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Peculiarities of long-term trends of surface temperature in Antarctica and their possible connection with outer belt electron precipitation

A. Shirochkov and L. Makarova

Arctic and Antarctic Research Institute Saint-Petersburg, Russia

Deep geographic isolation of the Antarctic continent from the major global industrial zones provides excellent opportunity to reveal natural tendencies in the Earth's climate dynamics by analysis of meteorological observations data in the Antarctica. Both experimental and model explorations of long-term trends of surface temperature in various places in Antarctica indicate with definite certainty presence of a vast area of climate warming around the Antarctic peninsula which strongly contrasted with clearly expressed tendency to cooling in other parts of Antarctica. This area of climate warming is the most intensive one in the whole Southern hemisphere and it is comparable with similar climate warming places in the Northern hemisphere (Alaska and Eastern Siberia). This phenomenon attracts close attention of the world scientific community but its real origin remains to be insoluble so far. Among many factors, which could explain existence of area of climate warming in this region the scientists mention peculiarities of atmospheric circulation around the Antarctic peninsula, influence of the El Nino effect, dynamics of cloud formation in the area etc. However, none of these explanations could be considered as a complete solution of the problem.

In this report we attract attention to a fact that the global maximum of the outer belt energetic electron precipitation is localized in a narrow longitudinal belt centered in the Weddell Sea i.e. in the area of climate warming in the Southern hemisphere. It was shown by several explorers that energetic resources of this electron precipitation are sufficient to change temperature regime of the stratosphere and troposphere. Possible sequence of physical processes, which could contribute to appearance of permanent area of climate warming around the Antarctic peninsula are discussed in this report.