frequencies. The volume of geomagnetic tubes of force at $L=1{\cdot}1$ with a base area of 1 m² is 5×10^{6} m³. Thus the total power radiated at 10 kHz by 10 eV electrons is of the order of $2{\cdot}5\times10^{-14}$ W m^{-2} Hz^{-1}. It is difficult to estimate the integrated power at a given frequency because electrons of different energies would contribute significantly to the integrated power at the given frequency. We only argue that the radiated VLF power at times may increase or decrease by orders of magnitude. We then find that the measurement reported by Gurnett[3] at 8·8 kHz ($L=1{\cdot}1$ and altitude 350 km) is of the order of 10^{-13} W m^{-2} Hz^{-1}, which is in fair accord with our calculations. There are several simultaneous mechanisms which have been invoked from time to time and deal with the spatial, temporal and phase bunching of electron influx (ref. 11 and unpublished work of N. M. Brice). We conclude that the Čerenkov process is chiefly responsible for VLF wave generation at low latitudes.

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Vertical Distribution of CO near the Tropopause

There is a marked decrease (by one or two orders of magnitude) in the CO mixing ratio from the upper troposphere to the lower stratosphere[1]. It has been suggested by Seiler and Junge, and by Pressman and Warneck, that recombination with OH provides an effective sink in the stratosphere (CACR Symposium, Heidelberg, September 1969). This note gives a quantitative justification for this suggestion.

A photochemical atmospheric model extending from 5 km to 20 km with the tropopause at 10 km is used. Vertical eddy mixing is considered, and the vertical eddy diffusion coefficients in the troposphere and stratosphere are taken as 10^{5} cm² s^{-1} and 10^{3} cm² s^{-1} respectively. The photochemistry is similar to that used in stratospheric ozone studies. Photochemical equilibrium is assumed for $O(^3P)$, $O(^1D)$, OH, H_2O_2 and H. I assume a constant mixing ratio of $0{\cdot}5\times10^{-6}$ for H_2. 60 per cent relative humidity for water vapour in the troposphere and a mixing ratio of 2×10^{-6} g/g in the stratosphere. Observed mean values are used for ozone. On this basis HO_2 concentrations are computed to give the OH values to be used in the photochemistry of CO. At the lower boundary a mixing ratio of 0·15 p.p.m. is assumed for CO; at the upper boundary CO is assumed to be in photochemical equilibrium defined by the reactions $CO+OH\rightarrow CO_2+H$ and $O(^1D)+CO_2\rightarrow CO+O_2$. This assumption is questionable, but is of little significance for the results in the region studied. For the recombination of CO and OH a reaction rate of $9\times10^{-13}\exp(-1/RT)$ is used.

The result of the computation is given in Fig. 1, curve *A*, which shows a continuous decrease with height in the CO mixing ratio. A mixing ratio of 0·1 p.p.m. is obtained

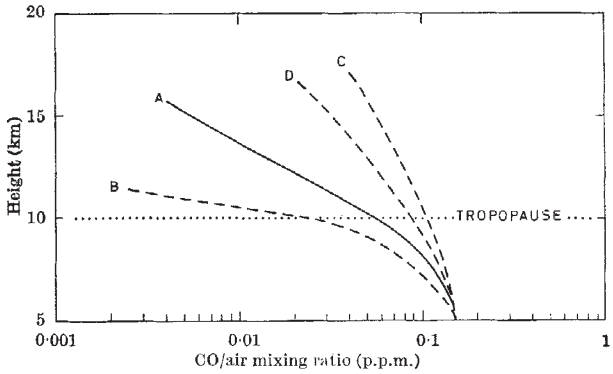

Fig. 1. Mixing ratio (theoretical) of carbon monoxide as a function of height. Curve *A* shows the result of a computation when a reaction rate of $9\times10^{-13}\exp(-1/RT)$ cm³ s^{-1} ($\approx10^{-13}$ cm³ s^{-1}) is used for the recombination of CO and OH. Similarly, curve *B* shows the result for a reaction rate of 10^{-12} cm³ s^{-1}, while curve *C* corresponds to 10^{-14} cm³ s^{-1}. Curve *D* gives the result for an increased value (5×10^{3} cm² s^{-1}) of the vertical eddy diffusion coefficient.

2 km below the tropopause—2 km above the tropopause the mixing ratio has dropped to 0·02 p.p.m. Although the agreement with observations is not complete, it seems likely from the result that the reaction between CO and OH provides an efficient sink for CO in the lower stratosphere.

In order to show how the result depends on the value of the reaction rate, computations were made for values differing by one order of magnitude up and down. The results are seen from curves *B* and *C*. Curve *D* shows the result when a higher value, 5×10^{3} cm² s^{-1}, is used for the vertical eddy diffusion coefficient of the stratosphere.

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Gravity Measurements over the Nigerian Younger Granite Province

The "Younger Granites", dated as Jurassic[1], intrude the Nigerian basement complex and occur characteristically as ring-complexes, which are prominent topographic features in this part of Nigeria (Fig. 1). These complexes are acidic in composition and include a wide variety of biotite granites, alkaline granites and rhyolites[2,3]. The great variety of different rock types and the economic importance of the region have stimulated much geological interest. Most of the minerals mined in commercial quantities in Nigeria, including cassiterite, columbite, monazite, tantalite and zircon, are associated with the Younger Granites.

Although the geology of the Younger Granites is well documented, there has been comparatively little geophysical work in the area. A gravity traverse over the Liruei ring complex[4] revealed a significant negative anomaly of − 15 mgal and, as a result of this work, a regional gravity survey of the whole Younger Granite province was undertaken chiefly to discover, if possible, the structural relations at depth between the ring-complexes and the basement.

The gravity survey was carried out between December 1967 and February 1968. Altogether about eight hundred stations were established at 3 to 6 km intervals on all accessible roads in the area. The survey was tied to the Benue Valley Survey[5] which in turn was tied to the Europe–Africa calibration line gravity bases at Lagos and Fort Lamy[6]. The gravity data were reduced at the Gravity Division of the Dominion Observatory, Ottawa,