

CORONAS-F observation of atmospheric gamma rays: single event study

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Although the main task of SONG instrument on CORONAS-F was to observe solar hard X rays, gamma rays and neutrons, in specific cases it provides an opportunity to observe also gamma emission from the atmosphere. We discuss one such event. Solar energetic proton penetration to high latitudes from the solar flare on January 20, 2005 produced gammas by nuclear interactions with the residual atmosphere. After the flare, during a period with lower level of relativistic solar protons, a geomagnetic storm on January 21st occurred, when hard X/gamma-ray enhancements outside the stable trapping in wide L shell range were observed. These gamma rays are likely bremsstrahlung photons from relativistic electrons precipitating into the Earth's atmosphere. The SONG experiment aboard low altitude (~ 380 km in January 2005) polar orbiting CORONAS-F satellite provided high time resolution measurements (1 s in burst and 4 s in monitoring mode) in the energy bins between 30 keV and 200 MeV. By continuously remote sensing these gamma rays over a wide area from limb to limb beneath CORONAS-F, SONG provides a global monitor of atmospheric energy input. These observations can be complementary to the January 2005 MINIS balloon campaign measuring MeV precipitation during the same event [E. A. Bering et al., URSI GA2005, New Delhi, India]. Work is supported by grant VEGA 4064 and by RFBR N 05-02-17487.