appropriate laboratory data.

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8. *Infra-red spectra of Jupiter and Saturn*

W. Sinton

L. Fredrick has a number of spectra of Jupiter and Saturn with a mica-window image intensifying tube between 9800 and 11 200 Å. The dispersion was 46 Å/mm. The observations were made with the Lowell 24-inch Morgan reflector.

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