responsible for this anomaly. The intensity of radiation from (1) and (3) per unit frequency interval depends on space coordinates (r, z) and so it fluctuates spatially. A similar phenomenon is also obtained by the variation of a. The equation (2) signifies that by simply adjusting, a the output of radiation can be accelerated or retarded. Thus the conducting boundary acts as a promoter and plays an important role in the graduation of energy loss which is technically important for concentration of radiation.

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Preliminary results on the conductivity of air under a thunder cloud

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There is a considerable interest in the problem of electrical conductivity of air under a thunder cloud because the data available so far are very sketchy and conflicting (Chalmers 1967a). Preliminary results of an investigation of conductivity under a thunder cloud carried out on June 9, 1972 at the Gulmarg Research Observatory (ht 2700 metres m s.l , 34 1°N, 74 4°E) are presented here and the observations recorded seem to be interesting.

Polar conductivities (λ_+, λ_-) were measured at the height of one metre above the ground alternately by a Gerdien type of cylindrical condenser. The Gerdien chamber used was constructed having the same dimensions as the one described by Hatakeyama *et al* (1958) A number of improvements made and described by Gunn (1965) in his conductivity apparatus were also incorporated in the design of our Gerdien chamber, except those which were not considered very essential. as the instrument was originally designed to operate in dry weather conditions, The electrometer used was the one described by Vanderschmidt (1960) and was directly coupled to the Gerdien tube. The output of the electrometer was fed to an Esterline Angus Strip Chart Recorder. Complete details of the conductivity apparatus are to be given elsewhere. The instrument is in use at the Observatory for more than a year with satisfactory results.

Potential gradient was measured by using passive antenna system devised by Crozier (1963). The antenna used was a 20 metres aluminium wire (diameter, 1 mm) stretched parallel to the level ground at the height of one metre The details of the field installation of the antenna and its associated circuitry were kept the same as those described by Crozier (1963). This type of sensor being suitable for fair-weather had an operating range of −100 volts to +250 volts. Meteorological data were available from the meteorological station operating at the observatory

A thunder cloud started developing around 1230 hrs on the southern side and it gradually spread over the station Positive conductivity showed continuous downward trend from 1230 hrs onward. As the thunder cloud approached the station the positive conductivity decreased more rapidly and became zero when the cloud was overhead. During the period of two hours when the cloud was over the station (altitude: 1800 metres approx.) negative potential gradient was observed Occasional lightning flashes occuring within the cloud produced abnormal but momentary changes in conductivity The average negative conductivity during the above period was 1.9×10^{-14} mho/m which was higher than the normal value of about 1.4×10^{-14} mho/m usually observed during this period at Gulmarg With the slow receding of the cloud towards west the potential gradient which was greater than −100 V/m gradually reversed its polarity and became positive (>250 V/m) During the next 38 minutes the average positive and negative polar conductivities increased to values of 2.4×10^{-14} mho/m and 2.2×10^{-14} mho/m respectively and showed greater agitation. With the potential gradient attaining more or less normal fair-weather value around 1650 hrs (about 80 V/m for Gulmarg for this hour) the negative conductivity fell to a value of 0.7×10^{-14} mho/m The measurements were stopped around 1710 hrs because of drizzling The drizzle seemed to have brought down some positive charge to the ground The sign of the charge was ascertained from the actual conductivity record (not shown in figure 1). The wind speed throughout the whole period was between 2-4 m/sec and the wind which was coming from south in the begining corresponded to the direction of the movement of the thunder cloud The measurements were started again at 1930 hrs after the drizzle stooped and were continued till 2100 hrs. During this period the wind speed was between 6-7 m/sec and it kept on changing direction Figure 1 shows the variation of positive and negative conductivities for the period 1130 hrs–1707 hrs; 1930 hrs—2100 hrs and those of the potential gradient between 1937 hrs to 2100 hrs. The values plotted represent averages over each of 4-minute interval The values of potential gradient prior to 1937 hrs are also indicated whenever possible as no continuous record was

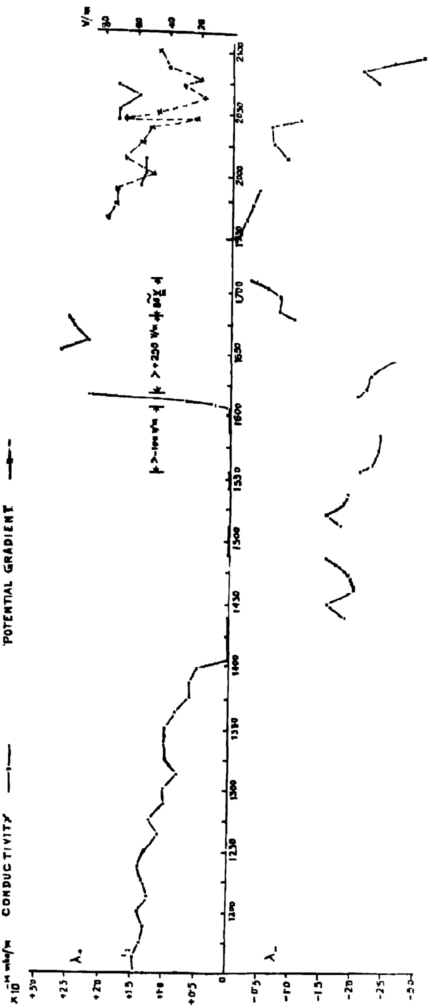

Figure 1. Variation of polar conductivities and potential gradient with local time

available. From the actual record of conductivities (using ion filter) one could easily conclude that when the positive conductivity was zero large positive ions were also absent. Therefore the complete disappearance of positive charge (near the ground) from the station would appear to be unusual and may not be easily understood in terms of the earlier work of Chalmers (1967b). The higher values of conductivity observed (between 1612 hrs and 1650 hrs) could be attributed partly to freshly injected negative ions from the lightning flashes and partly to the arrival of air masses from the cloud at the station., Further work in this direction is in progress

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Basic aluminum sulphate : An X-ray diffraction study

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Composition of basic aluminium sulphate varies depending on its mode of preparation. In literature and while going through the ASTM cards one comes across at least seventeen basic aluminium sulphates differing in their chemical compositions and structures.

In the present work basic aluminium sulphate was prepared in the following way. Mellonckrodt Analar solution (0.1M) of aluminium sulphate was refluxed in a round bottom flask at about 70°C for several hours (Milligan 1966). The resulting hydrolysed material was washed several times with distilled water to get the sample free from the associated anions The sample was dried at room temperature and the powder was placed in a capillary tube of low absorbing glass having wall thickness of 0.01mm and diameter 0 5mm. The X-ray powder

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