Relationship between variations of the atmospheric electric field in the southern polar region and thunderstorm activity

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High and dry regions with no thunderstorms, such as the Antarctic plateau, are ideal sites for monitoring the global geoelectric circuit. Additional solar influences on the geoelectric field occur at high latitudes, via the same processes that generate the aurora. In conjunction with Australian and American colleagues, we measure the geoelectric field at the Russian station, Vostok, on the Antarctic plateau. We have shown that solar variability can influence the geoelectric field measured at ground level in Polar Regions.
Comparative analysis of the near surface electric field variations at Vostok station (Antarctica) and the thunderstorm activity has been fulfilled for 10 days in April 1998. As a measure of thunderstorm activity we take VLF emission amplitude at 9.3 KHz, measured at Halley Bay (Antarctica) and intensity of the lightning flashes. No any good correlation is found between Ez, delta Ez and thunderstorm activity. The correlation between VLF and flashes is rather good. Conclusion is made, that steady conduction currents connected with the thunderstorm clouds, whereas flashes related to the explosive process, cannot provide essential effect in region far from the thunderstorm, generate the main geoelectric field. Estimations of the global flush effects at great distances, made for non-stationary model of the electric field in the atmosphere, showed that the flush input in Antarctica does not exceed 5 V/m. This effect of flushes registered in tropical zone turned out to be insignificant in comparison with the regular ionospheric electric fields in the polar region (about 20 – 30 V/m).