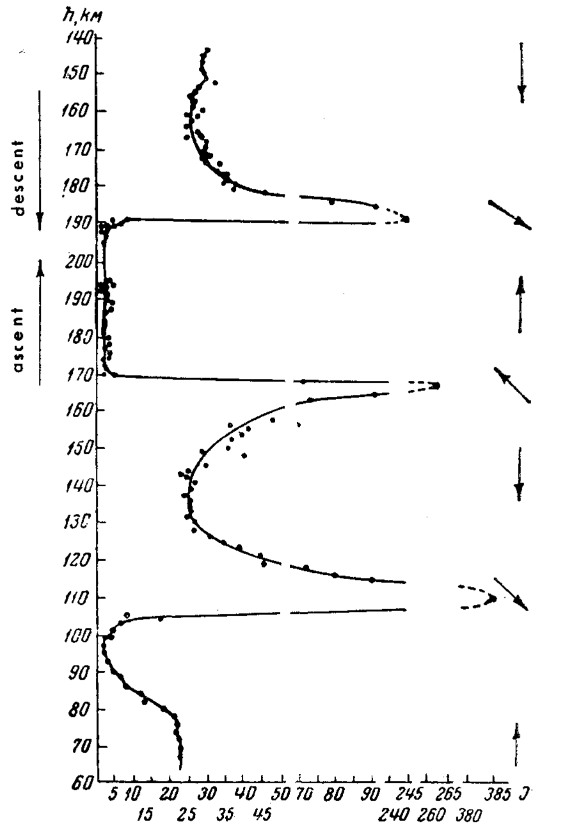
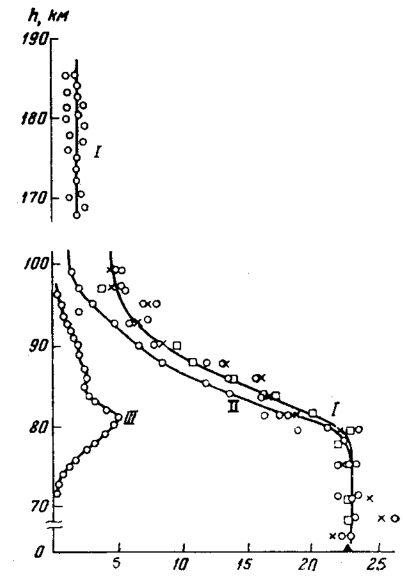


Fig. 1 Dependence on altitude of the relative intensity. The breaks in the curve correspond to breaks in the abscissa axis, made deliberately to reduce the size of the drawing.

Fig. 2 Dependence of glow intensity on altitude: I—without allowing for the orientation; II—at vertical sounding; III—relative intensity in the unit of volume.



duced to the zenith, and curve III for the emission in the unit of volume. The position of the maximum on curve III shows that the photometer indeed crosses the layer at altitude h = 80 km. The lower boundary of the layer is determined by the sharp decrease in intensity, caused by the reduction of volume brightness when the device enters the layer. This corresponds to h = 74 km. The upper boundary of the layer is at an altitude of 100 to 120 km, where the measured intensity is equal to that of the stellar background, registered at 170–200 km altitudes. The center of gravity of the layer is at 81 ± 2 km.

The derived distribution of intensity with altitude describes the combined emissions of O_2 and OH, since the filter employed in the photometer transmits not only the radiation of molecular oxygen but also a band of hydroxyl OH.

According to a preliminary estimate, the emission of molecular oxygen constitutes about 50% of the combined emission passing through the filter. The glow of the hydroxyl, which we measured in the region λ = 8640 Å, was found to be localized in the layer, the center of gravity of which lies at 78 ± 2 km.

The detection of the glowing layer, emitting in the region λ = 8640 Å, at the same heights at which hydroxyl emits, and the establishment of the absence of emitting layers at other altitudes, indicate that the emission of molecular oxygen is concentrated in the layer from 74–120 km, with the center of gravity at 81 km.

—Submitted August 2, 1961

Reviewer's Comment

The determination of the height of a layer emitting a night airglow component is best accomplished by measuring the response from a photometer in the nose of a rocket that rapidly traverses the emitting region on both the upward and downward paths. The method has been used by American investigators for the radiations [OI] 5577, NaI 5893, OH, O_2, and the so-called continuum. The several airglow layers would not necessarily be expected to be at the same height.

Table 1

Molecule	Height, km	
	Packer	Tarasova
O_2	94	81
OH	85	81

Tarasova reports on a Soviet measurement with a filter which she estimates transmits about half O_2 and half OH, and it is of interest to compare the results with American measurements reported by Packer,* as shown in Table 1.

* Packer, D. M., Annales de Geophysique **17**, 67 (1961).

Packer used a filter for O_2 centered on the 0–0 atmospheric band near 7600 Å, which is not observable at all from the ground because it is strongly absorbed by the lower atmosphere. Tarasova, on the other hand, employed a filter centered on the 0–1 band at 8640 Å, which is not significantly absorbed by the lower atmosphere. In the case of Packer's O_2 height determination, the lower atmosphere thus acted as an absorption filter blacking out completely any initial photometric response. After a height of several tens of kilometers was attained, the readings increased, confirming the fact that the photometer was responding to the 0–0 band.

A difficulty in the interpretation of Tarasova's results is, as she brought out, the question of the relative contributions of O_2 and OH to the total emission, but no possible weighting of Packer's heights (85 km and 94 km) can yield an effective height of 81 km as reported by Tarasova. Therefore it is necessary to conclude that the two independent measurements are in moderate disagreement, which is not surprising, considering the difficulty of interpretation involved in the experiments.

—F. E. Roach
National Bureau of Standards
Boulder, Colorado