30th International Cosmic Ray Conference

Contribution ID : **1222** Type : **Poster**

On a Plausible Relationship Between Cosmic Rays and the Ozone Hole Size

Friday, 6 July 2007 14:45 (0:00)

Abstract content

It is well known that anthropogenic activity can modify the Earth environment in a global scale. Several restrictions and policies may be adopted in order to attenuate the contamination effects and protect the environment. However, in order to design and evaluate the impact of these policies and restrictions in the human activity, it is important to identify if exists other sources that affects the global phenomena. The extraterrestrial sources are interesting, because we can not modify their intensity, we can only observe, and try to understand why, how and when these factors act over the Earth system.

In this work we are looking for an evidence of relationships between the Antarctic Ozone Hole Size (OHS) and the Solar Cycle (SC) periodicities, as well as with the Cosmic Rays (CR) fluxes. With this goal in mind we also analyze the Antarctic temperature anomalies, linked with the OHS, and their response to the SC and CR variations. By means of wavelet transformation based on the Morlet wavelet, it is found that (OHS) present a prominent periodicity frequency at ˜ 3.5 yrs. Then, applying the Wavelet Coherence analysis to two time-series, it is found: (1) there is a common signal along time (September-november) of ˜ 3.5 yrs. between (OHS) and Cosmic Ray (CR): from 1988 to 1990 with a coherence coefficient of 0.8 and from 1998 to 2002 with a coherence coefficient of 0.9. In both periods the relationship is of non-linear nature. (2) the coherence between the time series of (OHS) and Antarctic temperature (AT) is of linear nature (anticorrelation) with a coherence factor > 0.85 in the periods 1985- 1990 and 1998-2002. (3) the coherence between the time series of (RC) and (AT) at polar altitude of 10-30 Km is of non-linear nature between 1986-1990 and of linear nature in the period 1991-1996 with coherence within in the interval [0.65-0.7] in both cases. Between 1997-2002 there is a non-linear relation with s coherence in the interval [0.7-0.9]. (4) the coherence between (SC) and (AT) is of non-linear nature is in the range [0.7-0.85] in the period 1987-1992. Preliminary inferences seems to indicate that there is a relationship between the the Ozone Hole Size and Cosmic Rays.

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 789-792

Primary author(s) : Dr. ALVAREZ-MADRIGAL, MANUEL (IIE Department, Tecnológico de Monterrey, Campus Estado de México)

Co-author(s) : Dr. VELASCO HERRERA, VICTOR (INSTITUTO DE GEOFISICA, UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO); Prof. PEREZ-PERAZA, JORGE (INSTITUTO DE GEOFISICA, UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO)

Presenter(s) : Dr. ALVAREZ-MADRIGAL, MANUEL (IIE Department, Tecnológico de Monterrey, Campus Estado de México)

Session Classification : Posters 2 + Coffee

Track Classification : SH.3.6