About the relationships between thunderstorm grouth and the intracloud turbulence characteristics

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I. INTRODUCTION

In the resent decades a lot investigations were done in order to increase understanding of thundercloud turbulence in relation to its grouth and to the precise forecasting in favor to the planning of safe flight operations in a stormy atmosphere. But it still presents some open questions about the The problem

II. PRESENTATION OF RESEARCH

The turbulence is basically a stream of air in irregular motion that normally cannot be seen and often occurs unexpectedly. It can be created by a number of different conditions. The most common encounter is flying in the vicinity of thunderstorm.

Turbulence is important because it mixes and churns the atmosphere and causes water vapour, other substances, as well as energy, to become distributed both vertically and horizontally. In the upper part of violent thunderstorms, vertical accelerations of about three g have been reported.

The close coupling between lightning activity and storm updrafts and ice content implies that increases in lightning activity should be observed prior to severe weather, as many events such as damaging winds, tornadoes and hail are direct by-products of extreme updrafts and ice production aloft. Lightning jumps associated with a variety of severe weather events were observed in Florida by Williams et al. [1999] and in Alabama Goodman, S. J. et al., 2003 (Figure 1).

In addition to increases in total lightning rate, MacGorman et al. [1991] have hypothesized that stronger updrafts will loft the main storm electric dipole to higher levels in a storm.

It allows to be proposed a method to calculated the radio noise from the motio of the "charged" domains, which to determine the level of turbulence.

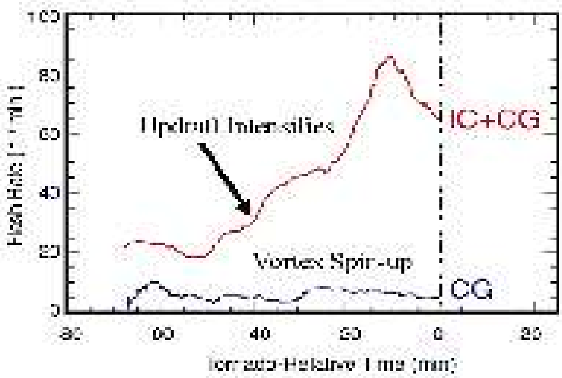

Fig. 1. Intracloud lightning dominates as the updraft intensifies, which in turn stretches vorticity and increases angular momentum

III. RESULTS AND CONCLUSIONS

Global atmospheric radio noise levels are calculated on the basis of global maps of thunderstorm activity derived from Ionosphere Sounding Satellite-b observations. Global distribution maps are presented for 2.5, 5.0, 10.0, and 20.0 Hz atmospheric radio noise frequencies, in Universal Time

Also the electromagnetic emissions are detected on the board of low orbiting satellites as a consequence of thunderstorm activity . The level of electromagnetic radio noises observed on satellite board strongly depends on properties of satellite environment and noises generated by payload system, as well as geophysical conditions.Most of these disturbances were observed at lower frequencies and only a few were correlated with the disturbances of HF electromagnetic emissions with a significant increase in emission intensity over some geographic areas.

Taking into account these differences and using a simple analytical model for temporal spectrum of the of the radio noise , depending from turbulence it could to be reproduced the order of magnitudes the temporal spectrum of the observed turbulence during the process ot the thunderstorm growth

In this, work it is shown that the approach could be a complementary tool to the radar-measured turbulence, classified into ranges of light, moderate, and severe turbulence. From a time history of radar echoes, it was found that the 30 dBZ echo detected at the -15 deg C temperature height is the best indicator of the beginning of CG lightning activity. The observed median lag time between this lightning initiation signature and the beginning of CG lightning flashes was 15.5 minutes. In particular, it is the best appropriate time interval for experimental measuring of the turbulence related radinoise.

IV. AKNOWLEDGMENTS

This work is devoted to the memory of Prof. Lev G.Katchurin .

V. REFERENCES

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