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The atmospheric muon flux in correlation with temperature variations in the low stratosphere (50-200mb).

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Abstract content

The dependence of the muon flux from the atmospheric parameters (pressure and temperature) is a well known effect since long time ago, that is usually corrected for in cosmic ray measurements. We have correlated at EAS-TOP (LNGS) the muon flux detected by the EMD detector (29 stations, 10m^2 each, $E_{\text{thr}} > 3\text{MeV}$) with the atmospheric temperature (10-1000mb levels) monitored by the radio-soundings of the Aeronautica Militare at Pratica di Mare (Rome). A significant effect has been observed when the muon flux is correlated with the atmospheric temperature in the region 50-200mb ($50\text{-}200\text{gr}/\text{cm}^2$), as expected, since this is the region where the mesons of first generation are produced. The effect becomes even larger ($K_T = -9.5 \pm 1.1 \times 10^{-4} \text{ K}^{-1}$) when the variations of the cosmic ray primary flux is taken into account (Neutron Monitor, Rome). Then, the technique has been used to monitor strong temperature variations in the low stratosphere through the muon flux in two periods, showing that the average temperature variations in the low stratosphere are reproduced with a $\sim 2\text{K}$ uncertainty. The main results of this analysis will be presented.

If this papers is presented for a collaboration, please specify the collaboration

EAS-TOP Collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 1 (SH), pages 713-716

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