

40th STUDENT CONFERENCE (E2)
Student Conference III (3)

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CORALCO: COSMIC RAYS - LIGHT, COMPACT & LOW-COST DEVICE FOR THE REAL-TIME
RADIATION ENVIRONMENT MEASUREMENT IN THE ATMOSPHERE AND STRATOSPHERE**Abstract**

We present the platform for the on-line Cosmic Ray measurement in the atmosphere and stratosphere, along with the results of our previous stratospheric balloon experiments already undertaken using the semiconductor pixel detectors of the Medipix family for energetic particle imaging. The original detecting device was the hybrid pixel detector Medipix-2 and Timepix developed at CERN with USB interface developed at Institute of Experimental and Applied Physics of Czech Technical University in Prague.

Terrestrial Cosmic Ray Flux (CR) is considered by the scientific community as a possible important agent influencing various atmospheric phenomena that range from Global Atmospheric Electric Circuit, dust concentrations, to cloud properties. Therefore, better experimental data on specific atmospheric fluxes along with particle types and energies present are an important input into various models. According to many scientists it will be very important to develop fully automatic, small, and light CR stations for regular ship and aircraft lines for continuous planetary surveys. Such an extended network of both stationary and moving CR stations will be much more effective also for problems related to space weather (e.g., forecasting of dangerous magnetic storms by analyzing galactic CR distribution and great radiation hazards from solar CRs). Therefore we argue that such a CR station could be readily available in our low-cost setup, providing all the required measurements. More advanced setup was flown twice on the stratospheric balloon platform, which is the optimal realization for in-situ measurements of atmospheric electricity. Not only because of the high altitudes reached, but also due to its slow ascent velocity for statistically relevant sampling of the ambient environment for improving cosmic ray induced ionisation rate model inputs. Our devices were flown on the BEXUS-7 (8th October 2008) and in modified setup on BEXUS-9 campaign from Swedish Space Corporations' ESRANGE north of the arctic circle.

Measurements on BEXUS-9 of about 4 hour duration by Timepix, Medipix-2 (equipped with the neutron converter) and ST-6 Geiger telescope instruments were recorded at the polar atmosphere till the ceiling altitude of 24km on 11th October 2009. The scientific goals were to check energetic particle type altitudinal dependencies, simultaneously testing proper detector calibration by detecting fluxes of ionizing radiation while evaluating instrumentation endurance and performance. The flight opportunity for the BEXUS student projects was provided by the Education office of the European Space Agency (ESA) and Eurolaunch - Collaboration of the Swedish National Space Board (SNSB) and the German Space Agency (DLR).