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Cosmic Ray Induced Ionization in the Atmosphere: Full Modeling

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Abstract content

We present a physical model to calculate cosmic ray induced ionization in the atmosphere. The model is based on the Monte-Carlo CORSIKA tool, which simulates full development of an electromagnetic-muon-nucleonic cascade in the atmosphere, with the FLUKA package used for low energy interactions. The model is applicable to the entire atmosphere, from the ground up to the stratosphere. A comparison to fragmentary direct measurements of the ionization in the atmosphere confirms the validity of the model in the whole range of geographical latitudes and altitudes. We provide a detailed recipe to compute easily the cosmic ray induced ionization for given location, altitude and the spectrum of cosmic rays. This provides a new tool for a quantitative study of the space weather influence upon the Earth's environment. Some practical applications are discussed.

If this papers is presented for a collaboration, please specify the 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 705-708

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